# End Semester Examination, Dec. 2022 

# B. Tech. - Second Semester <br> APPLIED PHYSICS-II (PH-201A) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Bragg's equation is given by $2 d \sin \theta=n \lambda$. What is $n$ and $d$ in this equation?
b) What is a crystal lattice?
c) Why the conductivity of a semiconductor decreases with decreases in temperature?
d) Give one difference between hetro-epitaxy and homo-epitaxy.
e) How traps affect the conductivity of a sample?
f) Write the expressions of Curie law and Curie-Weiss law.
g) Write one application each of soft and hard magnetic materials.
h) Cooper pair is a pair of i) electronsii) protons iii) positrons or iv) neutrons. How Cooper pairs are formed?
i) What is superconductivity?
j) What do you understand by nanoscience?
$2 \times 10$

## PART-A

Q. 2 a) Discuss briefly the types of defects in crystals.Derive an expression for concentration of Frankle defects. 12
b) Give a briefly account of powder method for crystal structure analysis. A simple cubic crystal has atonicradius of $2.0 \AA$. Determine the spacing of planes having Miller indices as (222).

8
Q. 3 a) Derive an expression for Hall coefficient. The carrier concentration in $n$-type
semiconductor is $10^{21}$ per $\mathrm{m}^{3}$. Calculate the value of Hall coefficient. $\mathbf{1 0}$
b) Distinguish between Direct and indirect Band Gap Semiconductors. Also, give important properties of semiconductors.

10
Q. 4 a) Discuss the modified model to show the effect of traps on the photoconductivity.
b) Explain briefly principle, construction and working of a photovoltaic cell.

## PART-B

Q. 5 a) Discuss in brief the diamagnetic materials and derive an expression for magnetic dipole moment of an atom.
b) Plot the hysteresis curve for a magnetic material and explain the important features of the curve. Also, give one example each of hard and soft materials. 10
Q. 6 a) What are superconducting materials? Explain Meissner effect in semiconductors.
b) Derive the London equations. Give an account of BCS theory of superconductors.
Q. 7 a) What are carbon nanotubes? What are their different types? Describe any one method for the fabrication of carbon nanotubes.

10
b) What are nonmaterials? Discuss briefly their properties and applications.

10

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# B. Tech. - Second Semester <br> APPLIED PHYSICS-II (PH-201A) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions
from PART-A and TWO questions from PART-B. Each question carries equal
marks.
Q. 1 a) Draw sketches illustrating (111) and (100) planes in cubic unit cell.
b) Classify direct and indirect band gap semiconductors.
c) Write two physical properties of semiconductors.
d) How does the optical absorption affect the conductivity of the sample?
e) What are traps? Explain.
f) Write one application each of soft and hard magnetic materials.
g) What are high temperature superconductors? Give examples.
h) What are Cooper pairs?
i) What are Quantum dots?
j) Give two reasons why the properties of a materials change at nanoscale?

## PART-A

Q. 2 a) Derive an expression for interplanar spacing between two parallel planes in a
simple cubic crystal.
b) What are defects in crystals? Explain types of point defects. 6
c) Derive Bragg's law for X-ray diffraction. Why X-rays are used to detect crystal structure?

8
Q. 3 a) What is Hall effect? Derive an expression for Hall coefficient. $\mathbf{1 0}$
b) Discuss any two of the following process for crystal growth.

10
i) Czochralski method
ii) Molecular beam epitaxy
iii) Vapour phase epitaxy
Q. 4 a) What is photoconductivity? Discuss simple model of a photoconductor. 12
b) With the help of a suitable diagram, describe the construction and working of solar cell.

8

## PART-B

Q. 5 Distinguish among dia, para and ferromagnetic substances. Derive an expression for temperature dependence of paramagnetic susceptibility on the basis of Langevin's theory.
Q. 6 a) Explain super conductivity. Distinguish between type-I and type-II superconductors. 10
b) Derive London equations and discuss how its solution explains Meissner effect and flux penetration.
Q. 7 a) What are nanomaterials? Discuss the different approaches in building nanomaterials.

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# End Semester Examination, Dec. 2022 <br> B. Tech. - Second Semester <br> APPLIED PHYSICS-II (PH-201) 

Time: 3 hrs
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) What are Miller indices?
b) Write Bragg's law for x-ray diffraction.
c) Write the Clausius-Mossotti equation and explain the terms involved.
d) What is Larmor's precession frequency?
e) Define 'antiferromagnetism'.
f) What is superconductivity?
g) Name two high temperature superconductors.
h) Give one example each of direct and indirect band semiconductors.
i) What is a substrate?
j) Nanomaterials are mechanically stronger than bulk materials. Why?

## PART-A

Q. 2 a) What is hcp structure? Show that $c / a$ ratio for an ideal hcp structure is $\sqrt{8 / 3}$. 10
b) What do you mean by schottkey defects in solids? Derive an expression for concentration of schottky defects.

## 10

Q. 3 a) Derive an expression for Gauss' Law in presence of dielectric medium.

8
b) Explain the behaviour of dielectric in alternating electric field.

6
c) Establish Clausius-Mossotti relation for dielectrics.

## 6

Q. 4 a) Explain ferromagnetism with the help of domain theory.

8
b) Write a short note on soft and hard magnetic materials.

## 6

c) What are antiferromagnetic materials and ferromagnetic materials?

6

## PART-B

Q. 5 a) Differentiate between type-I and type-II superconductors.

## 8

b) Derive the London equations and discuss how its solution explains Meissner effect and flux penetration?
Q. 6 a) Differentiate between direct and indirect band gap semiconductors. 10
b) Compare the Bridgman method and the Czochralski method of crystal growth. 10
Q. 7 a) Discuss in detail the electrical and mechanical properties of nanomaterials. 8
b) What are carbon nanotubes? What are their different types? Describe any two methods for fabrication of carbon nanotubes?

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# End Semester Examination, Dec. 2022 <br> M. Sc. (Microbiology) - Third Semester <br> SYNTHETIC BIOLOGY (MS-MB-303) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) Differentiate between motif and domain.
b) Are gates and circuits same? Why do you think so?
c) Biobrick is DNA. Yes or NO.
d) What are oscillations in gene function?
e) Define 'vector'.
f) Draw symbols of promoter, terminator and RBS.
g) Mention the phenomenon of cell communication.
h) What is a pathway?
i) Expand iGEM.
j) Differentiate between 'circuit' and 'pathway'.

## PART-A

Q. 2 a) Enlist the different types of vectors. How do we decide on the type to be used for experimentation?
[CO-1] [L-1] 10
b) What is the significance of terminology in synthetic biology? What is achieved by the same?
[CO-1] [L-2] 10
Q. 3 Give a detailed patterns in development of an organism. How synthetic biology exploits that?
Q. 4 Cell communication is a highly evolved phenomenon. Give example of how does a cell uses that for its functions.
[CO-2] [L-2] 20

## PART-B

Q. 5 Explain the figure for what kind of gate it is. Draw truth table and justify output.

[CO-3] [L-4] 20
Q. 6 Explain negative and positive feedback loops with examples and applications in synthetic biology. Illustrate with diagrams.
[CO-4] [L-5] 20
Q. 7 Draw and explain a circuit for lac operon
[CO-4] [L-5] 20

# End Semester Examination, Dec. 2022 <br> M.Sc. - Third Semester <br> MICROBIAL PATHOGENICITY (MS-MB-302) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) List the types of virus on the basis of envelop proteins.
[CO-2] [L-1]
b) What are pathogenicity islands? [CO-1] [L-1]
c) Define 'Evasion mechanisms'. [CO-3] [L-1]
d) Illustrate the host immune response. [CO-2] [L-2]
e) Explain bacterial adherence mechanisms.
[CO-1] [L-1]
f) Write a short note on the antigenic variations.
g) List the public health concern disease of India.
h) Compare two mode of virus entry into the host.
i) Explain the invasion mechanisms.
j) Define Host-pathogen interactions.

## PART-A

Q. 2 Compare the different bacterial pathogenesis mechanisms which bacteria use to infect the host cell.
[CO-1] [L-5] 20
Q. 3 Describe the determinants of Virulence. Explain in detail.
[CO-2] [L-2] 20
Q. 4 Describe the different adherence mechanisms which bacteria use to interact with the host cells.
[CO-1] [L-4] 20

## PART-B

Q. 5 Explain various evasion host defense mechanisms of pathogens.
[CO-3] [L-5] 20
Q. 6 Describe the public health concern disease and their epidemiology. [CO-3] [L-2] 20
Q. 7 a) Illustrate the viral pathogenesis.
[CO-2] [L-2] 10
b) Discuss the host immune response.

# End Semester Examination, Dec. 2022 

# M. Sc. (Microbiology) - Third Semester <br> CLINICAL MICROBIOLOGY AND VACCINOLOGY (MS-MB-301) 

Time: 3 hrs
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Taking at least ONE question from each UNIT. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) State Louis Pasture contribution. [CO-1] [L-1]
b) How would you define an opportunistic microorganism or pathogen? A compromised host?
[CO-1] [L-5]
c) How gram-positive cell wall is different from gram negative cell wall?
[CO-1] [L-3]
d) Differentiate between mycelium and Hyphae.
[CO-1] [L-1]
e) Enlist the difference between toxin and toxoids.
[CO-2] [L-1]
f) Determine the characteristics of MRSA.
[CO-2] [L-3]
g) Enlist the ways by which bacteria become resistant to antibiotics.
[CO-2] [L-1]
h) Illustrate the precaution from the collection of patient's samples to the diagnostic lab.
[CO-5] [L-4]
i) Describe toxoid vaccine.
[CO-3] [L-2]
j) Summarize the safety factors concern that is associated with attenuated vaccine. Give an example of attenuated vaccine.
[CO-3] [L-5] 2x10

## UNIT-I

Q. 2 a) Discuss the names of skin microbiota and the importance of normal bacterial and fungal microbiota to host.
[CO-1] [L-2] 10
b) What are toxins? Compare exotoxins and endotoxin's structure and mode of action.
[CO-1] [L-5] 10
Q. 3 Discuss in detail about Prions. Describe its types and the disease caused by it.
[CO-1] [L-5] 20

## UNIT-II

Q. 4 a) Discuss the factors that influence the effectiveness of antimicrobial drugs.
[CO-2] [L-3] 10
b) Illustrate the mechanism of action and the therapeutic use of tetracycline.
[CO-2] [L-4] 10
Q. 5 Describe on the strategy for laboratory diagnosis for bacterial, fungal and viral infections.
[CO-2] [L-4] 20

## UNIT-III

Q. 6 Describe the following:
a) Whole organism Vaccine.
b) Attenuated Vaccine.
c) DNA vaccine.
d) Peptide vaccine.
[CO-3] [L-2] 5x4
Q. 7 Evaluate different strategies for designing of vaccine. Discuss the types of vaccine available for covid -19 virus.
[CO-3] [L-5] 20

## End Semester Examination, Dec. 2022

## M. Sc. (Microbiology) - Third Semester <br> CLINICAL MICROBIOLOGY AND VACCINOLOGY (MS-MB-301)

Time: 3 hrs
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Taking at least ONE question from each UNIT. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) State Louis Pasture contribution.
[CO-1] [L-1]
b) How would you define an opportunistic microorganism or pathogen? A compromised host?
[CO-1] [L-5]
c) How gram-positive cell wall is different from gram negative cell wall?
[CO-1] [L-3]
d) Differentiate between mycelium and Hyphae.
[CO-1] [L-1]
e) Enlist the difference between toxin and toxoids.
[CO-2] [L-1]
f) Determine the characteristics of MRSA.
[CO-2] [L-3]
g) Enlist the ways by which bacteria become resistant to antibiotics.
[CO-2] [L-1]
h) Illustrate the precaution from the collection of patient's samples to the diagnostic lab.
[CO-5] [L-4]
i) Describe toxoid vaccine.
[CO-3] [L-2]
j) Summarize the safety factors concern that is associated with attenuated vaccine. Give an example of attenuated vaccine.
[CO-3] [L-5] 2x10

## UNIT-I

Q. 2 a) Discuss the names of skin microbiota and the importance of normal bacterial and fungal microbiota to host.
[CO-1] [L-2] 10
b) What are toxins? Compare exotoxins and endotoxin's structure and mode of action.
[CO-1] [L-5] 10
Q. 3 Discuss in detail about Prions. Describe its types and the disease caused by it.
[CO-1] [L-5] 20

## UNIT-II

Q. 4 a) Discuss the factors that influence the effectiveness of antimicrobial drugs.
[CO-2] [L-3] 10
b) Illustrate the mechanism of action and the therapeutic use of tetracycline.
[CO-2] [L-4] 10
Q. 5 Describe on the strategy for laboratory diagnosis for bacterial, fungal and viral infections.
[CO-2] [L-4] 20

## UNIT-III

Q. 6 Describe the following:
a) Whole organism Vaccine.
b) Attenuated Vaccine.
c) DNA vaccine.
d) Peptide vaccine.
[CO-3] [L-2] 5x4
Q. 7 Evaluate different strategies for designing of vaccine. Discuss the types of vaccine available for covid -19 virus.

# End Semester Examination, Dec. 2022 <br> M.Sc. (Microbiology) - First Semester <br> CLINICAL BIOCHEMISTRY (MS-MB-101) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1

## Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question. <br> Q. 1 a) Describe the properties of water that account for its surface tension, viscosity, liquid state at ambient temperature and solvent power.

[CO-1] [L-2]
b) Maltose is a reducing sugar. Explain.
[CO-2] [L-3]
c) How does ATP hydrolysis help thermodynamically unfavourable reactions?
[CO-3] [L-3]
d) TCA cycle is known as the metabolic hub, why?
[CO-3] [L-2]
e) Nucleophilic attack by water typically results in the cleavage of the amide, glycoside,
or ester bonds that hold biopolymers together. This process is termed hydrolysis.
Given this property of water, how can synthesis of biopolymers occur in an aqueous
environment that favors hydrolysis?
[CO-1] [L-3]
f) Briefly describe the major types of reactions that take place in metabolic pathways.
[CO-3] [L-2]
g) List the roles of enzymes in metabolic pathways.
[CO-4] [L-1]
h) Each of the nine glycolytic intermediates between glucose and pyruvate are phosphorylated. State it's significance.
[CO-3] [L-2]
i) Explain the relationship between vitamins and coenzymes.
[CO-4] [L-3]
j) Briefly describe two disorders of lipid metabolism.
[CO-6] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 Determine the pH of the buffer solution when the buffer solution is made from 0.4 M $\mathrm{CH}_{3} \mathrm{COOH}$ and $0.6 \mathrm{M} \mathrm{CH}_{3} \mathrm{COO}^{-}$? The acid dissociation constant of $\mathrm{CH}_{3} \mathrm{COOH}$ is $1.8 \times 10^{-}$ 5.
[CO-5] [L-3] 20
Q. 3 You have antisera containing antibodies against your protein. Describe a method that you would use to purify IgG antibodies from your antisera sample.
[CO-2] [L-3] 20
Q. 4 Illustrate the mechanisms of action of various types of hormones.
[CO-2] [L-2] 20

## PART-B

Q. 5 Analyze the process of cellular respiration with the help of diagrams.
[CO-3] [L-4] 20
Q. 6 Explain the relationship between cofactors, coenzymes, co-substrates and prosthetic groups with the help of examples.
[CO-1] [L-3] 20
Q. 7 Ammonia is a highly toxic by-product of metabolism. Describe the mechanism by which it is produced and removed by humans.
[CO-6] [L-2] 20

# End Semester Examination, Dec. 2022 

M.Sc. (Biotechnology/Microbiology) - Third Semester

STEM CELL AND REGENERATIVE MEDICINE (MS-BT -324)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt any FIVE questions in all; Q. 1 is compulsory. Taking at least ONE question from each UNIT. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) Define stem cells and their properties.
[CO-1] [L-1]
b) Contrast between adult stem cell and totipotent stem cells.
[CO-2] [L-3]
c) Outline the role of transcriptional factors in the development of pleuripotent cells.
[CO-3] [L-4]
d) Illustrate the need of hypoxia in the stem cells niche.
[CO-2] [L-3]
e) Summarize the functions of stem cell banking.
[CO-5] [L-2]
f) Evaluate the conditions for the activation of notch signaling pathway.
[CO-4] [L-5]
g) Enlist the applications of stem cell therapy.
[CO-5] [L-5]
h) What are the advantages of the induced pluripotent stem cell over embryonic stem cell as regenerative therapy?
[CO-6] [L-1]
i) Discuss the requirements for the stem cell therapy for cardiac system repair.
[CO-6] [L-2]
j) Enlist different types of diabetes.
[CO-6] [L-1] 2x10

## UNIT-I

Q. 2 a) Illustrate the stem cell niche environment and its impact on cell differentiation.
[CO-1] [L-4] 10
b) State about the miRNA and explain its function in the stem cell differentiation.
[CO-1] [L-1] 10
Q. 3 a) Discuss the epigenetic regulation of chromatin which are important for pluripotency maintenance in ES cells.
[CO-1] [L-2] 10
b) Analyze the modes by which a cell can become specified for a particular fate.
[CO-2] [L-4] 10

## UNIT-II

Q. 4 a) Discuss about the cancer stem cells and determine how the JAK STAT pathway impact in the formation of cancer stem cells.
[CO-4] [L-3] 15
b) Compare between induced-stem-cells and embryonic-stem-cells.
[CO-5] [L-2] 5
Q. 5 How is the Hedgehog pathway activated? Illustrate the Hedgehog pathway in detail. Also, explain its function and the inhibitors of its pathway.
[CO-4] [L-3] 20

## UNIT-III

Q. 6 Explain in detail about the types of Diabetes and strategies for its treatment.
[CO-6] [L-3] 20
Q. 7 a) Evaluate different sources of stem cells and consideration factors the use of stem cells in the cardiac repair.
[CO-5] [L-5] 10
b) Discuss the IPR issues in the use of stem cell therapy as a regenerative medicine.

# End Semester Examination, Dec. 2022 <br> M.Sc. (Biotechnology and Microbiology) - Third Semester <br> GENOMICS AND PROTEOMICS (MS-BT-321) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 4
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Evolution has produced only a tiny fraction of the theoretical possibilities a fraction that nevertheless represents an astronomical number of different polypeptides. Comment.
[CO1] [L4]
b) Once the protein is out of its natural environment, it is exposed to many agents that can irreversibly damage it. Name at least one agent that poses a threat.[CO1] [L1]
c) Biological materials are routinely dissolved in buffer solutions effective in the pH range over which the materials are stable. What happens if you fail to do so?
[CO2] [L1]
d) Protein purification is normally carried out at temperatures near $0^{\circ} \mathrm{C}$. Why?
[CO2] [L1]
e) How can one inactivate the degradative enzymes that pose a threat to purified protein?
[CO2] [L1]
f) What are Coupled enzymatic reactions?
[CO2] [L1]
g) Differentiate between salting in and salting out.
[CO2] [L4]
h) Knowing something about the target protein (or the proteins it is to be separated from) simplifies the selection of fractionation procedures. Comment.
[CO3] [L4]
i) What is the principle of High Performance Liquid Chromatography?
[CO1] [L1]
j) Name any one frequently used anion exchanger and cation exchanger.
[CO1] [L1] $\mathbf{2 x 1 0}$

## PART-A

Q. 2 The figure below draws comparison of the decay of linkage disequilibrium (LD) on chromosome 1B between 59 and 72 cM in the whole populationand the five subpopulations of bread wheat. The plots show the degree of LD with black indicating hgh LD and white depicting low LD. Observe the data carefully and interpret the results. What is Linkage Disequilibrium? Why is the LDs of whole population vary from the LDs of sub-population? By observing the LD block can you comment on the closeness of some sub-populations? Which 2 subpopulation are most distinct? Are there haplotypes that were intact in one population and decayed in the other?[CO6] [L5] 20



Subpopulation 3


Subpopulation 4


Subpopulation 5
Q. 3 Protein component of healthy liver cell and cancerous liver cell was isolated. Prior to 2D electrophoresis, the healthy and cancerous protein samples are labeled with fluorescent cyanine dyes, separately. The healthy protein is labeled with Cyanine Cy3 (bright, orangefluorescent dye) and cancerous protein samples are labeled with Cy5 (green fluorescent). After the labeling, the two samples are mixed and run using a 2D gel electrophoresis. When the results are compared a number of spots (encircled/ensquaqred/entriangled) show orange fluorescent (encircled) while the others show green fluorescent (ensquared). But a certain number of spots show yellow fluorescence (entriangled). Observe the data carefully and interpret the results. What is the principle of the 2D electrophoresis? What conclusions do you draw from the spot that show yellow colour (entriangled) and how do they differ from the spot that show single unique color [either orange (encircled) or green (ensquared)]? Which encircled/ ensquared/entriangled spot corresponds to protein with highest pI?[CO5] [L6]

Q. 4 The figure below shows the Ramachandran Plots of protein $X$ for general (all amino acids), amino acid 1 and 2 .Observe the data carefully and interpret the results. What is the significance of Ramachandran Plots? What do the light and dark grey areas signify? In the general Ramachandran plot, which of the two amino acids lie outside the area depicting favored torsional angle conformations? While drawing comparisons between the Ramachandran plots for amino acid 1 and 2, which amino acid appear rigid or less flexible? Which of the amino acid is most flexible according to the data provided? Name one most flexible amino acid and one most rigid amino acid? Why do you think that the most flexible amino acid is the "most flexible" or has maximum number of allowed conformations?
[CO4] [L5] 20


PART-B
Q. 5 The data below shows the global survey of organ and organelle protein expression levels. On the left, the grey-scale heatmap depicts protein levels as indicated by spectral counts from mass spectrometry. Gene Ontology classification is performed to categorize the proteins into different functional classes. At the top of the heatmap, labels depict the different types of cell types and the bottom labels depict the organelles. Observe the data carefully and interpret the results. What is proteomics? Can Mass spectrometry be used to study total proteome of a cell? Do the protein levels always correlate with their respective mRNA levels? What type of proteins are significantly the enriched in brain, heart, kidney, liver, lung and placental cells? Which organelle of these cell types have significantly enriched/high levels of proteins?

Q. 6 The data in the two figures (a) and (b) show the distribution of CNEs in the C. elegans genome. Please go through the data provided and answer the questions:


a) Interpret the data shown in figure (a)
b) Interpret the data shown in figure (b)
c) Which chromosome show maximum number of CNEs?
d) Is there any correlation between chromosome size and number of CNEs?
e) Is there a correlation between the number of genes and their associated CNEs?
f) Which chromosome shows maximum number of genes but still less number of CNEs associated with it?
Q. 7 Write detailed notes on (any two) topics support your write-up with diagrams wherever necessary:
a) Salient Features of Human Genome.
b) Genome Wide Association Studies.
c) Calculating Linkage Disequilibrium.
d) Out of Africa Hypothesis.
[CO5] [L5] 10x2

## End Semester Examination, Dec. 2022

## M. Sc. (Biotechnology) - Third Semester <br> FOOD AND ENZYME BIOTECHNOLOGY (MS-BT-303)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) List two methods of detecting food-born microorganisms.
[CO-1] [L-1]
b) What are artificial enzymes? [CO-4] [L-1]
c) Draw Lineweaver Burk Plot.
d) Describe the lock and key mechanism of enzyme actions. [CO-3] [L-1]
e) Name any two microbes production amylase. [CO-3] [L-3]
f) Write a short note on the utilization of food waste for the production of valuables.
[CO-5] [L-5]
g) List four factors affecting food spoilage.
h) What are nutraceuticals? Give examples of any four nutraceuticals.
i) Describe the physical and chemical properties of enzymes.
j) Define feedback inhibition of enzyme activity.

## PART-A

Q. 2 Explain food spoilage. Describe various types of food spoilage.
[CO-4] [L-2] 20
Q. 3 What is food preservation? Describe various methods of food preservation.
[CO-3] [L-2] 20
Q. 4 Write a detailed note about fermented food products.
[CO-3] [L-4] 20

## PART-B

Q. 5 Explain various classes of enzymes.
[CO-1] [L-2] 20
Q. 6 Describe the various application of catalase, oxidase, amylase and protease in food industry.
[CO-4] [L-2] 20
Q. 7 a) Illustrate the application of enzymes in the production of glucose syrup and maltose syrup.
[CO-6] [L-2] 10
b) Discuss the use of enzymes in cellulose and starch hydrolysis.
[CO-4] [L-6] 10

# End Semester Examination, Dec. 2022 <br> M.Sc. - Third Semester <br> ENVIRONMENT BIOTECHNOLOGY (MS-BT-302) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) Differentiate between coagulation and flocculation.
[CO-2] [L-3]
b) What does IUCN Red List stand for? [CO-2] [L-1]
c) Define Lagoons and analyze their role in waste water treatment. [CO-2] [L-1]
d) Explain the concept of bioavailability of heavy metals. [CO-2] [L-1]
e) What is Oilzapper Technology? [CO-2] [L-1]
f) What are the risks associated with genetically modified organisms (GMOs)?
[CO-2] [L-1]
g) Enlist various problems arising from overexploitation of natural resources.
[CO-2] [L-1]
h) What do you mean by environmental site assessment?
i) Discuss the threats to biodiversity.
j) Classify the indicators of sustainable development.

## PART-A

Q. 2 a) What are the main water quality parameters? Why is it important to test water quality?
[CO-1] [L-2] 15
b) Describe the process and operation of a trickling filter bioreactor.
[CO-3] [L-1] 5
Q. 3 What are bioreactors? Describe the different methods used for tertiary waste water treatment.
[CO-2] [L-1] 20
Q. 4 a) Explain the possible mechanisms of metal-microbe interactions. [CO-4] [L-2] 10
b) Summarize the various toxic influences of metals on microbial cell.
[CO-4] [L-2] 10

## PART-B

Q. 5 a) Describe the concepts and principles of bioremediation using microbes. Discuss its constraints.
[CO-3] [L-3] 10
b) Explain the in situ technologies for Bioremediation.
[CO-5] [L-2] 10
Q. 6 a) What are hyperaccumulators? Discuss their role in Phytoremediation.
[CO-5] [L-1] 10
b) What are protected areas? Differentiate between in situ and ex situ conservation of Biodiversity.
[CO-4] [L-2] 10
Q. 7 a) How biopiracy is different from bioprospecting? Explain with suitable examples.
[CO-5] [L-3] 10
b) Compare the different models of sustainable development.
[CO-6] [L-4] 10

# End Semester Examination, Dec. 2022 <br> M.Sc. (Biotechnology) and M. Sc (Microbiology) - Third Semester <br> PLANT BIOTECHNOLOGY (MS-BT-301) 

Time: 3 hrs.
Max Marks: 100

No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Taking at least ONE question from each UNIT. Marks are indicated against each question.
Q. 1 Answer briefly.
a) How is shoot bud different from embryo?
b) Identify rooting hormone and callusing hormone.
c) What is meant by 'embryo rescue?
d) Enlist the uses of cybrids.
e) How do variations emerge in clonal propagation?
f) Identify the role of opine metabolism genes in Agrobacterium.
g) What are viral vectors?
h) Distinguish between normal roots and hairy roots in plants.
i) Mention the unique feature of Flavr-Savr tomato.
j) What are the advantages and disadvantages of Bt Cotton?
[CO-1] [L-1] $\mathbf{2 x 1 0}$

UNIT-I
Q. 2 a) Summarize the method of protoplast isolation from plant tissue. [CO-1] [L-4] 10
b) Evaluate the factors affecting embryo culture.
[CO-1] [L-5] 10
Q. 3 a) Elaborate the process of in-vitro selection of hybrids.
[CO-2] [L-3] 10
b) Design a suitable process for plant germplasm conservation.
[CO-2] [L-6] 10

## UNIT-II

Q. 4 a) Demonstrate the structure of Ti plasmid of Agro bacterium tumefaciens.
[CO-3] [L-2] 10
b) Illustrate the composition of binary vectors.
[CO-3] [L-4] 10
Q. 5 Analyze various methods of plant transformation employing direct gene transfer.
[CO-4] [L-6] 20

## UNIT-III

Q. 6 Discuss transgenic strategies to introduce in plants-
a) Insect resistance.
b) Herbicide resistance.
[CO-5] [L-6] 10x2
Q. 7 Give an evaluative account of molecular markers as potential tools in the detection of genetic variations in plants.
[CO-6] [L-5] 20

## End Semester Examination, Dec. 2022

## M. Sc. - Second Semester <br> BIOPROCESS TECHNOLOGY (MS-BT-202)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Define 'bioprocess technology'.
b) List the raw materials used as nitrogen sources in fermentation.
c) Define unit operations in upstream processing.
d) What are the physical methods of cell lysis?
e) What are secondary metabolites?
f) How does sterilization affect the nutritive quality of the medium?
g) Define contact inhibition.
h) What is fed-batch fermentation?
i) What are metabolic regulators?
j) How is culture preserved?

## PART-A

Q. 2 Classify various types of bioreactors and explain microbial growth kinetics in a batch fermenter.
[CO-2] [L-2] 20
Q. 3 Sterilization is an essential process in fermentation. Give reasons for types employed, factors affecting and the limitations of sterilization.
[CO-3] [L-2] 20
Q. 4 Insulin is a protein of high therapeutic value. Explain the industrial production of human insulin.
[CO-4] [L-2] 20

## PART-B

Q. 5 Define the components required in microbial medium formulation and give reasons for their requirement.
[CO-2] [L-3] 20
Q. 6 Compare suspension and immobilized cells in culture. Explain the bioreactors which can be employed for suspension cell culture.
[CO-5] [L-2] 20
Q. 7 You were given a task to purify recombinant protein $X$ expressed in yeast. Apply your knowledge of the course and discuss methods employed in downstream processing.
[CO-4] [L-3] 20

# End Semester Examination, Dec. 2022 <br> M.Sc. - First Semester <br> BIOSTATISTICS (MS-BT-105) 

Time: 3 hrs
Max Marks: 100
No. of pages: 3
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Differentiate between qualitative and quantitative variable.
[CO1] [L2]
b) Why do we study a population via sampling?
[CO4] [L2]
c) What is the difference between statistic and parameter?
[CO1] [L2]
d) Mention two properties of mean.
[CO1] [L2]
e) Calculate the mode for the following number of observation:
[CO1] [L4]
$2,7,3,8,4,6,5,8,3,9,4,8,7,5,6,4,7,4,5,6,4,7,3,9,2,8,3,6,7,4,6,5$
f) Which population in the figure below has maximum range? Calculate the range for the two populations?

g) Two samples from human male population yield the following data:

|  | Sample 1 | Sample 2 |
| :--- | ---: | :--- |
| Age | 25 years | 11 years |
| Mean weight | 145 pounds | 80 pounds |
| Standard deviation | 10 pounds | 10 pounds |

Calculate the coefficient of variation for the above two samples? Which of the samples are more variable?
[CO1] [L5]
h) For the following observations calculate the 1st quartile and the 3rd quartile:

Sample $=\{13,10,15,27,45,6,78,100,36,66,75\}$ [CO1] [L4]
i) What is skewness?
j) For mutually exclusive outcomes, the sum of probability is $\qquad$ ?
[CO2] [L2]2×10

## PART-A

Q. 2 For the following set of observations, calculate the mean, median, mode and range.

| 35 | 32 | 21 | 43 | 39 | 60 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| 36 | 12 | 54 | 45 | 37 | 53 |
| 45 | 23 | 64 | 10 | 34 | 22 |
| 36 | 45 | 55 | 44 | 55 | 46 |
| 22 | 38 | 35 | 56 | 45 | 57 |

[CO2] [L4] 20
Q. 3 For the following set of observations, calculate the 1st, 2nd and 3rd quartile along with the inter quartile range

| 25 | 25 | 26 | 27 | 29 | 29 | 29 | 30 | 30 | 31 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 32 | 32 | 32 | 33 | 33 | 33 | 33 | 34 | 34 | 34 |
| 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 36 |
| 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 37 | 37 |

$$
\text { [CO3] [L5] } 20
$$

Q. 4 The following are the cystatin C levels ( $\mathrm{mg} / \mathrm{L}$ ) for the patients. Cystatin C is a cationic basic protein that was investigated for its relationship to GFR levels. Inaddition, creatinine levels are also given. Calculate the coefficient of variation comparing the variability of Cystatin C and Creatinine. Which according to you is more variable?

| Cystatin C | $(\mathrm{mg} / \mathrm{L})$ |  | Creatinime (mmol/L) |
| :--- | :--- | :--- | :--- |
| 1.78 | 4.09 | 0.35 | 0.14 |
| 2.16 | 3.78 | 0.30 | 0.11 |
| 1.82 | 2.24 | 0.20 | 0.09 |
| 1.86 | 4.93 | 0.17 | 0.12 |
| 1.75 | 2.71 | 0.15 | 0.07 |
| 1.83 | 1.76 | 0.13 | 0.12 |
| 2.49 | 2.62 | 0.14 | 0.11 |
| 1.69 | 2.61 | 0.12 | 0.07 |
| 1.85 | 3.65 | 0.24 | 0.10 |
| 1.76 | 2.36 | 0.16 | 0.13 |
| 1.25 | 3.25 | 0.17 | 0.09 |
| 1.50 | 2.01 | 0.11 | 0.12 |
| 2.06 | 2.51 | 0.12 | 0.06 |
| 2.34 |  |  |  |

## PART-B

Q. 5 The following table shows 1000 nursing school applicants classified according to scores made on a college entrance examination and the quality of the high school from which they graduated, as rated by a group of educators:

|  | Quality of High Schools |  |  |  |
| :--- | :---: | :---: | :---: | :---: |
|  | Poor | Average | Superior |  |
| Score | $(P)$ | $(A)$ | $(S)$ | Total |
| Low (L) | 105 | 60 | 55 | 220 |
| Medium $(M)$ | 70 | 175 | 145 | 390 |
| High $(H)$ | 25 | 65 | 300 | 390 |
| Total | 200 | 300 | 500 | 1000 |

Calculate the probability that an applicant picked at random from this group:
i) Made a low score on the examination.
ii) Graduated from a superior high school.
iii) Made a low score on the examination and graduated from a superior high school.
iv) Made a low score on the examination given that he or she graduated from a superior high school.
v) Made a high score or graduated from a superior high school.
[CO4] [L6] 20
Q. 6 A medical research team wished to evaluate a proposed screening test for Alzheimer's disease. The test was given to a random sample of 450 patients with Alzheimer's disease and an independent random sample of 500 patients without symptoms of the disease. The two samples were drawn from populations of subjects who were 65 years of age or older. The results are as follows:

|  | Alzheimer's Diagnosis? |  |  |
| :--- | :---: | :---: | :---: |
| Test Result | Yes $(\boldsymbol{D})$ | No $(\bar{D})$ | Total |
| Positive $(T)$ | 436 | 5 | 441 |
| Negative $(\bar{T})$ | 14 | 495 | 509 |
| Total | 450 | 500 | 950 |

Calculate the sensitivity, specificity, predictive value positive and predictive value negative.
[CO4] [L5] 20
Q. 7 For the data give below construct a cumulative frequency distribution table, the probability distribution table and cumulative probability distribution table.

| 0 | 144 |
| :--- | :--- |
| 1 | 342 |
| 2 | 142 |
| 3 | 72 |
| 4 | 39 |
| 5 | 20 |
| 8 | 6 |
| 7 | 9 |
| 3 | 2 |
| 9 | 1 |


| Number of Substances Used | Frequency |
| :---: | :---: |
| 0 | 144 |
| 1 | 342 |
| 2 | 142 |
| 3 | 72 |
| 4 | 39 |
| 5 | 20 |
| 6 | 6 |
| 7 | 9 |
| 8 | 2 |
| 9 | 1 |

# End Semester Examination, Dec. 2022 

## M. Sc. - First Semester <br> BIOANALYTICAL TECHNIQUES (MS-BT-104)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt at least ONE question from each UNIT. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Distinguish between 'magnification' and 'resolution' in microscopy.
b) What are fluorophores, give two examples?
c) Identify the role of thermionic electron gun in an electron microscope.
d) Define 'isopycnic point'.
e) What is the basis of separation in partition chromatography?
f) Differentiate between normal phase and reverse phase chromatography.
g) Criticize the use of ethidium bromide in gel electrophoresis.
h) Identify the use of Infra-red in characterization of compounds?
i) What is meant by 'absorption spectrum' of a compound?
j) Mention any two units of radioactivity measurement.

## UNIT-I

Q. 2 a) Compare light microscopy and phase contrast microscopy techniques.
[CO1][L4] 10
b) Illustrate the magnification of an object in a transmission electron microscope through ray diagram.
[CO-1] [L-3] 10
Q. 3 a) Calculate RCF for the particle under centrifugation at $10,000 \mathrm{rpm}$ and the radial distance 5.0 cm .
[CO-2] [L-3] 10
b) Evaluate the factors affecting sedimentation rate of the particle under centrifugation.
[CO-3] [L-5] 10

## UNIT-II

Q. 4 a) Explain the principle and method of Thin layer chromatography and mention the ways for detection of spots in the chromatogram.
[CO-3][L-2] 10
b) Illustrate the technique of high performance liquid chromatography. [CO-3][L-3] 10
Q. 5 a) Develop an electrophoretic technique to separate nucleic acids.
[CO-6] [L-6] 10
b) Describe briefly the technique of Isoelectric Focusing.
[CO-5] [L-2] 10

## UNIT-III

Q. 6 a) Describe the instrumentation of a double beam UV-VIS spectrophotometer.
[CO-4] [L-2] 10
b) Examine the application of UV-VIS spectroscopy in quantification of compounds.
[CO-4] [L-4] 10
Q. 7 a) Elaborate the method of radioactivity measurement using Geiger Muller method.
[CO-6] [L-3] 10
b) Assess the hazards posed by radioisotope toxicity and discuss radioactive waste management.
[CO-5] [L-5] 10

# End Semester Examination, Dec. 2022 

M.Sc. Biotechnology - First Semester

BIOMOLECULES (MS-BT-103)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) Describe the condition under which a buffer is most effective. [CO-1] [L-2]
b) State the second law of thermodynamics. [CO-3] [L-2]
c) Provide the reason due to which a peptide bond acquires its partial double-bond character.
[CO-1] [L-2]
d) Lactose is a reducing sugar whereas, sucrose is non-reducing. Explain. [CO2][L3]
e) List the functional groups of the four organic biomolecules, carbohydrates, lipids, proteins, and nucleic acids.
[CO-2] [L-2]
f) Why are certain heavy metals such as $\mathrm{Cd}^{2+}$ and $\mathrm{Hg}^{2+}$ toxic?
[CO-4] [L-1]
g) List the major types of reactions that take place in metabolic pathways. [CO3][L1]
h) Briefly describe the seven classes of enzymes.
[CO-4] [L-1]
i) Summarize the significance of glycolysis.
[CO-5] [L-2]
j) Describe the reactions involved in the release of amino acids amino group as ammonia.
[CO-6] [L-2]

## PART-A

Q. 2 Compare the structural features of the three polymers of glucose, cellulose, glycogen and starch.
[CO-2] [L-2] 20
Q. 3 Describe a method that you would choose to determine molecular weight of your purified protein.
[CO-2] [L-3] 20
Q. 4 Provide a sketch for the mechanism of action of protein and steroid hormones.
[CO-3] [L-3] 20

## PART-B

Q. 5 Analyze the relationship between cofactors, coenzymes, co-substrates and prosthetic groups with the help of examples.
[CO-4] [L-4] 20
Q. 6 Illustrate the process of cellular respiration with the help of diagrams. [CO-6] [L-4] 20
Q. 7 Explain in detail the biosynthesis of purine and pyrimidine nucleotides. [CO-3] [L-3] 20

# End Semester Examination, Dec. 2022 

M. Sc. (BT\&MB) - First Semester

MICROBIAL PHYSIOLOGY AND GENETICS (MS-BT-102)
Time: 3 hrs.
Max Marks: 100

No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Name the scientist who developed petriplate and discuss its importance.
b) What do you mean by type strain?
c) Define 'inclusion bodies'.
d) Name the two culture collection centers.
e) Describe classical characterization methods used in identification.
f) Discuss genetic make-up of Viruses.
g) Compare gram-negative and gram-positive bacteria.
h) Describe antibiotics with an example.
i) What do you mean by synchronous growth?
j) Discuss different methods of sterilization.

## PART-A

Q. 2 Who is known as "Father of Bacteriology"? Explain his major inventions and achievements in the same.
[CO-1] [L-2] 20
Q. 3 Explain how bacteria are placed in manual of systematic bacteriology?
[CO-4] [L-5] 20
Q. 4 a) Determine how pure cultures can be obtained from soil samples? Discuss different types.
[CO-2] [L-4] 10
b) Discuss the genetic characteristics that are used in annotation of phylogenetic relationship between bacteria.
[CO-2] [L-3] 10

## PART-B

Q. 5 Classify general characteristics of Archae. How archea survives in extreme habitats?
[CO-3] [L-4] 20
Q. 6 Explain the growth curve of bacteria and discuss the factor affecting microbial growth.
[CO-3] [L-4] 20
Q. 7 a) What are endospores? Discuss its major role.
[CO-5] [L-1] 10
b) Illustrate the role of Penicillin.
[CO-6] [L-3] 10

# End Semester Examination, Dec. 2022 <br> M. Sc. - First Semester <br> CELL AND MOLECULAR BIOLOGY (MS-BT-101) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) What are importins and exportins?
b) List the cytoskeletal elements.
c) What is the role of telomerase in replication?
d) What are the functions of DNA polymerase I?
e) What is tRNA charging?
f) How do you experimentally identify exons in mature RNA?
g) What is a YAC?
h) Can the terms DNA and chromatin be used interchangeably? Justify.
i) List various post translational modifications.
j) What is the composition of plasma membrane? $2 \times 10$

## PART-A

Q. 2 Explain the structure and function of membrane bound organelles in a eukaryotic cell. [CO-2] [L-2] 20
Q. 3 Illustrate various types of cellular receptors, which aid in cellular communication. Explain any one with example.
[CO-3] [L-2] 20
Q. 4 Explain the semiconservative DNA replication in eukaryotes with a schematic. Give reasons how the fidelity of the double helix is maintained.
[CO-4] [L-2] 20

## PART-B

Q. 5 Explain homologous recombination and non-homologous end joining mechanisms of DNA repair.
[CO-2] [L-2] 20
Q. 6 Make use of your understanding of the course and explain the journey of a nascent transcript after the dissociation from RNAP to the initiation of translation in eukaryotes, with illustration.
[CO-5] [L-3] 20
Q. 7 Phenotype is the outcome of the gene and environment effect. Analyze gene expression pathway and discuss possible stages of gene regulation. [CO-4] [L-3] 20

# End Semester Examination, Dec. 2022 

# M. Tech. - First Semester <br> SUPPLY CHAIN MANAGEMENT (MME-132) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TwO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Memorize the concept of multi location sourcing and its importance in supply chain effectiveness.
[CO-2; L-1]
b) Investigate the distribution channel role in supply chain and point out the factors that can help in managing the risks associated to the transportation of goods.
[CO-3; L-6]
c) Demonstrate the incorporation of uncertainty while designing the network in supply chain.
[CO-2; L-3]
d) List the various methods used for forecasting. Also, explore the importance of forecasting in designing the supply chain.
[CO-1; L-1]
e) Demonstrate the importance of supply chain in achieving and maintaining strategic fit in emerging retail markets.
[CO-6; L-3] $4 \times 5$

## PART-A

Q. 2 Appraise the importance of inventory in supply chain and its types in brief.
[CO-4,5; L-5] 20
Q. 3 Discuss the role and importance of collaboration and coordination through the supply chain and also examine and detail their role in dealing with unwanted situations.
[CO-1,6; L-2] 20
Q. 4 Enumerate the important factors to be kept in consideration while designing a supply chain.

## PART-B

Q. 5 Investigate the role and importance of advancement of information technology in managing the supply chain effectively.
[CO-3,6; L-6] 20
Q. 6 Examine the role of transportation's important driver for managing the supply chain. Also, list the various types of transportations used and their performance measures.
Q. 7 Appraise the concept of green supply chain management. Also, point the factors that can affect the GSCM design and operational part effectively.
[CO-1,5; L-5] 20

# End Semester Examination, Dec. 2022 

M. Tech. (Industrial Engineering) - First Semester

MANAGEMENT CONCEPT AND ORGANIZATION BEHAVIOUR (MME-
121)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) Differentiate between formal and informal groups.
[CO-1] [L-1]
b) What are the enablers for creativity? [CO-2] [L-2]
c) Define 'conflict management'.
d) Discuss 'innovation'. [CO-1] [L-2]
e) Discuss 'sound plan'. [CO-5] [L-3]
f) Define 'perception'.
g) Compare the management of American, Japanese and Indian.
h) Discuss 'decision tree'.
i) What are the major principles of organization?
[CO-6] [L-4]
j) Briefly discuss nature and scope of management.
[CO-5] [L-5] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 Discuss the role of various great managers like F.W. Taylor, Gilberth, H.R. Gantt, Henry Fayol in evolution of management concept.
[CO-1,2] [L-2] 20
Q. 3 State the decision making environment involving certainty, risk, uncertainty, decision making with utilities.
[CO-1,3] [L-3] 20
Q. 4 What do you understand by organizational design and its impact of technology on
organizational design?
$[C O-2,3][\mathrm{L}-4] 20$

## PART-B

Q. 5 Define work motivation and its barriers and effectiveness and explain in detail.
[CO-3,4] [L-2] 20
Q. 6 a) Discuss the influencing factors and leadership concepts.
[CO-3,5] [L-4] 10
b) Interpret: conflict management.
[CO-3,5] [L, 3$] 10$
Q. 7 a) Discuss factors that favor incremental innovation.
[CO-1,6] [L-2] 10
b) Define and differentiate between creativity and innovation.
[CO-1,6] [L-3] 10

## End Semester Examination, Dec. 2022

## M. Tech. - First Semester

## INDUSTRIAL STATISTICS AND FORECASTING (MME-102)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) What is the concept of skewness?
b) Differentiate between Bowley's measure and Kelly's Measure of skewness.
c) What do you mean by Sampling?
d) What is the major purpose of hypothesis testing?
e) State the application of analysis of variance.
f) What do you understand by correlation analysis?
g) What is the need for analysis of time series?
h) What is a seasonality forecast?
i) What is meant by modelling cycle?
j) Distinguish between Auto regressive (AR) model and Auto regressive moving average (ARMA) model.

## PART-A

Q. 2 Calculate Bowley's coefficient of skewness based on quartiles and median from the following data:

| Variable: | $0-10$ | $10-20$ | $20-30$ | $30-40$ | $40-50$ | $50-60$ | $60-70$ | $70-80$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Frequency: | 12 | 16 | 26 | 38 | 22 | 15 | 7 | 4 |

Q. 3 Based on information on 1000 randomly selected fields about the tenancy status of the cultivators of these fields and use of fertilizers, collected in an agro-economic survey, the following classification was noted:

|  | Owned | Rented | Total |
| :---: | :---: | :---: | :---: |
| Using fertilizers <br> Not using <br> fertilizers | 416 | 184 | 600 |
| Total | 64 | 336 | 400 |
|  | 480 | 520 | 1000 |

Would you conclude that owner cultivators are more inclined towards the use of fertilizers at $5 \%$ level? Carry out Chi-square test as per testing procedure. ( $5 \%$ value of $X^{2}$ for one degree of freedom=3.84).
Q. 4 Two random samples were drawn from two normal populations and their values are:

| Sample A: | 66 | 67 | 75 | 76 | 82 | 84 | 88 | 90 | 92 |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Sample B: | 64 | 66 | 74 | 78 | 82 | 85 | 87 | 92 | 93 | 95 | 97 |

Test whether the two populations have the same variance at the $5 \%$ level of significance. ( $\mathrm{F}=3.36$ at $5 \%$ level for $\mathrm{v} 1=10$ and $\mathrm{v} 2=8$ )

## PART-B

Q. 5 Explain briefly the various methods of determining trend in a time series. Explain the merits and demerits of each method.
Q. 6 Describe the term 'Forecasting'. Explain various types of forecasting in detail.
Q. 7 Write short notes on:
a) Moving average (MA) model.
b) Chain rule of forecasting.

# End Semester Examination, Dec. 2022 

## M. Tech. - First Semester <br> WORK STUDY AND ERGONOMICS (MME-101)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) What do you understand by work study? What is its application in manufacturing industry?
[CO-1] [L-1]
b) Explain various recording techniques used in work measurement.
[CO-1] [L-1]
c) What is a two hand process chart? Why is it used?
[CO-1] [L-1]
d) How productivity of a worker can be increased in a production plant? Suggest suitable ways with reference to work study and ergonomics.
[CO-1] [L-1]
e) Give one example of process flow chart (material type).
[CO-1] [L-1] $\mathbf{4 \times 5}$

## PART-A

Q. 2 Discuss in detail the basic principle of work study and motion economy with applications.
[L-1][CO-1] 20
Q. 3 Discuss the objective and function of string diagram. Explain with suitable example.
[L-3][CO-2] 20
Q. 4 "Various symbols are used in production to indicate storage, delay, transport, inspection etc. for smooth operations". Examine the statement and discuss in detail about each such symbol.
[L-2], [CO-1] 20

## PART-B

Q. 5 What are the effects of working environment on the workers in production plants? Discuss in detail about Musculoskeletal Disorders (MSDs).
[L-4][CO-3] 20
Q. 6 A manager sets a target for the worker to complete his job in 6 hours. The workers are promised to pay incentive according to Halsey $50-50$ plan. The hourly wage rate is Rs.5/-. The worker could complete the task in 5 hours only. Calculate the total earning and hourly wage rate of the worker.
[L-3][CO-4] 20
Q. 7 Discuss the following incentive plans in detail:
a) Taylor's differential piece rate system.
b) Meerick's differential piece rate system.
c) Halsey plan.
d) Rowan plan.
e) Bedaux plan.

# End Semester Examination, Dec. 2022 

## M. Tech. - First Semester

RESEARCH METHODOLOGY AND IPR (M-MC-100)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following questions.
a) Enlist the essential components of research.
b) Define primary data using example.
c) Define 'plagiarism'.
d) Explain cyber plagiarism with example.
e) Describe digital plagiarism with example.
f) Describe journal writing with example.
g) Explain 'patents'.
h) Write the duration of patent, copyright, trademark, registered design.
i) What is a geographical indication?
j) Enlist two Traditional knowledge case studies in India.

## PART-A

Q. 2 Illustrate research process in flow chart. Enlist five motivations in research. Explain four objectives of research.
[CO-1] [L-3] 20
Q. 3 Explain "Why research ethics is Important"? Describe how to avoid plagiarism. Make a comparison between Copyright and Plagiarism.
[CO-2] [L-4] 20
Q. 4 Describe quantitative, qualitative, conceptual and empirical types of research.
[CO-3] [L-1] 20

## PART-B

Q. 5 Write short notes on WIPO, trade mark and registered design. Express the registration procedure of trade marks. Also write the meaning of trade mark symbols SM, TM, ®.
[CO-6] [L-1] 20
Q. 6 List the key terminology used in Patents. Illustrate the flow chart of patents.
[CO-5] [L-1] 20
Q. 7 Enlist the Concerned Ministry/Department/ Organization of the major intellectual property rights in India. Describe the organization of the IP offices and the locations in India.

# End Semester Examination, Dec. 2022 

## M. Tech. - First Semester

RESEARCH METHODOLOGY AND IPR (M-MC-100)
Time: 2 hrs.
Max Marks: 50
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions
from PART-A and TWO questions from PART-B. Each question carries equal
marks.
Q. 1 a) Prepare a flowchart of research process.
[CO-2] [L-2]
b) Give the name of any four states that fall under the territorial jurisdiction of Kolkata in context of filing patents.
[CO-6] [L-2]
c) Briefly explain the importance of ethics in research.
[CO-3] [L-2]
d) Why are patents necessary?
[CO-5] [L-3]
e) "IPR is an instrument of development" give at least two points to justify this.
[CO-4] [L-3] $2 \times 5$

## PART-A

Q. 2 You are working on a research problem discuss the criteria that will help you to quantify the problem as a good research problem.
[CO-1] [L-4] 10
Q. 3 Write notes on:
i) Applied vs fundamental research.
ii) Qualitative vs quantitative research.
[CO-2] [L-3] $5 \times 2$
Q. 4 Discuss problems encountered by researchers in India.
[CO-1] [L-4] 10

## PART-B

Q. 5 Explain the procedure for grant of a patent in India. Also what role do patents play in everyday life and the rights a patent owner has?
[CO-4] [L-5] 10
Q. 6 Explain the different type of patent applications.
[CO-5] [L-4] 10
Q. 7 Discuss a case of any Geographical Indication in Indian context and the efforts made by local agency to ensure genuine supply of that product.
[CO-6] [L-5] 10

# End Semester Examination, Dec. 2022 <br> M. Tech. - First Semester <br> DISASTER MANAGEMENT (M-MC-003) 

Time: 2 hrs. Max Marks: 50No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer any two out of the following:
a) Discuss the significance of Disaster Management.
b) Discuss the areas prone to floods in India.
c) List the elements of disaster risk.
d) List the actions involved in Disaster Mitigation.

## PART-A

Q. 2 Elaborate the man-made disasters with their causes.
Q. 3 Discuss the countermeasures for epidemics.
[CO-3] [L-2] 10
Q. 4 Review the post-disaster diseases and epidemics.
[CO-4] [L-2] 10

## PART-B

Q. 5 How would you determine risk with the help of remote sensing? [CO-3] [L-5] $\mathbf{1 0}$
Q. 6 Discuss the concept of Community-Based Disaster Management (CBDM) in detail.
Q. 7 Analyze the programs of disaster mitigation in India.
[CO-5] [L-4] 10

# End Semester Examination, Dec. 2022 <br> M. Tech. - First Semester <br> DISASTER MANAGEMENT (M-MC-003) 

Time: 2 hrs. Max Marks: 50No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) Discuss the significance of Disaster Management. ..... (CO-1) (L-2)
b) List the repercussions of various natural disasters.(CO-5) (L-1)c) Recall the 3 A's of disaster preparedness.(CO-3) (L-1)d) List the actions involved in Disaster Mitigation.

## PART-A

Q. 2 Elaborate the natural disasters with their causes. ..... (CO-6) (L-2) $\mathbf{1 0}$
Q. 3 Discuss the countermeasures for industrial accidents. ..... (CO-3) (L-2) 10
Q. 4 Review post-disaster diseases and epidemics. ..... (CO-4) (L-2) $\mathbf{1 0}$

## PART-B

Q. 5 Elaborate the steps and organizational structure for Disaster Preparedness.
(CO-4) (L-2) 10
Q. 6 Analyse any 3 techniques of disaster risk assessment. (CO-3) (L-4) $\mathbf{1 0}$
Q. 7 Summarize the emerging trends in disaster mitigation.
(CO-2) (L-2) $\mathbf{1 0}$

## End Semester Examination, Dec. 2022

## M. Tech. - First Semester <br> STRESS MANAGEMENT BY YOGA (M-MC-001)

Time: 2 hrs. Max Marks: 50No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 What is Ashtang yoga? What are the different types of Asthang yog? Explain each briefly. ..... 10
PART-A
Q. 2 Which limb of Ashtang Yog describes the universal human values? What are they? ..... 10
Q. 3 Write an essay on Niyamas. ..... 10
Q. 4 What is meditation? ..... 10
PART-B
Q. 5 What is Anu Lom Vilom Pranayama? What are its benefits? ..... 10
Q. 6 What is Sun salutions? Name the asanas in it and its benefits. ..... 10
Q. 7 Who is your role model in your life and why? ..... 10

# End Semester Examination, Dec. 2022 

B. Tech. (Industry Integrated) - Seventh semester QUALITY ENGINEERING (MII-704)
Time: 3 hrs. Max Marks: 100No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q1. Answer the following in briefly:
a) Define 'Fish bone diagram'.\{L1\}
b) Write down the dimensions of quality. ..... $\{L 2\}$
c) Define 'Probability'. ..... \{L1\}
d) Write down various symbols used in flow chart \& their significance. ..... \{L2\}
e) Define 'Pareto Chart'.\{L1\}
\{L2\}
f) Define 'MTTF'.
\{L1\}
g) Define 'Acceptance sampling'.
\{L2\}
h) Define 'TQM'.
\{ L1\}
i) Draw Maslow's Hierarchy of Needs. ..... \{ L2\} 2x10
j) Write down 6 C's of Total quality Management.
$\{L 1, L 3\} 20$
Q. 2 Discuss Statistical Quality Control and 7 QC tools.
\{L3,L5\}20
Q. 3 Explain Sampling Inspection process, its advantages and imitations.
$\{L 2, L 6\} 20$
Q. 4 Discuss various statistical tools in quality Control.
PART-B
Q. 5 Discuss failure Mode and effect analysis in detail, along with its procedure, benefits with examples. ..... \{L5, L6\} 20
Q. 6 Discuss Quality circle and its role in meeting individual needs. ..... $\{L 3, L 4\} 20$
Q. 7 Discuss Generic Strategy Model for Implementing TQM Systems. ..... $\{L 4, L 5\} 20$

# End Semester Examination, Dec. 2022 <br> B.Tech. (Industry Integrated) - Seventh Semester <br> SURFACE ENGINEERING (MII-703) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1

> Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Define Lays and flaws in surface structures.
\{L1\}
b) Define 'induction hardening'.
\{L2\}
c) Define 'cyaniding process'.
d) Define 'electroless plating process'.
\{L1\}
e) What are the applications of Metal Flame Spraying? \{L2\}
f) Define 'Plasma'.
\{L1\}
g) Define High Velocity Oxy-Fuel Process.
\{L2\}
h) Define 'Thin Coatings'.
i) Define 'Alkaline Cleaning'.
j) Name some chemical cleaning processes.

PART-A
Q. 2 Explain Diffusion coating process.
\{L2, L3, L4\} 20
Q. 3 Explain Carburizing process and its advantages. $\{L 3, L 4\} 20$
Q. 4 Explain Electroless plating process, its characteristics, properties and applications.
\{L5, L6\} 20

## PART-B

Q. 5 Explain Metal Flame spray coating process.
$\{L 3, L 4\} 20$
Q. 6 Explain Laser beam hardening technique and its process parameter.
$\{L 2, L 5\} 20$
Q. 7 What are the methods for tool coatings, explain Diamond coating and its advantages? \{L3, L4, L5\} 20

# End Semester Examination, Dec. 2022 <br> B.Tech. (Industry Integrated) - Seventh Semester <br> SURFACE ENGINEERING (MII-703) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1

> Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Define Lays and flaws in surface structures.
\{L1\}
b) Define 'induction hardening'.
\{L2\}
c) Define 'cyaniding process'.
d) Define 'electroless plating process'.
\{L1\}
e) What are the applications of Metal Flame Spraying? \{L2\}
f) Define 'Plasma'.
\{L1\}
g) Define High Velocity Oxy-Fuel Process. \{L2\}
h) Define 'Thin Coatings'.
i) Define 'Alkaline Cleaning'.
j) Name some chemical cleaning processes.

PART-A
Q. 2 Explain Diffusion coating process.
$\{L 2, L 3, L 4\} 20$
Q. 3 Explain Carburizing process and its advantages. $\{L 3, L 4\} 20$
Q. 4 Explain Electroless plating process, its characteristics, properties and applications.
\{L5, L6\} 20

## PART-B

Q. 5 Explain Metal Flame spray coating process.
$\{L 3, L 4\} 20$
Q. 6 Explain Laser beam hardening technique and its process parameter.
$\{L 2, L 5\} 20$
Q. 7 What are the methods for tool coatings, explain Diamond coating and its advantages? \{L3, L4, L5\} 20

# End Semester Examination, Dec. 2022 <br> B-Tech. (Industry Integrated) - Seventh semester <br> PRESS TOOLS-II (MII-702) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) What is the role of single action Draw tool in sheet metal part manufacturing:
i) Produce 3D shape to flat sheet
ii) To bend the along open curve
iii) Neither of the two
b) Identify single action draw tool:
i) Die Block up - punch down
ii) Punch up - Die Block down
iii) Neither of the two
\{C01.L1\}
c) The maximum allowable percent reduction in third draw tool:
i) $16 \%$
ii) $15 \%$
iii) $18 \%$
\{CO2.L1\}
d) Higher cushion force in draw tool may lead to following problem in draw operation: i) Wrinkle ii) Spring back iii) crack
\{CO2.L2\}
e) If the finish of sheet is too smooth, it can lead to following problem:
i) crack
ii) Wrinkle
iii) spring back
\{CO2.L2\}
f) In Erichsen test, the punch keeps travelling down until the following happens:
i) sheet gets clamped
ii) Sheet gets drawn
iii) sheet cracks
\{CO3.L1\}
g) In ironing operation, choose the correct condition:
i) Part thickness decreases
ii) Part thickness does not change
iii) Part thickness increases
\{CO3.L1\}
h) In stamping simulation, the following is input in pre processing:
i) Physical properties of material ii) CAD Model of die face iii) Both
\{CO2.L1\}
i) Stamping simulation software indicates the following:
i) Thinning
ii) Wrinkle
iii) Both
\{CO2.L1\}
j) In sheet metal part manufacturing, the function of the trimming tools is:
i) Trim the blank
ii) Cut extra material
iii) Control spring back
\{CO3.L1\} 2x10

## PART-A

Q. 2 a) Make the diagram of a single action Draw tool and explain in detail.
\{CO1.L1\} 10
b) Explain rubber draw tool operation with the help of a diagram.
\{CO1.L1\} 10
Q. 3 Explain the various quality problems with reasons in draw operation and ways of eliminating them.
\{CO2.L1\} 20
Q. 4 Describe the function of stamping simulation softwares and advantages. Describe various steps in stamping simulation.
\{CO3.L2\} 20

## PART-B

Q. 5 a) Draw the diagram of downward restriking tool.
b) Explain the design principles of a restriking tool.
Q. 6 a) Explain the purpose of an angular Cam tool with diagram.
b) Describe a horizontal cam with the help of a diagram.
Q. 7 Describe the sequence of operations with brief explanation of the manufacturing of press tools.

# End Semester Examination, Dec. 2022 <br> B-Tech. (Industry Integrated) - Seventh semester <br> ROBOTICS (MII-701) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
$\begin{array}{lr}\text { a) Define 'Laws of Robotics'. } & \{L 1\} \\ \text { b) Sketch a robot and name its parts. } & \{L 2\} \\ \text { c) What is a mechanical gripper? } & \{L 1\} \\ \text { d) Give some examples of tool as robot end effector. } & \{L 2\} \\ \text { e) Explain the function of a piezoelectric sensor. } & \{L 1\} \\ \text { f) Differentiate between the 'sensor' and 'transducer'. } & \{L 2\} \\ \text { g) What are safety sensors? } & \{L 1\} \\ \text { h) Define 'Optic sensors'. } & \{L 2\} \\ \text { i) Define 'Cartesian space trajectory planning'. } & \{L 1\} \\ \text { j) Define 'Path and trajectory'. } & \{L 1\} \mathbf{2 x 1 0}\end{array}$

## PART-A

Q. 2 Describe the evolution of Robots and robotics. $\{L 2, L 4\} 20$
Q. 3 Discuss application of robots in Material Handling. $\{L 3, L 5\} 20$
Q. 4 Explain Industrial applications of robots. $\{L 4, L 6\} 20$

## PART-B

Q. 5 Describe the classification of sensors and the factors to be considered for its selection. $\{L 2, L 3, L 5\} 20$
Q. 6 Explain various steps in Trajectory Planning.
$\{L 3, L 4\} \quad 20$
Q. 7 Explain architecture of robotic vision system along with stationary and moving camera.
$\{L 3, L 5\} 20$

# End Semester Examination, Dec. 2022 <br> M. Tech. - Third Semester <br> OPERATIONS RESEARCH (M-ID-003) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) How to create constraint in linear programming?
(CO-1) (L-2)
b) Summarize Critical Path in Network Planning.
(CO-4) (L-3)
c) Differentiate between slack and surplus variables in Linear Programming Problems.
(CO-2) (L-2)
d) The expected time ( $\mathrm{t}_{\mathrm{e}}$ ) of a PERT activity in terms of optimistic time $\left(\mathrm{t}_{0}\right)$, pessimistic time ( $\mathrm{t}_{\mathrm{p}}$ ) and most likely time ( $\mathrm{t}_{\mathrm{l}}$ ) is given by $\qquad$ . (CO-1) (L-2)
e) Discuss the elementary graph theory in short.
(CO-3) (L-1)
f) List the various disadvantages of Graphical method for solving the linear programming problems.
(CO-1) (L-1)
g) List steps using for solution of Linear Programming Problems.
(CO-2) (L-2)
h) Differentiate between Probabilistic and deterministic inventory control models.
(CO-4) (L-3)
i) Interpret the necessity of Game theory in business decisions.
(CO-4) (L-1)
j) How can sensitivity analysis be used?
(CO-3) (L-2) $\mathbf{2 x 1 0}$

## PART-A

Q. 2 Summarize the following statements in brief:
a) Operation research play an important role in decision making. (CO-1,4) (L-2) 12
b) Cost involved in Inventory.
(CO-1) (L-3) 8
Q. 3 Use the Big M method to solve the following problem:

Maximize $z=-2 x_{1}-3 x_{2}$
Subject to the constraints:

$$
\begin{align*}
& x_{1}+x_{2} \geq 2 \\
& 2 x_{1}+x_{2} \leq 10 \\
& x_{1}+x_{2} \leq 8 \\
& x_{1} \geq 0 ; x_{2} \geq 0 \tag{CO-2,3}
\end{align*}
$$

Q. 4 In the construction site, the utility data for the network are given below:

| Activity $(\mathrm{i}-\mathrm{j})$ | Timing |
| :---: | :---: |
| $0-1$ | 4 |
| $1-2$ | 6 |
| $1-3$ | 3 |
| $2-4$ | 5 |
| $2-5$ | 6 |
| $3-4$ | 7 |
| $3-6$ | 8 |
| $4-7$ | 6 |
| $5-7$ | 9 |

a) Draw the network diagram and find out the critical path
b) Calculate the Total, Free, Independent and interference Floats.
(CO-1,2) (L-5) 10

## PART-B

Q. 5 a) Discuss the Kendall notation for waiting line model in brief.
(CO-2) (L-2) 7
b) Customers at one window drive according to Poisson distribution with a mean of 10 minutes. Service time per customer is exponential with a mean of 6 minutes.

Determine:
i) Probably that arriving customer doesn't have to wait.
ii) Expected length of system.
iii) Average waiting time in system.
(CO-2) (L-4) 13

## OR

A T V mechanic finds that the time spent on his jobs has an experiment distribution with mean 30 minutes, if he repairs sets in the order in which they come in. if the arrival of sets is approximately Poisson with an average rate of 10 per eight hour day, what is the mechanic's expected idle time each day? How many jobs are ahead of the average set just brought in?
(CO-4) (L-3) 20
Q. 6 a) A machine operator has to perform three operations - turning, threading and knurling - on a number of different jobs. The time required to perform these operations (in minutes) for each job is given as below:

| Job | $\mathbf{1}$ | $\mathbf{2}$ | $\mathbf{3}$ | $\mathbf{4}$ | $\mathbf{5}$ | $\mathbf{6}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Turning | 3 | 12 | 5 | 2 | 9 | 11 |
| Threading | 8 | 6. | 4 | 6 | 3 | 1 |
| Knurling | 13 | 14 | 9 | 12 | 8 | 13 |

Determine the order in which the jobs should be processed in order to minimize the total time required to perform all the jobs. Also find the minimum elapsed time.
(CO-1) (L-4) 14
b) Summarize the importance of scheduling in operation management. (CO-3) (L-3) 6
Q. 7 Use Principle of Optimality of Dynamic Programming to find the Minimum Value for the following problem:

$$
Z_{\min }=A^{2}+B^{2}+C^{3}
$$

Subject to constraints
$A+B+C \geq 15$ and $\forall A, B$ and $C \geq 0$.
(CO-4) (L-5) 20
$O R$
Solve the Game through Graphical Method whose pay off matrix is:

| A |  |  |  |  |  |  | B II |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| (X1) I |  | 3 | -3 | 7 |  |  |  |
|  |  |  |  | II | IV |  |  |
|  | (X2) II |  | 5 | 4 | -6 |  |  |

# End Semester Examination, Dec. 2022 <br> M.TECH. - Third Semester <br> BUSINESS ANALYTICS (M-ID-001) 

Time: 3 hrs
Max Marks: 100
No. of pages: 2
Note: Attempt any FIVE questions in all. Each question carries equal marks.
Q. 1 a) Compare and contrast descriptive, predictive and prescriptive analysis using suitable examples.
[CO-5] [L-4] 10
b) Describe the importance of Business Analysis.
[CO-3] [L-4] 10
Q. 2 a) Explain the essential Steps needed in the process of business analytics.
[CO-3] [L-2] 10
b) How is the business analytics process similar to the organization decision-making process?
[CO-4] [L-3] 10
Q. 3 a) Consider the vector " $x$ " with the values $\{4,4,5,6,7,2,9\}$.Calculate the mean, sum, max, min, variance of the vector ' $x$ ".
[CO-4] [L-4] 10
b) Find a Linear Regression equation for the following dataset
[CO-2] [L-2] 10

| $x$ | 2 | 4 | 6 | 8 |
| :---: | :---: | :---: | :---: | :---: |
| $y$ | 3 | 7 | 5 | 10 |

Q. 4 a) Explain the need of data preprocessing. How would you preprocess your data? Illustrate with examples.
[CO-4] [L-5] 10
b) Classify each of the variables in the data set given below as categorical, ordinal, interval, or ratio with suitable explanations.
[CO-5] [L-4] 10

| Streco | soreliane | StoreTipe | Location | Cpocatio gCont | Stall Cmt | Totalsiles | Tatal Cu stoners | Acracmats <br> sctus | Batcat52 <br> - | Proftrper cust | Ownstor | Onlinepr orance | TEIure | 5 turesig nant |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| STRIOI | Eectrosics Zone | Electucnircs | Delli | 21 | 60 | 160 | 110 | 3.9 | 252 | 16.45 | 0 | 1 | 4 | 4 |
| ETRLIM | Apparol Zone | Apparel | Delhi | 21 | 60 | 100 | 130 | 3.9 | 2873 | 17.02 | 0 | 1 | 4 | 4 |
| \$TR103 | Super lager | super <br> Markes | Debi | 228 | 40 | 108 | 98 | 385 | 2.22 | 18.61 | 1 | 1 | 4 | 1 |
| STR104 | Supsr <br> Maket | 5uper Wirket | Doliti | 21.4 | 60 | 288 | 110 | 3.08 | 3.215 | 19.44 | 1 | $t$ | 3 | 1 |
| \&TFIOS | Central 5 50re | super <br> Mokes: | Delhi | 13.7 | 80 | 30 | 173 | 335 | 3.44 | 1702 | 0 | - | 3 | 2 |
| STRELOK | apoarel <br> Zone | Apparal | Dolini | 18.1 | 60 | 2 F | 145 | 2.75 | 3.46 | 20.22 | 1 | \$ | 3 | 1. |
| \|STR107 | Fashion日azal | Apparel | Delhi | 143 | 10 | 300 | 245 | 3.21 | 3.57 | 1534 | 0 | V | 3 | 4 |
| STEIM | Dejital <br> Bazal | Eletucnircs | Dellij | 24.4 | 40 | 145.7 | 62 | 368 | 3.19 | 20 | 1 | 1 | 4 | 2 |
| STR109 | Electroniss <br> Z0fe | Elactronires | Chemal | 278 | 40 | 142.3 | 50 | 3.92 | 3.15 | 279 | 1 | 0 | 4 | 2 |
| STR100 | Apparsel Zone | Apparel | Orenasi | 192 | 60 | 1075 | 123 | 3.92 | 3.44 | 183 | 1 | 1 | 4 | 4 |
| \|STEMII | Super 3aze | Supe! <br> Mrket | Cramai | 178. | 60 | 1075. | 113. | 392 | 3.44 | 189 | 1 | 8. | 4. |  |

Q. 5 Elaborate various forecasting techniques with suitable examples.

| The sales of a magazine in a stall for the previous 10 months are given below. |  |
| :--- | :---: |
| Month | Sales |
| Jan | 30 |
| Feb | 25 |
| March | 35 |
| April | 25 |
| May | 20 |
| June | 30 |
| July | 35 |
| August | 40 |
| September | 30 |
| October | 45 |

the sales of a magazine in a stall for the previous 10 months are given below.
Jan
Feb
25
March 35
April 25
May
20
June
35
August

September
45
Calculate the simple exponential smoothing taking $a=0.3$ for the above data.
[CO-2] [L-3] 20
Q. 6 a) Explain the role of Information Gain in Decision Trees.
[CO-5] [L-4] 10
b) Create a Decision Tree for the following data having 3 features and 2 classes using Information gain.
[CO-5] [L-4] 10

| $X$ | $Y$ | $Z$ | $C$ |
| :--- | :--- | :--- | :--- |
| 1 | 1 | 1 | I |
| 1 | 1 | 0 | I |
| 0 | 0 | 1 | II |
| 1 | 0 | 0 | II |

Q. 7 a) Describe Embedded business intelligence.
[CO-1] [L-2] 10
b) What do you mean by Data Quality? How quality of data is ensured during analysis?
[CO-1] [L-2] 10
Q. 8 Explain the following:
a) Visual data recovery
b) Data journalism

## End Semester Examination, Dec. 2022

## M. Tech. - Third Semester

HUMAN RESOURCE MANAGEMENT (M-HM-ID-001)
Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions
from PART-A and TWO questions from PART-B. Each question carries equal
marks.
Q. 1 Answer any four out of the following:
a) Recall the roles and responsibilities of HR managers.
(CO-1) (L-1)
b) Discuss the concept of job analysis.
(CO-1) (L-2)
c) List the benefits of Induction.
d) Discuss the purposes of Training.
e) Outline the objectives of Performance Management System.
(CO-5) (L-1)
f) Discuss Turnover as a separation process.
(CO-5) (L-2)
5x4

## PART-A

Q. 2 Comprehend the challenges of HRM.
(CO-5) (L-4) 20
Q. 3 Illustrate the process of Human Resource Planning.
(CO-2) (L-3) 20
Q. 4 Recall the sources of Recruitment with its importance in the organization.
(CO-5) (L-1) 20

## PART-B

Q. 5 Discuss the process of designing a training program.
(CO-5) (L-2) 20
Q. 6 How would you design and determine a compensation structure?
(CO-6) (L-6) 20
Q. 7 Discuss the following:
a) VRS.
b) Layoff.
(CO-5) (L-2) 10x2

# End Semester Examination, Dec. 2022 <br> M. Tech. - Third Semester <br> PNEUMATIC AND HYDRAULIC CONTROL (MEEIR-356) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt any FIVE questions in all. Marks are indicated against each question.
Q. 1 a) Explain the components of hydraulic and pneumatic system. [CO-1] [L-1] 10
b) List out the applications of fluid power employed in different industries/fields. List the merits and Demerits of fluid power system.
[CO-2] [L-2] 10
Q. 2 a) Design and explain the working of a sequencing circuit.
[CO-2] [L-3] 10
b) Explain the construction and working of pilot operated sequence valve.
[CO-2] [L-1] 10
Q. 3 a) Explain the Hydraulic Actuators. List their advantage and disadvantages.
[CO-2] [L-1] 10
b) Explain the working of gear type motor and vane type motor. [CO-2] [L-1] 5
c) A centrifugal pump must deliver at least $845 \mathrm{~L} / \mathrm{min}$ of water at a total head of 79 m (260ft) of water. Specify a suitable pump. List its performance characteristics.
[CO-2] [L-3] 5
Q. 4 Compare the working principle for following types of cylinders: Single acting cylinder, Double Acting Cylinder and Cylinder cushioning.
[CO-3] [L-2] 20
Q. 5 Explain the working of a pneumatic speed control circuit.
[CO-3] [L-2] 20
Q. 6 Develop an electro pneumatic circuit for the following sequence $A+B+(A-B)$ Where $A$ and $B$ stand for cylinder (+) indicates extension and ( - ) indicates retraction of cylinders.
[CO-3] [L-2] 20
Q. 7 a) Explain the hydro mechanical servo system with suitable application.
[CO-3] [L-1] 10
b) Explain regenerative circuit with application of drill machine.
[CO-5] [L-3] 10
Q. 8 a) Explain direct and indirect actuation pneumatic cylinders in detail to supply and exhaust air throttling.
[CO-4] [L-4] 10
b) Explain working of Simple pneumatic control memory valves.
[CO-5] [L-4] 10

# End Semester Examination, Dec. 2022 <br> M. Tech. - First Semester <br> MOBILE ROBOTS (MEEIR-156) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Marks are indicated against each question.
Q. 1 a) Briefly explain the use of robots in (any two):
i) Defence sector.
ii) Space exploration.
iii) Commercial robots.
[CO-1] [L-1] $\mathbf{5 \times 2}$
b) Compare different types of legged robots.
[CO-1] [L-3] 10
Q. 2 Analyze the positioning of standard wheeled robot in a local and global reference frame. Explain the different constraints used.
[CO-1] [L-4] 20
Q. 3 a) Classify different types of sensors used in mobile robots.
[CO-2] [L-3] 10
b) Evaluate the use of ground based beacons in robot perception.
[CO-2] [L-5] 10
Q. 4 a) Evaluate the working of different blocks of robot architecture. [CO-3] [L-5] 10
b) Compare different types of locomotion systems used in mobile robots.
[CO-4] [L-3] 10
Q. 5 a) Compare localization based navigation and programmed solutions. $\quad[\mathrm{CO}-4][\mathrm{L}-3] 8$
Q. 6 a) Compare different algorithms used for path planning by a robot.
[CO-3] [L-2] 10
b) Explain path planning and obstacle avoidance in a robot.
[CO-3] [L-2] 10
$\begin{array}{lll}\text { Q. } 7 & \text { a) Explain the different steps involved in image processing. } & \\ & \text { b) Evaluate the importance of transformation of a digital image. } & {[\mathrm{L}-1] \mathbf{1 0}} \\ \text { b) } & {[C O-5][\mathrm{L}-3] \mathbf{1 0}}\end{array}$
Q. 8 a) Explain different fields related with computer vision used by robots.
[CO-5] [L-2] 10
b) Describe the various functions occurring in computer vision system. [CO-5] [L-2] 10

# End Semester Examination, Dec. 2022 <br> M. Tech. (A \& R) - First Semester 

COMPUTER AIDED MODELING AND DESIGN (MEEIR-151)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Marks are indicated against each question.
Q. 1 a) Give the general configuration of a CAD computer system. $\mathbf{1 0}$
b) CAD helps in integrating CAM. Justify this statement. 10

Q. 2 a) $A$ square is having $A(2,1), B(6,1), C(5,5)$ and $D(2,5)$ and is rotated at $60^{\circ}$ in
clockwise direction keeping point $B$ fixed. Find the final coordinates.

10
b) What is the need for concatenation of transformations? Explain what care should be
taken in such cases.
[CO-2] [L-3,2] 10
Q. 3 a) Distinguish between interpolation and approximation approaches used in design of
curves.
b) Explain the basic curve fitting techniques.
[CO-3] [L-3,2] 10
Q. 4 a) State the properties of stiffness matrix. $\mathbf{1 0}$
b) A vertically hanging bar is to be modeled by FEM. It is discretized in to four elements. It is subjected to a load of 10 kN at its end. If each element is considered to be having length of 300 mm , formulate the global stiffness matrix.
[CO-5] [L-1,4] 10
Q. 5 The following differential is available for physical phenomenon $A E \frac{d 2_{y}}{d x^{2}}+q_{0}=0$. With the boundary condition $\frac{d y}{d x}$ at $Y(0)$ is 0 .

$$
\frac{\mathrm{dy}}{\mathrm{dx}} \text { at } \mathrm{X}=\mathrm{L} \text { is } 0
$$

Find the solution Galerkin's Method.
[CO-5] [L- 4] 20
Q. 6 Write a note on:
a) NURBS
b) B-splines.
[CO-6] [L-1] 20
Q. 7 a) What are the different steps of FEM? Explain each of them briefly. $\mathbf{1 0}$
b) Explain the term shape function. Write the properties of shape function.
[CO-4] [L- 2] 10
Q. 8 What do you mean by geometric modeling? Enumerate various solid-modeling techniques and compare them.
[CO-4] [L-1] 20

# End Semester Examination, Dec. 2022 <br> M. Tech. (A \& R) - First Semester <br> DRIVES AND CONTROL SYSTEM FOR AUTOMATION (MEEIR-102A) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Marks are indicated against each question.
Q. 1 a) Enumerate the switching characteristics of MOSFET and deliberate its safe operation area (SOA). Also, discuss its switching characteristics. [CO-1] [L-1, 3] 10
b) Classify different types of commutation techniques and discuss one of the forced commutation techniques in detail.
[CO-1] [L-1,3] 10
Q. 2 a) Exemplify how the speed of a separately excited DC motor can be controlled using Single phase converter. Draw the relevant waveforms in continuous and discontinuous mode of operation. [CO-2] [L-3,4] 15
b) Discuss the types of electric braking employed in electric drives $\quad[C O-2][L-3,4] 5$
Q. 3 a) Enumerate the operation of brushless DC motor and its control mechanism.
[CO-3] [L-3,2] 10
b) List different methods of speed control of induction motor and how the speed of an induction motor can be controlled through inverters.
[CO-3] [L-3,2] 10
Q. 4 Discuss the architecture of field bus system and also enumerate its the different field bus system protocols.
[CO-5][L-3] 20
Q. 5 Explain the hardware architecture of SCADA system in detail. List the benefits of automation in power system using PLC \& SCADA
[CO-4] [L-1] 20
Q. 6 a) Deliberate the types of HMI used in industries. Explain its various features
[CO-4] [L- 1] 10
b) Examine the interfacing of HMI with the PLC and how can it be programmed.
[CO-4] [L-1] 10
Q. 7 a) Explain why SCR's can be connected in series and what will be the effect on the string efficiency. Also enumerate the static and dynamic equalization of series connected SCR.
[CO-5] [L3] 10
b) Enumerate the operation of four quadrant variable speed chopper fed DC Drives
[CO-5] [L3] 10
Q. 8 Write short notes on:
a) AC voltage controller fed AC drives.
b) Distributed control system hierarchy.
[CO-5] [L-1] $\mathbf{1 0 \times 2}$

# End Semester Examination, Dec. 2022 <br> M. Tech. - First Semester <br> INDUSTRIAL AUTOMATION (MEEIR-101A) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Marks are indicated against each question.
Q. 1 a) What is the use of industrial automation? Describe three levels of industrial automation?
[CO-1] [L-1,2]
b) i) What is the basic principle of PLC?
ii) Explain three types of PLCs.
iii) How PLC is used in industrial automation?
[CO-4] [L-2]
c) What's the difference between DCS, SCADA, and PLC system?
[CO-2] [L-2]
d) Write any four strategies for automation and process improvement.
[CO-5] [L-2]
e) Explain material handling and its advantages.
[CO-3] [L-1] $4 \times 5$
Q. 2 a) What is automated manufacturing system? Explain in detail types of automated manufacturing system along with features and characteristics.
[CO-3] [L-1,2] 15
b) List the advantages and disadvantages of automation.
[CO-11][L-1] 5
Q. 3 a) List different PLC programming languages. Explain any one with example. [CO4][L2] $\mathbf{1 0}$
b) Explain basic structure of PLC using block diagram.
[CO-4] [L-1,2] 10
Q. 4 a) Construct ladder diagram for the logical expression:
$y=A B+B C+C D$
[CO-2] [L-2] 10
b) Explain different types of sensors used in automation.
[CO-5] [L-5] 10
Q. 5 a) Develop a ladder program for traffic light control system with following conditions:
i) Red light ON for 30 sec ,
ii) green light ON for 25 sec ,
iii) Yellow light on for 05 sec .
iv) Repeat the sequence until stop push button is pressed.
[CO-5] [L-6] 10
b) Discuss the steps in PLC scanning process.
[CO-4] [L-2] 10
Q. 6 a) Describe industrial automation components. Explain the role of engineers in automation.
[CO-2] [L-2,3] 10
b) Compare DCS with PLC.
[CO-2] [L-4] 10
Q. 7 a) What are the various types of timers and counters used in PLC?
[CO-4] [L-2] 10
b) Write a PLC ladder diagram for the following motor sequence:
i) Start button starts motor M1.
ii) After 10 sec M 1 is off and M2 is ON.
iii) After 5 sec motor M2 is off.
iv) Stop push button stops M1, M2, if pressed any time during process.
[CO-4] [L-2] 10

## End Semester Examination, Dec. 2022

## M. Tech. - Third Semester <br> VLSI DESIGN VERIFICATION AND TESTING (MEC-257)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions out of seven. Marks are indicated against each question.
Q. 1 a) Explain layered test bench in detail.
[CO-3] [L-2] 10
b) What are the different types of verification approaches in VLSI?
[CO-1] [L-2] 10
Q. 2 a) Explain various data types that are available in system Verilog.
[CO-1] [L-2] 10
b) Discuss type casting with reference to system Verilog.
[CO-1] [L-2] 10
Q. 3 a) Differentiate between blocking and non-blocking assignments in system Verilog.
[CO-2] [L-2] 10
b) Explain void function in system Verilog with an example.
[CO-2] [L-2] 10
Q. 4 a) How can a class be defined in system Verilog? Explain.
[CO-4] [L-2] 10
b) Differentiate between static variables and global variables.
[CO-4] [L-2] 10
Q. 5 a) Discuss Randomization with reference to system Verilog.
[CO-3] [L-2] 10
b) What is the importance of pre_randomize and post_randomize functions?
[CO-3] [L-3] 10
Q. 6 a) What is the difference between a reg, wire and logic in system Verilog?
[CO-2] [L-3] 10
b) Which of the array types: dynamic array or associative array, are good to model really large arrays, say: a huge memory array of 32 KB .
[CO-2] [L-3] 10
Q. 7 Write short notes on:
a) Atomic stimulus generation vs. Scenario generation.
[CO-2] [L-3] 10
b) Random number functions.
[CO-4] [L-3] 10

# End Semester Examination, Dec. 2022 

## M. Tech. - First Semester

MICROCONTROLLERS AND PROGRAMMABLE DIGITAL SIGNAL PROCESSORS (MEC-158)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt any FIVE questions in all. Marks are indicated against each question.
Q. 1 a) Give the structure of a $4 \times 4$ Braun Multiplier. Explain its concept. [CO-3] [L-2] 10
b) What modification is required to carry out multiplication signed numbers? Comment on the speed of the multiplier.
[CO-3] [L-1] 10
Q. 2 a) Describe the main features of the Cortex M3 processor core. Also explain its architecture, instruction set and major internal core blocks. [CO-1] [L-2] 10
b) Illustrate different Registers and Special Registers in Cortex M3 processor.
[CO-1] [L-4] 10
Q. 3 a) Show the Cortex M3 based microcontrollers memory organization structure.
[CO-1] [L-3] 10
b) What is pipeline mechanism? Explain briefly the pipeline mechanism in Cortex-M3 processor.
[CO-1] [L-3] 10
Q. 4 a) Describe the Features and benefits of LPC 17XX Microcontroller. [CO-1] [L-2] 10
b) Write about the SPI serial I/O controller of LPC 17XX Microcontrollers. [CO1] [L2] 10
Q. 5 a) Describe the Harvard architecture of Programmable DSP processors. [CO-2] [L-2] 10
b) What is ALU of DSP system? Explain briefly ALU of DSP system with a block diagram.
[CO-2] [L-2] 10
Q. 6 a) Explain in detail about the VLIW architecture with a diagram. [CO-2] [L-2] 10
b) Describe the architectural details and features of a DSP TMS320C6000 processor.
[CO-2] [L-2] 10
Q. 7 Write short notes on (any two):
a) Direct Memory Access.
b) Flash Memory Interface to DSP Processor.
c) Code Composer.
d) Applications of ARM Cortex M3 processor.
[CO-3] [L-2] $\mathbf{1 0 \times 2}$
Q. 8 Illustrate guard bits in a MAC unit of DSP. Consider a MAC unit whose inputs are 24 bit numbers. How many guard bits should be provided if 512 products have to be added in the accumulator to prevent overflow condition? What is the overall size of the accumulator required?
[CO-2] [L-3] 20

# End Semester Examination, Dec. 2022 <br> M. Tech. - First Semester <br> WIRELESS AND MOBILE COMMUNICATION (MEC-102) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Marks are indicated against each question.
Q. 1 a) Draw the architecture of GSM for Communication and explain each subsystem in detail.
[CO-1] [L-2] 10
b) Categorize the different types of techniques used to improve coverage and capacity
of a cellular system
[CO-2] [L-3] 10
Q. 2 a) Define multiple access and discuss various types of multiple access techniques in detail.
[CO-3] [L-2] 15
b) In US-AMPS , 416 channels are allocated to various cellular operators. The Channel
between them is 30 KHz with the guard band of 10 KHz . Calculate the spectrum allocation given to each operator.
[CO-3] [L-3] 5
Q. 3 a) Calculate the path loss and power received in a free space propagation model.
[CO-4] [L-3] 15
b) Determine the fraunhofer distance for an antenna with maximum dimension of 1 mtr and operating frequency of 900 MHz . If antenna has unity gain , calculate path
loss.
[CO-4] [L-4] 5
Q. 4 a) Illustrate the concept of adaptive equalizer in communication system at the receiver.
[CO-4] [L-3] 10
b) Compare various diversity techniques in communication system. [CO-4] [L-5] 10
Q. 5 a) Discuss IS-95 system architecture in detail.
[CO-5] [L-2] 8
b) Illustrate the concept of Forward Link operation in CDMA (IS-95).
[CO-5] [L-4] 12
Q. 6 a) Differentiate between various 3G standards.
[CO-5] [L-2] 10
b) Summarize evolution of 5 G in detail.
[CO-5] [L-3] 10
Q. 7 a) Define frequency reuse concept. Prove that $C=M S$, Where ' $M$ ' is the number of time the cluster is replicated and ' S ' is the number of duplex channels available for use.
[CO-2] [L-3] 10
b) Analyze different types of small scale fading in detail.
[CO-4] [L-4] 10
Q. 8 a) Consider global system for mobile user, which is a TDMA/FDD system that uses 25 Mhz for forward link which is broken into radio channels of 200 khz . If 8 speech channels are supported on a single radio channel and if no guard band is assumed, find the number of simultaneous users that can be accommodated in GSM.
[CO-3] [L-3] 5
b) Derive the expression for worst case signal to interference ratio (S/I), assuming that
the distance between the co-channel cells is ' $D$ ' and the radius of hexagonal cell is 'R'.
[CO-2] [L-6] 15

# End Semester Examination, Dec. 2022 

M. Tech. - First Semester

## ADVANCED COMMUNICATION NETWORKS (MEC-101)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt any FIVE questions in all. Marks are indicated against each question.
Q. 1 a) Elaborate in detail OSI reference model and how is it different from TCP/IP model.
[CO-1] [L-2] 10
b) Discuss in details various protocols that work in transport layer of TCP model.
[CO-2] [L-1] 10
Q. 2 a) Explain in detail ATM structure with its layers. How is it different from ISDN network?
[CO-3] [L-3] 10
b) List the advantages of using ATM.
[CO-1] [L-2] 10
Q. 3 a) Design the selective reject ARQ protocol and how is it different from stop and wait protocol.
[CO-2] [L-5] 10
b) What is flow control and how it is provided in internet?
[CO-3] [L-2] 10
Q. 4 a) Classify various types of congestion control Algorithm in TCP/IP. [CO-1] [L-3] 10
b) Let the size of congestion window of TCP connection in two cases where

Case 1: Timeout occur
Case 2: 3 ACK received
is 32 Kb . The RTT of a connection is 100 ms and $\mathrm{MSS}=2 \mathrm{~Kb}$. The time taken (msec) by TCP connection to get back to 32 Kb congestion window is $\qquad$ and
$\qquad$ respectively.
[CO-2] [L-5] 10
Q. 5 a) Design the architecture of MPLS with its protocol.
[CO-1] [L-6] 10
b) Compare and contrast the differences between IPV4 and IPV6.
[CO-2] [L-3] 10
Q. 6 a) Discuss various methods of providing QOS in a network.
[CO-3] [L-2] 10
b) What is resource reservation protocol and where it is used.
[CO-3] [L-3] 10
Q. 7 a) Elaborate different packet classification algorithm.
[CO-3] [L-1] 10
b) Categorize the taxonomy for different software based packet classification.
[CO-2] [L-2] 10
Q. 8 a) How IP switching is different from MPLS switching?
[CO-2] [L-5] 10
b) Calculate the bandwidth delay product for the following networks:
i) $\mathrm{T} 1(1.5 \mathrm{Mbps})$.
ii) Ethernet ( 10 Mbps ).
iii) T3(45 Mbps).

Assume a round trip time of 120 ms .
[CO-3] [L-6] 8
c) List the merits of using MPLS label switching.
[CO-2] [L-2] 2

# End Semester Examination, Dec. 2022 <br> M. Tech. - First / Third Semester <br> ADVANCED COMMUNICATION NETWORKS (MEC-101) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Marks are indicated against each question.
Q. 1 a) Elaborate in detail TCP/IP reference model and how it is different from OSI model.
[CO-1] [L-2] 10
b) Discuss in detail various protocols that work in application layer. [CO-2] [L-2] 10
Q. 2 a) Draw the architecture of ATM. How it is different from ISDN network. [CO1][L2] 10
b) Mention the role of each layer in ATM.
[CO-2] [L-1] 10
Q. 3 a) How the inefficiency of stop and wait protocol is overcome in sliding window protocol?
[CO-3] [L-3] 10
b) How the flow control is provided in internet?
[CO-2] [L-2] 10
Q. 4 a) Classify various types of congestion control Algorithm in TCP/IP. [CO-3] [L-2] $\mathbf{1 0}$
b) Let the size of congestion window of TCP connection in two cases where

Case 1: Timeout occur
Case 2: 3 ACK received is 32 KB . The RTT of a connection is 100 ms and MSS $=$ 2 KB . The time taken (msec) by TCP connection to get back to 32 KB congestion window is $\qquad$ and $\qquad$ respectively.
[CO-3] [L-5] 10
Q. 5 a) Compare and contrast the differences between IPV4 and IPV6. [CO-3] [L-2] 10
b) Why MPLS is called layer 2.5 technology? Design the architecture of MPLS.
[CO-3] [L-3] 10
Q. 6 a) Differentiate between diffserv and intserv. Illustrate the framework of diffserv.
b) How latency is different from throughput.
[CO-2] [L-4] 10
c) Mention different features of resource reservation protocol.
[CO-2] [L-2] 5
[CO-2] [L-1] 5
Q. 7 a) Discuss in detail leaky bucket algorithm with its properties.
[CO-3] [L-3] 10
b) Calculate the bandwidth delay product for the following networks:
i) T 1 (1.5 Mbps)
ii) Ethernet (10Mbps)
iii) T3 (45 Mbps)

Assume a round trip time of 100 ms .
[CO-3] [L-6] 10
Q. 8 a) Illustrate the method of implementation of packet classification algorithm.
[CO2] [L-5] 10
b) Categorize the taxonomy for different software based packet classification.
[CO-2] [L-3] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Third Semester <br> OPTIMIZATION TECHNIQUES (MCS-323) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 3
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from Part-A and TWO questions from Part-B. Each question carries equal marks.
Q. 1 a) The feasible region for an equality constraint is a subset of that for the same constraint expressed as an inequality (True or False?)
b) For a rectangle matrix, when number of rows is less than number of columns, i.e., $\mathrm{m}<\mathrm{n}$, the rank of this matrix can be
i) less than or equal $m$
ii) less than or equal $n$
iii) more than or equal $m$
iv) none of the above
c) One of the techniques developed for solution of non linear programming is?
i) Single programming
ii) Multi-linear programming
iii) Reverse programming
iv) Dynamic programming
d) Convert the following maximization to min transportation problem.

| Dacalers | $A$ | $B$ | $C$ | D | Capscity |
| :---: | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |
| X | 6 | 6 | 6 | 4 | 310 |
| Y | 4 | 2 | 4 | 5 | 100 |
| Z | 5 | 6 | 7 | 8 | 290 |
| Requirement | 150 | 130 | 120 | 300 | 700 |


| Ans: |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  | A | B | C | D | Capacity |
| X |  |  |  |  |  |
| Y |  |  |  |  |  |
| Z |  |  |  |  |  |
| Requirement |  |  |  |  |  |

e) Genetic algorithms (GA) are heuristic methods that do not guarantee an optimal solution to a problem (True or False?)
f) Heuristic approaches are typically used to solve more complex problems. (True or False?)
g) Genetic algorithms belong to the family of methods in the
i) Artificial intelligence area.
ii) Optimization area.
iii) Complete enumeration family of methods
iv) Non-computer based (human) solutions
h) In modeling, an optimal solution is understood to be
i) A solution that can only be determined by an exhaustive enumeration and testing of alternatives.
ii) A solution found in the least possible time and using the least possible computing resources
iii) A solution that is the best based on criteria defined in the design phase
iv) a solution that requires an algorithm for determination
i) All of the following are suitable problems for Genetic Algorithms (GA) EXCEPT
i) Dynamic process control
ii) Pattern recognition with complex patterns
iii) Simulation of biological models
iv) Simple optimization with few variables
j) In Swarm intelligence which is true
i) Global behaviour appears as a result of centralized control
ii) In Particle Swarm Optimization (PSO), velocity and position of particles are updated
iii) Communication through the environment is called stigmergy
iv) The probability of choosing a new edge in ant colony optimization is proportional with the pheromone level of the edge(CO1,2,3,4,5) (L1,L2,L3,4,5) 2x10

## PART-A

Q. 2 Consider a chocolate manufacturing company that produces only two types of chocolate - A and B . Both the chocolates require Milk and Choco only. To manufacture each unit of $A$ and $B$, the following quantities are required:
Each unit of A requires 1 unit of Milk and 3 units of Choco
Each unit of $B$ requires 1 unit of Milk and 2 units of Choco
The company kitchen has a total of 5 units of Milk and 12 units of Choco. On each sale, the company makes a profit : Rs 6 per unit A sold, Rs 5 per unit B sold.
Now, the company wishes to maximize its profit.
a) Formulate this real-world problem into a mathematical/LP model. What are the decision variables, objective, and the constraints? Indicate sign restrictions if any and draw the model in graph.
(CO1,CO2 L5,L1) 10
b) How many units of $A$ and $B$ should it produce, respectively? (CO1,CO2 L5,L1) 10
Q. 3 a) Consider the objective function as $Q_{A}(x, y, z)=x^{2}+3 y^{2}+2 z^{2}$. Write down all of the entries of square matrix $A$, and classify $A$ as positive definite, negative definite, indefinite or unknown.
(CO3,L2,L3) 10
b) Prove that this system of linear equations has infinitely many solutions by using rank and augmented matrix concepta
(CO3,L2,L3) 10

$$
\begin{aligned}
& x_{1}+x_{2}+x_{3}=3 \\
& -x_{1}+x_{2}+0.5 x_{3}=1.5
\end{aligned}
$$

Q. 4 a) Find the optimal Solution to the following transportation problem using Least cost method.

|  |  | Ware Houses |  |  |  | Capacity |
| :---: | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  | $W_{1}$ | $W_{2}$ | $W_{3}$ | $W_{4}$ |  |
| Factory | $F_{1}$ | 10 | 30 | 50 | 10 |  |
|  | $F_{2}$ | 70 | 30 | 40 | 60 | 9 |
|  | $F_{3}$ | 40 | 80 | 70 | 20 | 18 |
|  | Demand | 5 | 8 | 7 | 14 |  |

b) Formulate as an LPP, laying its objective function and constraints.
(CO4 L3,L5) 10
(CO4 L3,L5) 10

## PART-B

Q. 5 a) Describe a Hessian matrix and mention any two usages.
(CO3 L2,L3) $\mathbf{1 0}$
b) Use Lagrange's Multipliers to find the maximum volume of a rectangular box( $x, y, z$ dimensions) that is inscribed in a sphere of radius $r$. Complete laying the objective function, constraints and solve it. Hint: maximize $V=(2 x)(2 y)(2 z)=8 x y z$
(CO3 L2,L3) 10
Q. 6 a) Genetic Algorithms (GA) use principles of natural evolution. Describe five important features of GA.
(CO5 L2,L3) 10
b) Consider the Travelling Salesperson Problem (TSP) . Suppose that in order to solve this problem we use GA, in which genes represent links between pairs of cities. For example, a link between city 0 and city 1 is represented by a single gene ' 01 '.
Assume: the direction is irrelevant, so that $01=10$.
i) How many genes will be used in a chromosome of each individual, if the number of cities is 10 ?
ii) How many genes will be in the alphabet of the algorithm? ( Hint: 10 cities visit remaining 9)
iii) Perform the following crossover operations Cross the fittest two individuals using one-point crossover at the middle point.
(CO5 L2,L3) 10
Q. 7 a) With reference to Ant Colony Optimisation (ACO), define these algorithmic elements in detail: Evaporation, Transition Probability.
(CO6 L1,L2) 10
b) Assume that the original ACO as presented by Dorigo is being used to solve TSP. Discuss the changes that would have to be made to the algorithm to convert it to an ant algorithm- based hyper-heuristic.

# End Semester Examination, Dec. 2022 <br> M. Tech. - Third Semester <br> MOBILE APPLICATIONS AND SERVICES (MCS-321) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt any FIVE questions in all. Marks are indicated against each question.
Q. 1 a) What do you understand by Mobility in Mobile Computing?
[CO-5] [L-4] 10
b) Discuss and Detail the factors to be considered when developing mobile applications?
[CO-3] [L-4] 10
Q. 2 a) How to Build a Text-to-Speech App?
[CO-3] [L-2] 10
b) How is data stored and retrieved in Android?
[CO-4] [L-3] 10
Q. 3 a) Discuss the purpose of using 'Intent' in Android and its working with an example.
[CO-4] [L-4] 10
b) How to set an Alarm in an Android application? Explain with the help of Code.
[CO-2] [L-2] 10
Q. 4 a) What are location-based services in mobile application development?
[CO-4] [L-5] 10
b) Describe Multimedia Mobile Agents and Peer-to-Peer Architecture in details.
[CO-5] [L-4] 10
Q. 5 a) Explain performance based best practices to develop an Android application.
[CO-5] [L-3] 10
b) List and explain various Location Based Services that works with Android?
[CO-2] [L-3] 10
Q. 6 a) What are the new trends in mobile application development? [CO-5] [L-4] 10
b) Which model is used for developing a mobile application? Explain its architecture.
[CO-2] [L-4] 10
Q. 7 a) Describe the impacts of Internet of Things (IoT) on mobile computing techniques.
[CO-1] [L-2] 10
b) How Wireless Communications might affect the Development and Implementation of the Internet of Things (IoT)?
[CO-2] [L-3] 10
Q. 8 a) Why do mobile applications fail?
[CO-4] [L-4] 10
b) What are the usage models for synchronization in mobile application?
[CO-3] [L-4] 10

# End Semester Examination, Dec. 2022 <br> M. Tech - First Semester <br> DISTRIBUTED SYSTEMS (MCS-125) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all. Marks are indicated against each question.
Q. 1 a) Define 'DDBS'. Discuss its architecture, advantages and disadvantages.
[CO-1][L-2] 10
b) Explain how transparency is handled in distributed DBMS.
[CO-1][L-3] 10
Q. 2 a) Discuss in details the different methods of data fragmentation.
[CO-2][L-3] 10
b) Critically examine the concept of layered query processing.
[CO-2][L-5] 10
Q. 3 State the significance of semantic integrity control in DDBS. Differentiate between:
a) Data type integrity constraint.
b) Entity integrity constraint.
c) Referential integrity constraint.
[CO-3][L-4] 20
Q. 4 Draw the architecture for distributed query processing highlighting the steps taken for global and local optimization.
Considering the following project schema which is horizontally fragmented according to city, the cities being New Delhi, Kolkata and Hyderabad.
PROJECT

| P Id | City | Department | Status |
| :--- | :--- | :--- | :--- |

Demonstrate how to run the query to retrieve details of all projects whose status is "Qngoing".
[CO-3][L-6] 20
Q. 5 What do you understand by transaction location and transaction control? Explain how it affects deadlock management in DDMS.
[CO-3][L-3] 20
Q. 6 Discuss the execution of commit protocol in DDMS. What are the different types of commit protocol supported in DDMS? State the various steps followed in each of the types.
[CO-2][L-2] 20
Q. 7 a) Differentiate between static and dynamic load balancing.
[CO- 2][L- 4] 10
b) Discuss in details hash and IP hash.
[CO-3][L- 2] 10
Q. 8 Write short notes on:
a) Mobile databases.
b) Multi-databases.
[CO- 2][L- 2] $\mathbf{1 0 \times 2}$

# End Semester Examination, Dec. 2022 <br> M. Tech. - First Semester <br> DATA SCIENCE (MCS-124) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt any FIVE questions in all. Marks are indicated against each question.
Q. 1 a) Explain the difference between a Validation Set and a Test Set?
[CO-2] [L-2] 10
b) Compare different kernels in SVM.
[CO-5] [L-3] 10
$\begin{array}{lll}\text { Q. } 2 & \text { a) Enumerate in detail, the various data encoding schemes. } & \\ & \text { b) What does Bokeh offer to a data scientist? Discuss it in detail. } & {[\mathrm{L}-2] \mathbf{1 0}} \\ & {[C O-4][\mathrm{L}-2] \mathbf{1 0}}\end{array}$
Q. 3 a) Describe the concept of 'Naive' in a Naive Bayes.
[CO-3] [L-2] 10
b) Assume the following dataset as given below: $\{(2,2),(4,4),(5,5),(6,6),(7,7)$, $(9,9),(0,6),(6,0)\}$ Use $K-M e a n s$ with $K=3$, for a single iteration. What are the new clusters and what are their centroids?
[CO-2] [L-3] 10
Q. 4 a) Illustrate the working of ROC curve.
[CO-4] [L-4] 10
b) Discuss how does data cleaning play a vital role in the data analysis technique/process.
[CO-3] [L-3] 10
Q. 5 a) Differentiate between univariate, bivariate and multivariate analysis.
[CO-4] [L-4] 10
b) How Machine learning programming is used to optimize the performance data science? Explain in detail.
[CO-5] [L-5] 10
Q. 6 a) Construct confusion matrix and compute accuracy, precision and recall. $\mathrm{TN}=50$ $\mathrm{FP}=10 \mathrm{FN}=5 \mathrm{TP}=100$.
[CO-5] [L-5] 10
b) What is entropy and information gain in decision tree algorithm?
[CO-3] [L-2] 10
Q. 7 a) Define 'logistic regression'. State an example when and where you have recently applied logistic regression.
[CO-3] [L-2] 10
b) List and explain the various ways to treat outlier values.
[CO-3] [L-2] 10
Q. 8 a) How will you define the number of clusters in a clustering algorithm? Support with example.
[CO-3] [L-2] 10
b) Explain reinforcement learning with the help of an example.
[CO-3] [L-2] 10

# End Semester Examination, Dec. 2022 

## M. Tech. - First Semester <br> MACHINE LEARNING (MCS-121)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all. Marks are indicated against each question.
Q. 1 Consider the following set of training examples:

| Class | A1 | A2 |
| :---: | :---: | :---: |
| + | T | T |
| + | T | T |
| $=$ | T | F |
| + | F | F |
| $=$ | F | T |
| - | F | T |

What is the entropy of this collection of training examples with respect to target variable class?
Calculate the information gain of A2 for given training examples. [CO-2][L-3] 20
Q. 2 Use the k-means algorithm to cluster the following 8 points into 3 clusters:
$A 1=(2,10), A 2=(2,5)$,
$A 3=(8,4), A 4=(5,8), A 5=(7,5), A 6=(6,4), A 7=(1,2), A 8=(4,9)$. Suppose initial seeds are A1, A4 and A7. Run the k-means algorithm for 2 epochs. At the end of each epoch show:
a) The new clusters.
b) Centers of new clusters.
[CO-2][L-3] 20
Q. 3 Explain support vector machine from the perspective of a Non-Linear kernel by means of an algorithm. Derive the margin of the support vectors with an example and depict it with necessary diagrams.
[CO-3][L-2] 20
Q. 4 a) What do you mean by feature extraction? Explain principle component Analysis algorithm for feature extraction.
[CO-3][L-2] 10
b) Explain the feed forward neural network using example. List the application areas where it can be used.
[CO-3][L-2] 10
Q. 5 a) Explain confusion matrix with respect to detection of "spam e-mails". [CO1][L2] 10
b) Illustrate the impact of over fitting in a typical machine learning model. [CO1][L2] 10
Q. 7 a) Discuss back propagation and its benefits in deep learning.
[CO-3][L-2] 10
b) Explain the role of machine learning in designing IoT applications. [CO-3][L-2] 10
Q. 8 a) How does the AdaBoost algorithm work? Why ensemble learning is not used though it has better output most of the time?
[CO-5][L-2] 10
b) Explain the steps involved in a typical reinforcement learning algorithm.
[CO-5][L-2] 10

# End Semester Examination, Dec. 2022 

## M. Tech. - First Semester <br> MACHINE LEARNING (MCS-121)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all. Marks are indicated against each question.
Q. 1 Consider the following set of training examples:

| Class | A1 | A2 |
| :---: | :---: | :---: |
| + | T | T |
| + | T | T |
| $=$ | T | F |
| + | F | F |
| $=$ | F | T |
| - | F | T |

What is the entropy of this collection of training examples with respect to target variable class?
Calculate the information gain of A2 for given training examples. [CO-2][L-3] 20
Q. 2 Use the $k$-means algorithm to cluster the following 8 points into 3 clusters:
$\mathrm{A} 1=(2,10), \mathrm{A} 2=(2,5)$,
$A 3=(8,4), A 4=(5,8), A 5=(7,5), A 6=(6,4), A 7=(1,2), A 8=(4,9)$. Suppose initial seeds are A1, A4 and A7. Run the $k$-means algorithm for 2 epochs. At the end of each epoch show:
a) The new clusters.
b) Centers of new clusters.
[CO-2][L-3] 20
Q. 3 Explain support vector machine from the perspective of a Non-Linear kernel by means of an algorithm. Derive the margin of the support vectors with an example and depict it with necessary diagrams.
[CO-3][L-2] 20
Q. 4 a) What do you mean by feature extraction? Explain principle component Analysis algorithm for feature extraction.
[CO-3][L-2] 10
b) Explain the feed forward neural network using example. List the application areas where it can be used.
[CO-3][L-2] 10
Q. 5 a) Explain confusion matrix with respect to detection of "spam e-mails". [CO1][L2] $\mathbf{1 0}$
b) Illustrate the impact of over fitting in a typical machine learning model. [CO1][L2] 10
Q. 7 a) Discuss back propagation and its benefits in deep learning.
[CO-3][L-2] 10
b) Explain the role of machine learning in designing IoT applications. [CO-3][L-2] 10
Q. 8 a) How does the AdaBoost algorithm work? Why ensemble learning is not used though it has better output most of the time?
[CO-5][L-2] 10
b) Explain the steps involved in a typical reinforcement learning algorithm.
[CO-5][L-2] 10

# End Semester Examination, Dec. 2022 

## M. Tech. - First Semester

ADVANCED DATA STRUCTURES (MCS-102)
Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Marks are indicated against each question.
Q. 1 a) Explain the term "Collision" in Hashing. Solve the following problem by using double hashing. Insert the keys 79, 69, 98, 72, 14, 50 into the Hash Table of size 13. Resolve all collisions using Double Hashing where first hash-function is $h_{1}(k)=$ $k$ mod 13 and second hash-function is $h_{2}(k)=1+(k \bmod 11)$
[CO-3] [L-3] 10
b) Explain why rehashing is required? Explain terminologies used for extendible hashing with its working principle.
[CO-2] [L-2] 10
Q. 2 Write short notes on following:
a) Search and update operations in a skip list.
b) Probabilistic analysis of skip lists.
[CO-1] [L-1] $\mathbf{1 0 \times 2}$
Q. 3 a) Construct an AVL tree for the following input sequence in their alphabetical order. < Mar, May, Nov, Aug, Apr, Jan, Dec, July, Feb, June, Oct, Sept > [CO-3] [L-5] 10
b) Describe the properties of Red-Black tree. And construct a Red-Black tree by inserting following sequence numbers. $\langle 8,18,5,15,17,25,40,80>$. [CO3][L5] 10
Q. 4 a) Explain Knuth-Morris-Pratt Algorithm with a suitable example.
[CO-5] [L-4] 10
b) Find the LCS of following two sequences by applying dynamic programming.

Sequence 1: AECFDEF
Sequence 2: B A CGDGBF
[CO-6] [L-3] 10
Q. 5 a) Define Priority Search Tree. Write the algorithm for constructing a priority search tree and find the cost of making a priority search tree.
[CO-4] [L-2] 10
b) Write short notes on:
i) quad tree
ii) k-D tree
[CO-1] [L-1] 10
Q. 6 a) Explain various computational geometry methods for efficiently solving the new evolving problem.
[CO-6] [L-2] 10
b) Explain the following in detail:
i) Static Hashing.
ii) Dynamic Hashing.
[CO-6] [L-2] 10
Q. 7 a) Write down the Huffman encoding algorithm and solve the following.

Characters Frequencies
A 10
E 15
I 12
$0 \quad 3$
U 4
S 13
T 1
b) Explain the insertion algorithm for Red-Black tree with a suitable example.


# End Semester Examination, Dec. 2022 

## M. Tech. - First Semester

## MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE (MCS-101)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1
Note: Attempt any FIVE questions in all. Marks are indicated against each question.
Q. 1 a) The random variable with PDF is given by:

$$
f(x)=\left[\begin{array}{c}
k\left(x^{2}+x\right) ; \text { if } 0 \leq x \leq 1 \\
0 ; \text { else }
\end{array}\right]
$$

Find the cumulative distribution function (CDF).
[CO-1] [L-3] 15
b) Explain parametric families of distribution.
[CO-1] [L-2] 5
Q. 2 a) An article presented data on compressive strength $x$ and intrinsic permeability $y$ of various concrete mixes and cures. Summary quantities are $=14,=572,=23530$, $=43,=157.42$, and $=1698.80$ Assume that the two variables are related according to the simple linear regression model. Round all intermediate calculations to at least 5 decimal places and round your final answers to 3 decimal places.
i) Test for significance of regression using $=0.05$.
ii) Estimate.
iii) What is the standard error of the intercept and slope in this model?[CO1][L4] 15
b) Briefly discuss sampling distributions of estimators.
[CO-2] [L-3] 5
Q. 3 a) How is the first principal component axis selected in PCA?
[CO-2] [L-1] 10
b) Explain in detail the problem of over fitting model assessment. [CO-2] [L-2] 10
Q. 4 a) A bag contains 25 balls numbered 1 through 25 . Two balls are drawn from the bag with replacement. Find the probability of getting:
i) Both are odd numbered.
ii) One odd and one even numbered.
iii) At least one odd numbered.
iv) No odd numbered.
[CO-2] [L-4] 10
b) Suppose a simple graph $G$ on $n$ vertices has at least $(((n-1)(n-2)) / 2)+2 e d g e s$. Prove that G has a Hamilton cycle, for $n \geq 2$, show that there is a simple graph with $(((n-1)(n-2)) / 2)+1$ edges that has no Hamilton cycle.
[CO-2] [L-4] 10
Q. 5 a) Explain the methods for analysing the web traffics.
[CO-2] [L-2] 10
b) How the missing data or corrupted data is handled in machine learning. Explain in detail.
[CO-3] [L-2] 10
Q. 6 a) Differentiate between cohesion and coupling. What are the elements to be considered in the system model construction? [CO-1] [L-2] 10
b) Explain Distributed system functions and services in detail. [CO-1] [L-2] 10
Q. 7 a) In a box, there are 6 balls of which 3 are white and 3 are black. They are drawn, successively.
i) With replacement
ii) Without replacement
Find the probability that colors are alternate.
[CO-3] [L-3] 10
b) Write the algorithm for graph coloring. How the chromatic number in graph is calculated.
Q. 8 a) Explain in detail recent trends in various distribution functions in Mathematical field of computer science in field of computer vision.
[CO-3] [L-3] 10
b) Differentiate between soft computing and hard computing. Write five applications of soft computing.

# End Semester Examination, Dec. 2022 

M. Tech. - Second Semester

ADVANCED DESIGN OF BRIDGES (MCE-TE-208)
Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) State the different forms of a typical bridge structure.
b) Classify bridges based on inter - span relations.
c) Correlate the significance of "scour depth" in terms of bridge engineering.
[CO-2] [L-1]
d) With the help of a neat sketch, illustrate the loading condition of a wheeled vehicle of IRC Class AA loading.
[CO-2] [L-3]
e) List the various forces acting on a culvert.
[CO-3] [L-1]
f) Evaluate the impact factor for IRC Class AA loading for tracked vehicle if the effective span of the bridge is 10 m .
[CO-3] [L-4]
g) Compare "substructure" and "foundation" in context to bridge structure. [CO-4] [L-2]
h) List the various loads considered in designing of an abutment.
[CO-5] [L-2]
i) Justify the necessity of elastomeric bearings in the bridge structure.
[CO-5] [L-3]
j) Differentiate between the principles of major inspection and minor inspection with respect to bridge health monitoring.
[CO-6] [L-2] 2×10

## PART-A

Q. 2 a) Classify bridges.
[CO-1] [L-3] 10
b) Elaborate "Necessity for bridge investigation" in detail.
[CO-1] [L-3] 10
Q. 3 Write a well - explained note on "economical span" and "linear waterway".[CO2][L3] 20
Q. 4 Design the deck slab for a reinforced concrete slab culvert, having following data:

- Clear Span of bridge
- 2 - Lane width Roadway
- 1.0 m footpaths on either side of roadway
- Wearing Coat : 85 mm
- Width of bearing
: 400 mm
- IRC Class A Tracked Vehicle
- M 25 grade concrete and Fe 415 Steel
[CO-3] [L-6] 20


## PART-B

Q. 5 a) With the help of a neat sketch, illustrate the various shapes of abutments.
[CO-4] [L-3] 5
b) Analyze the stresses acting on a pier structure for the following data:

- Simply Supported T - Beam Bridge Deck
- Dead Load from each span : 3200 kN
- Reaction due to Live Load : 1000 kN
- Total height of Pier :8m
- Width at GL : 2.5 m
- Width at Bearing Level : 1.3 m
- Length of Pier
: 8 m
- Maximum mean velocity of current : $3.2 \mathrm{~m} / \mathrm{s}$
- M 25 grade of concrete
- Class AA wheeled vehicle
Q. 6 Illustrate the following with the help of neat sketches:
a) Elastomeric bearings.
b) Fixed bearings.
c) Expansion bearings.
Q. 7 a) Summarize the importance of "bridge inspection".
b) Compare the different degrees of damage in a bridge structure.


# End Semester Examination, Dec. 2022 

M. Tech. - Second Semester

INTELLIGENT TRANSPORTATION SYSTEM (MCE-TE-202)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) What is intelligent transport system?
[CO-1] [L-1]
b) How does digitalization fit into the wider transport policy?
c) What user services are offered by ITS?
[CO-3] [L-2]
d) How road side communication helps in transmitting the information?
e) What are objectives of advanced rural transportation systems?
f) Explain the importance of advanced public transportation system in brief.
g) Explain the benefits of advanced vehicle safety system in brief.
h) What is role of Traffic Management Centers (TMC)?
i) Write down the components of AVL system.
j) List out the benefits of electronic payment.

## PART-A

Q. 2 What is an intelligent transport system? Along with it, explain the concept and major components of ITS ?
[CO-1] [L-2] 20
Q. 3 a) Explain automated roadside safety inspection and on-board safety monitoring.
[CO-1] [L-3] 10
b) Discuss how GIS could br implemented in highway maintenance management.
[CO-2] [L-4] 10
Q. 4 a) What are various emerging techniques for wireless vehicular communications? Explain.
[CO-3] [L-2] 10
b) Explain the various parameters on which functioning of traffic management center depends.
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Explain the advanced public transportation systems in detail and its benefits to the society.
[CO-5] [L-2] 10
b) On what principles advanced traffic management system (ATMS) works, explain.
[CO-4] [L-2] 10
Q. 6 a) Explain the different phases involved in commercial vehicle operation (CVO) for managing the maneuver of commercial vehicle.
[CO-4] [L-2] 10
b) Discuss the importance of emergency management in managing congestion on roads.
[CO-4] [L-2] 10
Q. 7 Discuss ITS approach for the goal enhance public safety.
[CO-6] [L-3] 20

# End Semester Examination, Dec. 2022 

## M. Tech. - First Semester

## ADVANCE RAILWAY ENGINEERING (MCE-TE-103)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) What are basic requirements of a good alignment?
[CO-1] [L-2]
b) Compare different modes of transportation? [CO-1] [L-2]
c) What are the objectives of signaling? [CO-5] [L-2]
d) Differentiate between stock rail and tongue rail. [CO-2] [L-2]
e) Why sleepers are used in railway tracks? [CO-3] [L-3]
f) Categorize the types of rail wear.
g) State the disadvantages of having a multiple gauge system.
h) Why track drainage is important?
[CO-3] [L-2]
i) Differentiate between absolute and automatic block system.
j) Enlist various measures normally taken to improve the track for it to accommodate high speeds?
[CO-5] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 Discuss the role of Indian Railways in the social and economic development of the country. Mention briefly the strengths and weaknesses of the Indian Railways.
[CO-1] [L-2] 20
Q. 3 What are various types of track stresses induced in a rail section? Explain briefly how these are evaluated?
[CO-2] [L-3] 20
Q. 4 What is the ballast? Why is it used in the railway track? Describe the various types of ballasts used.
[CO-3] [L-3] 20

## PART-B

Q. 5 Draw a neat sketch of a right-hand turnout taking off from a straight broad gauge track and name thereon the various component parts and important terms connected with the layout. Show the disposition of the sleepers.
[CO-4] [L-4] 20
Q. 6 a) Describe the locations and purposes of the following signals:
i) Warner
ii) Outer
iii) Home
iv) Starter
v) Advance starter
[CO-5] [L-3] 10
b) What are the essentials of interlocking? Distinguish between direct and indirect interlocking.
[CO-5] [L-3] 10
Q. 7 Discuss various forms of urban transport along with its advantages and disadvantages.
[CO-5] [L-4] 20

# End Semester Examination, Dec. 2022 

## M. Tech. - First Semester

## URBAN AND REGIONAL TRANSPORT PLANNING (MCE-TE-102)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Differentiate between the process problem solving and transportation planning.
b) Explain the classification of trip ends.
[CO-1] [L-1]
c) Explain classification of roads.
d) Enlist the various growth factor methods of trip distribution.
[CO-2] [L-2]
e) Explain the purpose of modeling.
f) What are the assumptions behind user equilibrium assignment for network modeling?
[CO-3] [L-1]
g) Draw a flow chart for the system engineering process of transportation planning.
[CO-1] [L-1]
h) What are the different disadvantages of fratar model?
[CO-5] [L-1]
i) Explain the term "traffic assignment" and different techniques used for traffic assignment.
[CO-5] [L-2]
j) List various types of transportation survey.
[CO-6] [L-1] 2x10

## PART-A

Q. 2 a) Explain the transportation planning process alongwith various steps associated with it.
b) Explain the methodology of approach to analysis of goods movement.
[CO-2] [L-1] 10
Q. 3 a) What do you understand by category analysis. Also describe the advantages and disadvantages associated with it.
[CO-2] [L-2] 10
b) Differentiate between home based and non-home-based trips. List the various characteristics that define a journey.
[CO-2] [L-1] 10
Q. 4 a) Define trip generation and explain trip distribution in trip generation analysis.
[CO-3] [L-2] 10
b) Explain the factors affecting modal split.
[CO-3] [L-2]10

## PART-B

Q. 5 a) Write down the factors influencing the choice of mode.
[CO-4] [L-2] 10
b) The total number of trips from zone i to zone j is 4200 . Currently all trips are made by car. Government has two alternatives- to introduce a train or a bus. The travel characteristics and respective coefficients are given in table below. Decide the best alternative in terms of trips carried.

|  | $\mathrm{t}^{\mathrm{v}}{ }_{\mathrm{ij}}$ | $\mathrm{t}^{\mathrm{walk}}{ }_{\mathrm{ij}}$ | $\mathrm{t}_{\mathrm{ij}}^{\mathrm{t}}$ | $\mathrm{F}_{\mathrm{ij}}$ | $\phi_{\mathrm{ij}}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| coefficient | 0.02 | 0.04 | 0.08 | 0.2 | 0.2 |
| car | 40 | - | - | 16 | 2 |
| bus | 50 | 5 | 3 | 8 | - |
| train | 10 | 12 | 2 | 4 | - |

Q. 6 A self-contained town consists of four residential areas A, B, C, D and two industrial estates $X$ and $Y$. Generation equations show that, for the design year in question, the trip s from home to work generated by each residential area per 24-hour day are as follows:

| A | 1000 |
| :---: | :---: |
| B | 2250 |
| C | 1750 |
| D | 3200 |

There are 3,700 jobs in industrial estates $X$ and 4,500 jobs in industrial estate $Y$. It is known that the attraction between zones is inversely proportional to the square of the journey times between zones. The journey times in minutes from home to work are:

| Zones | X | Y |
| :---: | :---: | :---: |
| A | 15 | 20 |
| B | 15 | 10 |
| C | 10 | 10 |
| D | 15 | 20 |

Calculate and tabulate the inter zonal trips for journeys from home to work.
[CO-5] [L-3] 20
Q. 7 a) What are the different types of movements in a given study area. Explain each.
[CO-6] [L-2] 10
b) Explain home interview method in detail. Also write down the various factors influencing the trips based on home interview survey.
[CO-6] [L-2] 10

# End Semester Examination, Dec. 2022 

## M. Tech. - First Semester

## URBAN AND REGIONAL TRANSPORT PLANNING (MCE-TE-102)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) Differentiate between the process problem solving and transportation planning.
b) Explain the advantages of Post-card questionnaire survey.
[CO-1] [L-1]
[CO-2] [L-2]
c) Explain various factors governing trip generation and attraction.
d) Write down all different methods used for trip distribution.
e) What do you understand by cordan count?
[CO-3] [L-1]
f) What are the assumptions behind user equilibrium assignment for network modeling?
[CO-3] [L-1]
g) Discuss the relation between transport and socio-economic activities.
h) Define all or nothing assignment technique.
[CO-5] [L-1]
i) Explain the term "traffic assignment" and different techniques used for traffic assignment.
[CO-5] [L-2]
j) Show the relation between speed, density and flow using graphs. [CO6] [L-1] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) What do you understand by urban transportation planning. Also write the different components of a transportation system.
[CO-1] [L-2] 10
b) Explain the travel demand forecasting process.
[CO-2] [L-1] 10
Q. 3 a) Explain the different types of urban road systems. Describe any two with neat diagrams.
[CO-2] [L-2] 10
b) Differentiate between home based and non-home-based trips. Write down the various characteristics that define a journey.
[CO-2] [L-1] 10
Q. 4 a) Explain in short the growth factor modeling and regression methods. [CO3][L-2] 10
b) Let the trip rate of a zone is explained by the household size done from the field survey. It was found that the household sizes are 1, 2, 3, and 4. The trip rates of the corresponding household are as shown in the table below. Fit a linear equation relating trip rate and household size.

| Household size $(x)$ |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: |
|  | 1 | 2 | 3 | 4 |
| Trips | 1 | 3 | 5 | 7 |
| Per | 3 | 4 | 6 | 8 |
| day $(\mathrm{y})$ | 3 | 3 | 7 | 6 |
| $\sum y$ | 7 | 10 | 18 | 21 |

[CO-3] [L-3] 10

## PART-B

Q. 5 a) Write down the factors influencing the choice of mode.
[CO-4] [L-2] 10
b) The total number of trips from zone I to zone J is 4200 . Currently all trips are made by car. Government has two alternatives to introduce a bus or a metro. The travel characteristics and respective coefficients are given below. Decide the best alternative in terms of trips carried.

|  | $\mathrm{t}_{j}^{(\mathrm{v})}$ | $\mathrm{t}_{\mathrm{ij}}{ }^{\boldsymbol{\omega} \mathrm{lk}}$ | $\mathrm{t}_{\mathrm{i}}{ }^{*}$ | $\mathrm{~F}_{\mathrm{ij}}$ | $\Phi_{i j}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Coefficient | 0.06 | 0.03 | 0.07 | 0.2 | 0.2 |
| Car | 30 | - | - | 22 | 6 |
| Bus | 40 | 8 | 7 | 9 | - |
| Metro | 16 | 15 | 4 | 7 | - |

$$
\begin{aligned}
t_{y j}^{(y)} & \rightarrow \text { in vehicle travel time } \\
t_{y} t_{y}^{\text {mak }} & \rightarrow \text { walking time } \\
t_{y}{ }^{\prime} & \rightarrow \text { waiting time } \\
F_{y} & \rightarrow \text { Fare charged } \\
\phi_{y} & \rightarrow \text { Parking cost }
\end{aligned}
$$

Q. 6 a) Explain link cost function in network assignment.
[CO-5] [L-2] 10
b) Calculate the system travel time and link flows by doing user equilibrium assignment for the network in the given figure below. Verify that the flows are at user equilibrium.

[CO-5] [L-2] 10
Q. 7 a) Explain different types of movements in a given study area. Explain in detail.
b) Explain home interview method in detail. Also write down the various factors influencing the trips based on home interview survey.
[CO-6] [L-2] 10

# End Semester Examination, Dec. 2022 <br> M. Tech. - First Semester <br> TRAFFIC ENGINEERING (MCE-TE-101) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) Explain the traffic manoeuvres and their applications.
[CO-2] [L-2]
b) Explain the various factors on which PCU values depend. [CO-1] [L-2]
c) Differentiate between traffic flow and traffic capacity. [CO-2] [L-1]
d) Define the term "Desire Lines" in brief. [CO-2] [L-1]
e) Explain the objective of origin and destination study. [CO-2] [L-1]
f) Explain different types of traffic signals.
g) Explain various types of road markings. [CO-4] [L-2]
h) Differentiate between phase diagram and time diagram.
[CO-5] [L-1]
i) Show the conflict points at the following types of intersections:
i) Cross roads, one road one way
ii) T-section, both roads two way
[CO-3] [L-3]
j) Explain various types of queue disciplines of Queuing theory.
[CO-3] [L-1] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) The table below gives the consolidated data of spot speed studies on a section of a road. Determine the most preferred speed at which maximum proportion of vehicles travels.

| Speed range | No of vehicles |
| :---: | :---: |
| $0-10$ | 0 |
| $10-20$ | 11 |
| $20-30$ | 30 |
| $30-40$ | 105 |
| $40-50$ | 233 |
| $50-60$ | 216 |
| $60-70$ | 68 |
| $70-80$ | 24 |
| $80-90$ | 0 |

[CO-2] [L-3] 10
b) Explain the significance of road user characteristics in traffic engineering. Discuss briefly the various factors which affect the road user characteristics. [CO-1] [L-2] 10
Q. 3 a) Explain various steps for design of level of service of urban streets by HCM method.
[CO-3] [L-3] 10
b) Explain the various factors affecting capacity and level of service in detail.
[CO-3] [L-2] 10
Q. 4 a) The hourly flow rate in a road section is 120 vph. Use Poisson distribution to model this vehicle arrival.
[CO-4] [L-3] 10
b) Derive the equation of car following theory of analysing movement of vehicles over road network.
[CO-4] [L-3] 10

## PART-B

Q. 5 a) The Motor vehicle consumption in a city is 5.082 million litres, there were 3114 motor vehicle fatalities, 355,799 motor vehicle injuries, $6,721,049$ motor vehicle registrations and an estimated population of 18,190,238. Kilometre of travel per litres of fuel is $12.42 \mathrm{~km} / \mathrm{litres}$. Calculate registration death rate, population death rate and accident rate per vehicle km .
[CO-4] [L-3] 10
b) Explain various stages of road safety audit and also discuss the general approach to improve road safety.
[CO-4] [L-3] 10
Q. 6 a) Explain the design steps of traffic signals by using Webster's method. [CO5] [L3] 10
b) Explain various phases of signals in detail.
[CO-5] [L-2] 10
Q. 7 a) Classify the different types of traffic signs and mention the general objective of each type of sign; with sketches show the general shape of these types of signs.
[CO-4] [L-2] 10
b) Explain the various types of markings and also explain how it helps to control the traffic?
[CO-4] [L-2] 10

# M. Tech. - Second Semester <br> DESIGN OF ADVANCED CONCRETE STRUCTURES (MCE-SE-207) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Explain the provisions for design of resistance against corrosion.
[CO-3] [L-1]
b) Summarise the geophysical sources of building load.
[CO-1] [L-2]
c) Define a framework for design of corbels.
d) When will you consider the use of shear walls?
e) As per revised IS code, "torsional reinforcement is now not required to be worked out separately from that required for bending and shear". Justify
f) List the various classifications of cross section as per plastic analysis.
g) Illustrate the parameters influencing the design of deep beams.
h) Differentiate between buckling and crippling.
i) Explain fatigue loadings with regards to structural failure.
[CO-3] [L-1]
j) What do you understand by "stress concentration" associated with structural steel?
[CO-5] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Detail an overview of performance based design highlighting its advantages over other design philosophies.
[CO-1] [L-3] 10
b) Explain in details how structural systems are differentiated in terms of load transmission mechanism in reinforced concrete building design. [CO-1] [L-2] 10
Q. 3 Design a simply supported transfer girder of 5.5 m length loaded from two columns at 2 m from each end with 5500 kN . The total depth of the beam is 4.5 m and the width of support is 60 cm . Assume 40 grade concrete and Fe415 steel, (Sketch the arrangement of the design). [CO-2] [L-5] 20
Q. 4 Enunciate the different classifications of shear walls with proper detailing. Draft a note on the compression field theory for shear design.
[CO-3] [L-4] 20

## PART-B

Q. 5 Carry out a full torsional design of a rectangular reinforced concrete beam subjected to an ultimate torsional moment of 50 kNm , and SF of 220 kN . The section is 600 x 400 mm. (Use M25 and Fe500 grade) Assume additional required data. [CO-4] [L-5] 20
Q. 6 Elaborate the various chemical compositions of structural steel. Explain the different types of structural steel as per the above compositions.
[CO-5] [L-3] 20
Q. 7 According to ACI, enunciate the fatigue properties of the following component materials:
"Prestressing tendons" and "Reinforcement bars."
[CO-6] [L-2] 20

# End Semester Examination, Dec. 2022 

# M. Tech. - Second Semester <br> STRUCTURAL DYNAMICS (MCE-SE-202) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Mention the various dynamic loads encountered by civil engineering structures.
[CO-4] [L-2]
b) Illustrate two examples of structures modeled as SDOF system.
[CO-1] [L-2]
c) Starting from the basic definition of stiffness, determine the effective stiffness of the combined spring and write the equation of motion for the spring-mass systems shown below:
[CO-1] [L-3]

d) Explain logarithmic decrement?
e) Illustrate with a figure half power bandwidth.
f) Compute the natural frequency and time Period of an SDOF system of mass 2000 kg and stiffness of $30 \mathrm{kN} / \mathrm{m}$.
g) Model a 2-storeyed building into a mass-spring-damper system with free body diagrams.
[CO-2] [L-3]
h) Elaborate conceptually vibrations caused by traffic.
[CO-6] [L-2]
i) Derive briefly time history at storey level for a three DOF system.
j) Derive briefly total response at floor for a three storeyed building as in response spectrum analysis.
[CO-6] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 Develop expression for response of damped SDOF system to free vibration. [CO1][L2] 20
Q. 3 Discuss briefly Duhamel's integral.
[CO-4] [L-2] 20
Q. 4 Explain central difference method for finding the response of a non-linear system subjected to arbitrary dynamic loading.
[CO-3] [L-2] 20

## PART-B

Q. 5 Derive characteristic equation for undamped free vibration in a MDOF system. [CO2][L2] 20
Q. 6 Perform eigen value analysis-the Eigen values and Eigen vectors for a two storeyed building $3.0 \mathrm{~m} \times 3.0 \mathrm{~m}$ plan area, floor to floor height as 3 m , Column Dimension as $230 \mathrm{~mm} \times 230 \mathrm{~mm}$ and thickness of slab as 100 mm . Assume mass-less columns and no infill walls. M25 Concrete has been used.
[CO-5] [L-2] 20
Q. 7 a) Defend Rayleigh's method of finding first natural frequency of MDOF structure.
[CO-4] [L-2] 10
b) Elaborate any two of the following:
i) Foundations for industrial machinery.
ii) Base isolation.
iii) Dynamic effects of wind loading.

# End Semester Examination, Dec. 2022 

## M. Tech. - First Semester

STRUCTURAL HEALTH MONITORING (MCE-SE-107)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) State the necessity of "Structural Health Monitoring" in present scenarios.
b) What do you understand by "Non - Destructive Testing" of concrete.
c) Define the concept of "Smart Structures".
d) List the two factors which are considered at the stage of "Data Retrieval".
[CO-2] [L-2]
e) Define the function of Embeddable Optic Sensors.
[CO-3] [L-1]
f) List two example of sensors used in Structural Health Monitoring.
[CO-3] [L-2]
g) With proper notations, explain the concept of "Design Wind Pressure". [CO-4] [L-2]
h) Define the term: Seismology.
[CO-5] [L-3]
i) List the various "Scales" for measuring the Intensity of Earthquake.
[CO-5] [L-2]
j) Elaborate the importance of "Hinge Formation" in structural analysis.

## PART-A

Q. 2 Write a well detailed note on "Non - Destructive Testing" of concrete with suitable laboratory and site testing methods.
[CO-1] [L-2] 20
Q. 3 a) List the various advantages of Structural Health Monitoring - Sensor System.
[CO-2] [L-2] 5
b) With the help of neat sketch, explain the components of a typical SHM system.
[CO-2] [L-3] 15
Q. 4 Correlate the following in relation with Structural Health Monitoring System:
a) Periodic SHM Monitoring.
b) Continuous SHM Monitoring.
c) Issues in designing of SHM System.
d) Methodology of SHM.
[CO-3] [L-2] 5x4

## PART-B

Q. 5 Plan a mechanism to determine the "Wind Load" as per the guidelines of Indian Standard IS 875: 2015 (Part III).
[CO-4] [L-6] 20
Q. 6 Write a well detailed note on "Magnitude of Earthquake".
[CO-5] [L-2] 20
Q. 7 With reference as a technique of the purpose of Retrofitting, explain the following:
a) Composite Column
b) Shear Wall
[CO-6] [L-3] 20

# End Semester Examination, Dec. 2022 

# M. Tech. - First Semester <br> STRUCTURAL HEALTH MONITORING (MCE-SE-107) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) What do you understand by the term "structural health monitoring"?
[CO-1] [L-2]
b) Elaborate the objectives of structural health monitoring. [CO-1] [L-2]
c) Define the concept of "Smart Materials. [CO-2] [L-1]
d) State the necessity of structural health monitoring. [CO-2] [L-2]
e) Define the function of Weldable optic sensors.
f) Justify the significance of "sensor system" in structural health monitoring.
g) Classify the different wind zones of India.
h) List the various tectonic plates in the world
i) What do you understand by the term "retrofitting"?
j) Elaborate the importance of "P - delta" effect in structural analysis.

## PART-A

Q. 2 Write a well - detailed note on "factors leading to degradation".
[CO-1] [L-2] 20
Q. 3 a) With the help of neat sketch, explain the classifications of SHM systems. [CO2] L3] $\mathbf{1 0}$
b) In context with components of SHM system, elaborate the phase of "acquisition of data".
[CO-2] [L-3] 10
Q. 4 Summarize the different ways in which responses in a SHM system are assessed in the Structure.
[CO-3] [L-3] 20

## PART-B

Q. 5 In accordance with the IS guidelines of IS 875: 2015 (Part III) explain the following terms:
[CO-4] [L-3] 20
a) Design wind speed
b) Factor of risk coefficient
c) Factor for terrain, height, and structure size
d) Topography factor
Q. 6 a) Elaborate:"The theory of elastic rebound".
[CO-5] [L-2] 12
b) Write a well - detailed note on "Intensity of earthquake".
[CO-5] [L-2] 8
Q. 7 With reference as a technique of the purpose of retrofitting, explain the following:
a) RC Jacketing.
b) Bracing.
[CO-6] [L-3] 10×2

# End Semester Examination, Dec. 2022 

M. Tech. - First Semester

DESIGN OF INDUSTRIAL STRUCTURES (MCE-SE-104)
Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Elaborate "Crane Rails and its data" with respect to Gantry Girder.
[CO-1] [L-2]
b) Summarize the loads that must be considered while designing Gantry Girders including its impact allowances.
[CO-1] [L-2]
c) Define "Portal frames" with definitive diagrams indicating different elements of such.
[CO-2] [L-2]
d) Enunciate the factors increasing the Bin Loads. [CO-2] [L-1]
e) Differentiate between "Bunkers" and "Silos" in details.
f) State "Coulomb's Theory".
g) With a detailed diagram, explain "Steel Stacks". State the important factors considered for the choice of design. [CO-4] [L-1]
h) Where would you provide "Stiffening Angles" on a water tank? Specify its allowable minimum Section Modulus. [CO-6] [L-3]
i) With a neat diagram, explain the provisions for Circular Water Tanks. [CO-5] [L-2]
j) Elaborate the classifications of Prestressed Steel Water Tanks. [CO-6] [L-1] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 The Design a Gantry Girder to check whether ISMB 600 with ISMC 300 on compression flange is adequate to carry moment and shear force. The data are as follows:
Electrically operated crane capacity $=200 \mathrm{kN}$; Span of Gantry Girder: 6 m ; Span of Crane Girder: 18 m ; Self wt. of Crane Girder : 180 kN ; Crane Capacity : 200 kN ; Self wt. of trolley : 75 kN ; Min. Hook approach: 1 m ; Distance between wheels: 3.5 m ; Self wt. of rails $=0.3 \mathrm{kN} / \mathrm{m}$.
[CO-1] [L-6] 20
Q. 3 a) Draft a detailed procedure for the design of portal frames.
[CO-2] [L-4] 10
b) With the help of neat sketches, write detailed notes on:
i) Tied portal frame.
ii) Crane portal frame with column brackets.
iii) Mono pitch portal frames.
[CO-2] [L-3] 10
Q. 4 Design a rectangular steel bunker of 16 m length and 6 m width supported on 8 columns to store coal of bulk density $8 \mathrm{kN} / \mathrm{m} 3$ and angle of internal friction 350. (Assume other data as required).

[CO-3] [L-5] 20

## PART-B

Q. 5 Consider the location of Delhi with its the topography as almost flat and of Category 2, design a self supporting steel stack of height 60 m above the foundation with one breech opening. The diameter of cylindrical part of chimney is 3.5 m and the foundation rest on medium soil (bearing capacity $200 \mathrm{kN} / \mathrm{m} 2$ ). Brickwork lining is 10 cm and supported throughout its height.
[CO-4] [L-5] 20
Q. 6 Design considering Delhi's location, design for a circular elevated water tank with data as follows:
Capacity: 3,00,000 Litres
Height of tank above G.L.: 9m
Tank supported over 8 columns.
[CO-5] [L-5] 20
Q. 7 Design a prestressed steel tank for the following data:
a) Capacity $=85000$ Litres.
b) Height of tint container $=2.5 \mathrm{~m}$.
c) Bottom of tank bearer above G.L. $=9 \mathrm{~m}$.
d) Size of prestressed plates $=1.25 \mathrm{~m} \times 1.25 \mathrm{~m}$.
e) Horizontal acceleration $=6 \%$.
f) Design wind pressure $=930 \mathrm{~N} / \mathrm{m}^{2}$.
[CO-6] [L-5

## End Semester Examination, Dec. 2022

## M. Tech. - First Semester

ADVANCED SOLID MECHANICS (MCE-SE-102)
Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Summarize the concept of Principal Stresses and its components.
[CO-1] [L-2]
b) Summarize the concept of "Orthonormality".
[CO-1] [L-2]
c) What do you understand by the terms: "Cauchy Traction" and "Piola Traction"?
[CO-2] [L-2]
d) Discuss "Hydrostatic Components".
[CO-2] [L-1]
e) Discuss the stress strain relations for Isotropic Materials.
[CO-3] [L-1]
f) Write a detailed note on the boundary conditions in analysis of stress while idealizing the mechanics of solids.
[CO-4] [L-1]
g) Define "Airy's Function".
[CO-4] [L-3]
h) With the help of neat sketch, explain "Prandtl's Membrane Analogy".
[CO-6] [L-2]
i) A 30 cm I-beam with flanges and web 1.25 cm thick, is subjected to a torque of $50000 \mathrm{kgf} . \mathrm{cm}(4900 \mathrm{Nm})$. Find the maximum shear stress and the angle of twist per unit length.
j) Explain the relevance of 'Von Mises Yield Criterion' in solid mechanics.

## PART-A

Q. 2 a) i) "Structural elements are not always perfectly Homogenous or Isotropic". Correlating this statement, what are the considerations one must take in order to fulfill the general assumptions of "Theory of Elasticity"?
[CO-1] [L-2] 5
ii) Discuss the importance adopting constitutive relations in solving problems of Theory of elasticity.
[CO-1] [L-2] 5
b) Write a well detailed note on "Cartesian tensors" highlighting the importance of power of tensors.
[CO-1] [L-3] 10
Q. 3 a) Explain "Octahedral planes". For a frame of reference, derive an expression for Octahedral Stresses.
[CO-2] [L-3] 10
b) Determine the:
i) Extremum value of the shear stress and their associated normal stresses.
ii) Octahedral shear stress and its associated normal stress for the state of stress at a point characterized by the components: $\sigma_{x}=70 \mathrm{MPa} ; \sigma_{y}=-36 \mathrm{MPa} ; \sigma_{z}=$ $60 \mathrm{MPa} ; \tau_{\mathrm{xy}}=\tau_{\mathrm{yz}}=\tau_{\mathrm{zx}}=0$.
Q. 4 a) Derive the equation that represents the Mechanical, Geometrical and Physical characteristics of an Elastic Solid.
[CO-3] [L-5] 10
b) Plan a mechanism to obtain a relation for the differential equation of equilibrium with proper assumptions.
[CO-3] [L-5] 10

## PART-B

Q. 5 Correlate the importance of Airy's function in solid mechanics.
[CO-4] [L-3] 20
Q. 6 Plan a mechanism to justify:"Torque is proportional to the angle of twist per unit
length with a proportionality limit i.e., Torsional Rigidity."
Q. 7 a) Discuss "Haigh's Theory".
[CO-6][L-2] 5
b) Determine the diameter "d" of a circular shaft subjected to a bending moment M and torque T using:
i) Huber, Von Mises and Hencky's theory.
ii) Guest and Tresca's Theory.
iii) Haigh's Theory. 15

# End Semester Examination, Dec. 2022 

## M. Tech. - First Semester

ADVANCED SOLID MECHANICS (MCE-SE-102)
Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) State the basic assumptions considered in "Theory of Elasticity".
b) Summarize the concept of "Deviatoric Components".
[CO-1] [L-2]
c) What do you understand by "Orthonormality"? [CO-1] [L-2]
d) Discuss "Stress Invariants". [CO-2] [L-2]
e) Discuss the importance of Poison's Ratio. [CO-2] [L-1]
f) What is Airy's Stress function based on?
g) A cylindrical bar of 7 cm diameter is subjected to a $3400 \mathrm{~N}-\mathrm{m}$ torque and a bending moment $M$. If the bar is at the point of failing, determine the maximum bending moment it can support in addition to the torque. The tensile elastic limit for the material is 207 MPa , and the FOS is 3.
[CO-4] [L-3]
h) With appropriate diagram, explain "Prandtl's Membrane Analogy".
i) Discuss the relevance of Von Mises Yield Criterion in Solid mechanics.
[CO-5] [L-2]
j) Explain the concept of "Isotropic Hardening".
[CO-6] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) "The definition of Stress does not hold true for some Structural elements with complex loadings. "Justify the above statement with proper examples.
[CO-1] [L-3] 10
b) Write a well detailed note on "Cartesian Tensors". Highlight the importance of power of tensors.
[CO-1] [L-3] 10
Q. 3 a) Explain "Octahedral planes". For a frame of reference, derive an expression for Octahedral Stresses.
[CO-2] [L-3] 10
b) Determine the
i) Extremum Value of the shear stress and their associated normal stresses.
ii) Octahedral shear stress \& its associated normal stress for the state of stress at a point characterized by the components: $\sigma_{x}=70 \mathrm{MPa} ; \sigma_{y}=-36 \mathrm{MPa} ; \sigma_{z}=$ $60 \mathrm{MPa} ; \tau_{\mathrm{xy}}=\tau_{\mathrm{yz}}=\tau_{\mathrm{zx}}=0$.
[CO-2] [L-4] 10
Q. 4 a) Derive the equation that represents the Mechanical, Geometrical and Physical characteristics of an Elastic Solid.
[CO-3] [L-5] 10
b) Consider a rectangular beam with width " $b$ " and depth " $h$ ". Consider the fibre stress in the elastic range due to bending as per elementary theory of bending, where $M$ is the $B M$ which is a ruction of " $x$ ". Assume that $\sigma_{z}=\tau_{z x}=\tau_{z y}=0$ and that $\boldsymbol{\tau}_{x y}=0$ @ the top and bottom, and further that $\sigma_{y}=0$ @ bottom. Using the differential equation of equilibrium, determine $\boldsymbol{\tau}_{\mathrm{xy}}$ and $\sigma_{\mathrm{y}}$. Compare these with the values given in elementary strength of materials.
[CO-3] [L-4] 10

## PART-B

Q. 5 With proper mathematical expressions, justify the significance of Airy's Function while analysis of solid sections.
Q. 6 Plan a mechanism to justify: "Torque is proportional to the angle of twist per unit length with a proportionality limit i.e., Torsional Rigidity. "
Q. 7 a) Justify the significance of "Yield Criteria" in solid mechanics.
[CO-6] [L-2] 5
b) Determine the diameter " d " of a circular shaft subjected to a bending moment M and torque T using:
i) Rankine's theory.
ii) Guest and Tresca's theory.
iii) St. Venant's theory.
[CO-6] [L-5] 15

## End Semester Examination, Dec. 2022

## M. Tech. - First Semester <br> ADVANCED STRUCTURAL ANALYSIS (MCE-SE-101)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Find the Static and Kinematic Indeterminacies:
[CO-1] [L-2]

b) What do you understand about Degree of Freedom?
[CO-1] [L-2]
c) Write a note on Force Vector.
[CO-1] [L-1]
d) Explain about Stiffness method for Large frames
e) Enlist the properties of Stiffness matrix.
f) What do you understand about element and Global Stiffness matrices?
g) Write down the steps for Finite Element Analysis.
h) Define an arch. How an arch differ from a Beam?
i) Give a brief note on "Nodes".
j) Describe the Linear Element.
[CO-5] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Explain the fundamental relationships for structural analysis.
[CO-1] [L-2] 10
b) Compare Global and Local coordinate system. [CO-1] [L-2] 10
Q. 3 a) Compare stiffness and Flexibility methods of analysis.
[CO-2] [L-2] 10
b) What do you understand by "Beam on Elastic Foundation"?
[CO-2] [L-3] 10
Q. 4 Two Steel bars $A B$ and $B C$, each having a cross-sectional area of $20 \mathrm{~mm}^{2}$, are connected in series as shown in figure. Develop the flexibility and stiffness matrices with reference to coordinates 1 and 2 shown in figure. Verify that the two matrices are the inverse of each other. Take $\mathrm{E}=200 \mathrm{kN} / \mathrm{mm}^{2}$.

[CO-3] [L-4] 20
PART-B
Q. 5 a) Determine the degree of static indeterminacy of the Bow-string girder shown in figure. Assume all joints to be rigid.

[CO-3] [L-4] 10
b) Determine the degree of static indeterminacy of the rigid-jointed building frame shown in figure

[CO-3] [L-4] 10
Q. 6 Explain following terms:
a) One dimensional elements.
b) Two Dimensional elements.
c) Axi-symmetric elements.
d) Three dimensional elements.
Q. 7 An axial load $\mathrm{P}=200 \times 10^{3} \mathrm{~N}$ is applied on a bar as shown in figure. Using the penalty approach for handling boundary condition, determine nodal displacements, stress in each materials and reaction forces.


| $1-A_{1}-2400 \mathrm{~mm}^{2} ; E_{1}-70 \times 10^{3} \mathrm{~N}_{2} \mathrm{~m}^{2}$ |
| :--- |
| $2-A_{2}-600 \mathrm{~mm} 2 ; E_{2}-200 \times 10^{4} \mathrm{~N} / \mathrm{m}^{2}$ |

[CO-5] [L-5] 20

## End Semester Examination, Dec. 2022

## M. Tech. - First Semester

## PAVEMENT MATERIALS AND CONSTRUCTION TECHNIQUES (MCE-CM-108)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) Explain the requirements of a good binder.
[CO-1] [L-2]
b) Write down the name of various test conducted on bituminous road after construction.
[CO-2] [L-2]
c) Explain desirable properties of aggregates to be used in pavement construction.
[CO-1] [L-2]
d) Briefly explain the classification of aggregates
[CO-2] [L-2]
e) For what purpose joints provided in cement concrete roads?
[CO-6] [L-3]
f) Explain the terms: i) VFB, ii) VMA.
[CO-2] [L-2]
g) Define the various characteristics of sealing compound.
[CO-5] [L-2]
h) Write a note on 'aggregate blending to meet the specified gradation'.
[CO-3] [L-2]
i) Explain the advantages of water bound madam roads.
[CO-4] [L-2]
j) List and explain the desirable properties of a bituminous mix. [CO-6] [L-2] 2x10

## PART-A

Q. 2 a) Explain the desirable properties of aggregates to be used in different types of pavement construction. State the tests conducted for each property. [CO-1] [L-3] 10
b) Explain briefly Rothfutch method of desired gradation. [CO-1] [L-5] 10
Q. 3 a) Explain various methods of bituminous mix design. Also explain the design steps of Hveem mix method.
[CO-2] [L-2] 10
b) $A B C$ mix is prepared with aggregates $A, B$ and $C$ in the proportion $A: B: C=$ 40:50:10. The respective specific gravity of $A, B, C$ and bitumen are 2.7,2.8,3.0 and 1.02. The bitumen content by weight of aggregate is $5 \%$. Determine maximum theoretical density, percentage air voids, voids filled with bitumen. Given that specimen weight 1251.5 g in air and 720.6 g in water. [CO-2] [L-3] 10
Q. 4 a) For soft soil which type of stabilization would you recommend? Explain in detail.
b) Explain the material specification, construction method and quality control checks for wet mix macadam.
[CO-3] [L-3] 10

## PART-B

Q. 5 a) Explain various types of emulsions used in bituminous pavement. Under which condition each one is used.
[CO-4] [L-2] 10
b) Mention specification of material and quality control test for laying bituminous macadam road.
[CO-4] [L-2] 10
Q. 6 Discuss the applications of following:
i) Surface dressing ii) Tack Coat
iii) Prime coat
iv) Grouting
[CO-5] [L-3] 20
Q. 7 a) Explain the requirements of materials, plants and equipments for cement concrete road construction.
[CO-6] [L-3] 10
b) List the quality checks on cement concrete pavement, carried out in laboratory and on also the field.
[CO-6] [L-3] 10

## End Semester Examination, Dec. 2022

M. Tech. - First Semester

# PAVEMENT MATERIALS AND CONSTRUCTION TECHNIQUES (MCE-CM-108) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Explain the requirements of a good road aggregate.
[CO-1] [L-2]
b) Why float test is carried out for bituminous materials.
c) Describe various types of natural aggregates.
d) Why bitumen has become a popular binding material?
e) Describe the requirements of joint filler and sealer. Also, discuss the desirable properties and various materials in use.
[CO-6] [L-3]
f) Write down the name of various types of tests conducted on aggregate to check their quality.
[CO-6] [L-3]
g) Define the various characteristics of sealing compound.
h) Define the term "bituminous concrete".
i) Explain the advantages of water mix macadam roads.
[CO-4] [L-2]
j) Discuss the scope of soil stabilization in road construction.
[CO-6] [L-1] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Explain various tests for judging the suitability of aggregate for pavement construction. Discuss the objects of carrying out each of these tests. [CO-1] [L-2] 10
b) Determine the desired gradation of following types of aggregates by Rothfutch method:

| S.No. | Sieve size | Percentage passing |  |  |  | Required <br> gradation |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 20 mm | 10 mm | 6 mm | Dust | \% Passing |
|  |  | 20 mm | 89.5 | 100 | 100 | 100 |
| 1 | 13.2 mm | 5.8 | 98.5 | 100 | 100 | $56-80$ |
| 2 | 4.75 mm | 0.75 | 2.7 | 57.23 | 100 | $38-54$ |
| 3 | 4.36 |  |  |  |  |  |
| 4 | 2.36 mm | 0.4 | 0.85 | 17.02 | 74.05 | $28-42$ |
| 5 | 300 microns | 0.1 | 0.35 | 0.8 | 25 | $7-21$ |
| 6 | 75 microns | 0.05 | 0.1 | 0.05 | 1.5 | $2-8$ |

[CO-1] [L-3] 10
Q. 3 a) Explain the procedure of determining the optimum bitumen content for a bituminous mix by Marshall Test.
[CO-2] [L-3] 10
b) Explain the various tests performed in bitumen. Mention importance of each.
[CO-2] [L-3] 10
Q. 4 a) Discuss the scope of stabilization in road construction.
[CO-3] [L-2] 5
b) Explain the steps involved in the preparation of sub grade. How is the adequacy of compaction in the field evaluated?
[CO-3] [L-3] 15

## PART-B

Q. 5 a) Explain the material specification and construction steps for bituminous surface dressing.
[CO-4] [L-3] 10
b) Explain different types of compacting equipment used for pavement construction. Write an explanatory note on rollers in road construction.
Q. 6 a) Explain the objective, type of material and method of application for i) Prime coat ii) Tack coat
[CO-5] [L-2] 10
b) Explain the construction procedure of mastic asphalt in detail and also mention the quality control checks apply post construction.
[CO-5] [L-2] 10
Q. 7 a) Explain the various types of joints in cement concrete pavement indicating their purpose of providing.
[CO-6] [L-2] 10
b) Draw a neat diagram showing various component layers of a cement concrete pavement structure. Mention the objective of each layer.
[CO-6] [L-3] 10

## End Semester Examination, Dec. 2022

## M. Tech. - First Semester

## QUALITY CONTROL AND SAFETY IN CONSTRUCTION (MCE-CM-103)

Time: 3 hrs.

Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) What is quality in construction?
[CO-1] [L-1]
b) Explain about evolution of quality in construction. [CO-1] [L-1]
c) Give a brief note on In-Process Item Control. [CO-1] [L-2]
d) What is quality assurance? [CO-3] [L-2]
e) Write a short note on 'Total Quality Management'. [CO-3] [L-2]
f) What is the function of total quality management? [CO-5] [L-2]
g) Give two example of need for safety. [CO-2] [L-3]
h) What do you understand about general safety in construction? [CO-2] [L-3]
i) Write two safety rules in construction. [CO-3] [L-2]
j) What is water extinguisher?
[CO-5] [L-5] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Discuss element of quality in construction.
[CO-1] [L-1] 10
b) What do you understand about quality characteristics of construction? [CO1][L1] 10
Q. 3 a) Write down five differences in quality assurance and quality control. [CO-2] [L-2] 10
b) Write short notes on:
i) Manufacturing variation control.
ii) Quality documentation.
iii) Deviation report system.
iv) Raw Materials laboratory testing and documentation.
[CO-2] [L-2] 10
Q. 4 a) Describe the relationship between QA, QC and GMP.
[CO-3] [L-2] 10
b) What are the advantages and disadvantages of total quality management?
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Write down regulation and objective on environment and human safety. [CO4][L3] 10
b) What steps can be taken to effectively and efficiently eliminate unsafe work environments? Explain in detail.
[CO-4] [L-3] 10
Q. 6 a) Describe the safety education and periodic training. [CO-5] [L-4] $\mathbf{1 0}$
b) What changes are included in the "Safety and Health Audit Recognition Program (SHARP)" construction safety system?
[CO-5] [L-4] 10
Q. 7 a) Write a detailed note on use of fire extinguisher.
[CO-6] [L-4] 10
b) Explain in detail about the gloves used keeping in view the safety in the construction sector.
[CO-6] [L-4] 10

# End Semester Examination, Dec. 2022 

## M. Tech. - First Semester <br> CONSTRUCTION CONTRACT MANAGEMENT (MCE-CM-102)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Give the date when the Indian Contract Act came into force.
[CO-1] [L-1]
b) Differentiate between a cross offer and counter offer. [CO-2] [L-2]
c) Briefly explain executed contract with a relevant example. [CO-2] [L-2]
d) Frame a typical clause granting extension in time limit of a contract. [CO-3] [L-2]
e) What is purpose of issuance of expression of interest? [CO-3] [L-2]
f) Why is a feasibility report provided to a bidder?
g) Give the purpose of contract dispute resolution.
h) List any two essential elements of an arbitration agreement.
i) Give any two benefits of labour codes.
j) Differentiate between living wage and starvation wage.

## PART-A

Q. 2 a) Explain the rules governing offers citing relevant examples.
[CO-1] [L-3] 10
b) Discuss the rules governing acceptance of an offer citing relevant examples.
[CO-1] [L-4] 10
Q. 3 Discuss the following contracts with their advantages, disadvantages and suitability:
a) Item rate contract.
[CO-2] [L-2] 10
b) Percentage rate contract.
[CO-2] [L-2] 10
Q. 4 Discuss in detail the significance of measurement book.
[CO-3] [L-3] 20

## PART-B

Q. 5 Give an over-view of arbitration history in India, it's principal characteristics and benefits.
[CO-4] [L-3] 20
Q. 6 Discuss in detail the issues to be considered for virtual dispute board meeting.
[CO-5] [L-3] 20
Q. 7 With the help of flow chart explain the concept of value engineering. [CO-6] [L-3] 20

## End Semester Examination, Dec. 2022

## M. Tech. - First Semester PROJECT PLANNING AND CONTROL (MCE-CM-101)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Explain the following:
a) What do you understand by project planning?
[CO-1] [L-1]
b) Explain the different elements of project management. [CO-2] [L-2]
c) List out the various errors in the network. [CO-2] [L-2]
d) Define 'critical path'. [CO-4] [L-1]
e) Explain the role of head and tail activities. [CO-3] [L-1]
f) What does a node mean in an arrow diagram?
g) What is the cost slope?
h) What is resource allocation?
i) Explain the fundamental of earthwork.
j) List various types of depreciation.

## PART-A

Q. 2 a) What are the main advantages of bar charts that have made them so popular? What are their main disadvantages?
[CO-1] [L-2] 10
b) What are the different limitations of bar chart?
[CO-2] [L-1] 10
Q. 3 What are the different techniques of project management? Discuss in detail.
[CO-2] [L-1] 20
Q. 4 a) In a construction project events have been identified as $A$ to $M, A$ is the start event, $B$ occurs after $A, C$ succeed $B$ \& preceeds $L$ but restrains the occurrence of $G$, $D$ occurs after $B$ but before $K$ and restrains $C, F$ succeeds $C$ preceeds $G$ and restrains $E, E$ succeeds $B$ but preceeds $J, G$ succeeds $F$ and preceeds $H, H$ preceeds L and constraints J, L occurs after J but before K, M succeeds K. Draw the network for the given relationship.
[CO-3] [L-2] 15
b) Explain the various types of events in the network.
[CO-3] [L-2] 5

## PART-B

Q. 5 In the network as shown, the three times viz. optimistic time, most likely time and the pessimistic time (in days) are shown on the arrows. Compute the earliest expected times and the latest allowable occurrence times of various events.
[CO-4] [L-5] 20

Q. 6 a) What is the earned value analysis, define in detail.
b) Define objectives of project evaluation. Also describe the different evaluation methods
Q. 7 Materials management is a balance between two extreme theories. Explain this statement, mentioning the factors that influence your decision to lean more toward one theory than the other.
[CO-5] [L-4] 20

## End Semester Examination, Dec. 2022

## M. Tech. - First Semester <br> ADVANCED CONCRETE TECHNOLOGY (MCE-101)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
[Assume appropriate data, if required. Use of scientific calculators, IS 10262:2019 and IS 456:2000 is allowed.]
Q. 1 Answer the following in brief:
a) Classify aggregates on the basis of origin, texture and unit weight. [CO-2] [L-3]
b) Define Fineness Modulus and give its range of values for coarse, medium and fine sand.
[CO-1] [L-2]
c) Briefly describe the harmful long term effects of bleeding, segregation and laitance.
[CO-2] [L-2]
d) Justify sulphate resisting cement used contemporarily.
[CO-3] [L-3]
e) What cement would you use for minimizing heat of hydration and sea water attack for mass concreting in Mumbai?
[CO-2] [L-3]
f) The aggregate to be used was found to be unsuitable as it could result in Alkali Aggregate Reaction in Chennai. What steps would you initiate?
[CO-4] [L-5]
g) Depict with labels the various cracks as visible on a structural element.
[CO-1] [L-3]
h) Why steel embedded in uncontaminated concrete does not corrode?
[CO-1] [L-4]
i) Justify the use of air entraining admixtures in cold climate.
[CO-3] [L-3]
j) What are the immediate and time dependent losses in prestressed concrete?
[CO-1] [L-3] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) What are the factors governing the maximum size of aggregates in reinforced concrete members?
[CO-1] [L-2] 10
b) Determine fineness modulus of a sample of aggregate for the following observations of sieve analysis:
[CO-2] [L-3] 10

| IS sieve size | 10 mm | 4.75 mm | 2.36 mm | 1.18 mm | $600 \mu \mathrm{~m}$ | $300 \mu \mathrm{~m}$ | $150 \mu \mathrm{~m}$ | $75 \mu \mathrm{~m}$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Percentage | 100 | 92 | 74 | 55 | 23 | 12 | 9 | 7 |
| passing |  |  |  |  |  |  |  |  |

Q. 3 a) Discuss, with graph, modulus of elasticity of concrete and various factor influencing it.
b) Develop a research and test plan to employ geopolymer concrete with varying percentages of Fly Ash and GGBFS.
[CO-6] [L-5] 10
Q. 4 Design a concrete mix taking the following data:
i) Stipulation for Proportioning Concrete Ingredients:
a) Characteristic compressive strength required in the field at 28 days grade : M 40
b) Type of Cement: OPC 43 Grade confirming to IS 12269
c) Maximum Nominal size of aggregate -20 mm
d) Shape of CA - Angular
e) Workability required at site -150 mm (slump)
f) Type of exposure (as defined in IS: 456) - Moderate
g) Method of concrete placing: pump able concrete
h) Chemical admixture : Super plasticizer confirming to IS 9103
i) Mineral Admixture : Fly ash (20\%)
ii) Test data of material:

The following materials were tested in the laboratory and results are to be ascertained for the design mix:
a) Specific Gravity of Cement : 3.15
b) Specific gravity of Aggregates:

Specific gravity of Fine Aggregate (sand) : 2.70
Specific gravity of Coarse Aggregate : 2.80 SSD Condition
c) Sieve Analysis:

Fine aggregates : Confirming to Zone II of Table 4 IS - 383. [CO5][L6] 20

## PART-B

Q. 5 a) Describe the two major types of corrosion as experienced in concrete structures, their likely places and typical mechanisms and characteristics.
[CO-4] [L-4] 10
b) Justify any two measures being employed in Contemporary Cement Manufacturing Industry to increase the sustainability quotient.
[CO-6] [L-4] 10
Q. 6 a) Give two measures for increasing the fire resistance of concrete. [CO-5] [L-5] 10
b) How is peak temperature identified during forensic evaluations of a structure having experienced fire?
[CO-4] [L-4] 10
Q. 7 Write short notes on (any four) of the following:
a) Fibre reinforced concrete in rigid pavements.
b) High performance concrete.
c) The quantity of water required for a given workability is higher if the maximum size of the aggregates is smaller.
d) Self compacting concrete.
e) Light weight concrete.
f) Sustainability of geopolymer concrete.
[CO-6] [L-4] 5×4

## End Semester Examination, Dec. 2022

## M. Tech. (Biotechnology) - Third Semester

## BIOETHICS IN STEM CELL TECHNOLOGY (M-BT-324)

Time: 3 hrs
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Taking at least ONE question from each UNIT. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Define 'stem cells and their properties'.
[CO-1] [L-1]
b) Contrast between adult stem cell and totipotent stem cells.
[CO-2] [L-3]
c) Enlist molecular markers to identify embryonic stem cells.
[CO-3] [L-4]
d) How organ transplantation can be considered ethical.
[CO-2] [L-3]
e) Summarize the functions of stem cell banking.
[CO-5] [L-2]
f) Evaluate the public concern issues with respect to application of stem cell regenerative therapy.
[CO-4] [L-5]
g) Enlist the applications of stem cell therapy.
[CO-5] [L-5]
h) GEAC is one of the organizations set up by the Indian Government. Write its full form.
[CO-5] [L-1]
i) Discuss the applications of therapeutic cloning.
[CO-6] [L-2]
j) Enlist the properties of stem cell lines.

## UNIT-I

Q. 2 a) Illustrate the stem cell niche environment and its impact on cell differentiation.
[CO-1] [L-4] 10
b) State about the micro-RNA and explain its function in the stem cell differentiation.
[CO-1] [L-1] 10
Q. 3 a) Discuss the epigenetic regulation of chromatin which are important for pluripotency maintenance in ES cells.
[CO-1] [L-2] 10
b) Analyze the modes by which a cell can become specified for a particular fate.
[CO-2] [L-4] 10

## UNIT-II

Q. 4 Evaluate and discuss the social and legal aspects associated with stem cell technology justify your answer with example.
[CO-3] [L-5] 20
Q. 5 a) Determine the ethical issues involved in the use of stem cell therapy as regenerative medicine.
[CO-4] [L-3] 10
b) Discuss the public issues concern with stem cell therapy.
[CO-3] [L-3] 10
Q. 6 Explain therapeutic cloning? Describe the steps involved with clean and labelled diagram.
Q. 7 a) Explain the gene therapy and its application in hemopoietic disorder.
[CO-6] [L-4] 10
b) Illustrate different types of stem cell line. How Stem cell line is differed from primary cell line.

## End Semester Examination, Dec. 2022

## M. Tech. (Biotechnology) - First Semester <br> FOOD PROCESS TECHNOLOGY (M-BT-126)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt at least ONE question from each UNIT. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) What you understand by TDT, F, Z\&D values? [CO-1][L-1]
b) Contrast between HTST and UHT.
[CO-2][L-5]
c) Illustrate the principles of food preservation.
[CO-1][L-4]
d) Differentiate between 'wet milling' and 'dry milling'.
[CO-3][L-3]
e) Draw and explain the different parts of rice.
[CO-4][L-4]
f) What you understand by preprocessing of food?
[CO-5][L-1]
g) Explain the process of vegetable canning.
[CO-6][L-2]
h) Discuss the principles of cheese production.
[CO-5][L-3]
i) Evaluate the difference between drying and dehydration.
[CO-5][L-5]
j) Determine the procedure for the storage and transport of egg.
[CO6][L2] $\mathbf{2 \times 1 0}$

## UNIT-I

Q. 2 Illustrate Different methods of Food Preservations with suitable examples.
[CO-1][L-4] 20
Q. 3 a) Compare Lactic acid fermentation and alcohol fermentation. [CO-2][L-2] 10
b) How radiation can be used on food process technology. Discuss its advantages and disadvantages.
[CO-1][L-2] 10

## UNIT-II

Q. 4 a) Evaluate and analyze different methods for the storage of Rice. [CO-5][L-5] 10
b) With help of a diagram explain different parts of wheat and the analyze the difference between Roll Mill and Pan Mill.
[CO-5][L-4] 10
Q. 5 Define milling and discuss different types of milling with their advantages and disadvantages.

## UNIT-III

Q. 6 Suppose you want to setup a Cheese making industry. Develop strategically approach step wise for the production of Cheese at industry level. Name the essential additives in the cheese making process.
[CO-6][L-6] 20
Q. 7 a) Define 'HACCP'. Formulate a plan of processing and preservation in Fisheries for the transportation of fishes from one place to another place. [CO-4][L-6] 10
b) Illustrate the preservation of milk and different fermented milk products.
[CO-4][L-4] 10

## End Semester Examination, Dec. 2022

M. Tech. (Biotechnology) - First Semester

FOOD MICROBIOLOGY (M-BT-121)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Define 'food spoilage'.
[CO-2] [L-1]
b) What are the factors that cause food spoilage? Give names of common spoilage bacteria.
[CO-2] [L-1]
c) What is food microbiology?
[CO-1] [L-2]
d) Enlist the various methods of food preservation.
[CO-2] [L-2]
e) Explain food infections and food intoxications with examples.
[CO-3] [L-2]
f) What is the use of microbes in industry?
g) Name an antioxidant which is permitted to be added to edible oils in India.
[CO-3] [L-1]
h) What are artificial sweeteners?
[CO-3] [L-2]
i) What food safety measures should be adopted for street foods?
[CO-1] [L-2]
j) Explain GM foods briefly.
[CO-2] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 What is the relationship between microorganism and food? Write down the procedure for production of Beer and Cheese.
[CO-2] [L-2] 20
Q. 3 Describe some diseases caused by food borne parasites. Enlist the measures you would adopt to prevent food infestation.
[CO-3] [L-2] 20
Q. 4 a) Discuss the use of chemicals as a measure to control and destroy microorganisms in foods. 10
b) Describe the food safety measures that should be observed for the premises of a catering establishment. What are the sanitary facilities that need to be provided?
[CO-1] [L-3] 10

## PART-B

Q. 5 a) What are food additives? Why are they used in foods? Discuss giving examples. 10
b) Describe some of the chemical changes that take place in food due to spoilage.
[CO-2] [L-2] 10
Q. 6 Write short notes on the following:
a) Food borne illness.
b) Food intoxication.
c) Mycotoxins.
d) Bacterial toxins.
[CO-3] [L-3] 5×4
Q. 7 a) Describe the various physical, chemical and biological hazards that may be present in our food supplies.
b) Discuss some harmful effects of food adulterants.

# End Semester Examination, Dec. 2022 

## M. Tech. (Biotechnology) - First Semester <br> APPLIED BIOINFORMATICS (M-BT-102)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1

## Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions form PART-B. Marks are indicated against each question.

## Q. 1 Briefly explain:

a) Describe algorithm of BLAST.
[CO-2] [L-2]
b) Enlist difference between dot matrix and dot plot. [CO-4] [L-1]
c) Define Homology modelling.
d) Explain Basic operators in Perl programming.
e) What do you mean by Maximum likelihood?

## PART-A

Q. 2 a) Discuss algorithm of stacks.
[CO-1] [L-2] 10
b) What do you mean by PUSH and POP function?
[CO-1] [L-1] 10
Q. 3 a) Explain the algorithm for queue and dequeue.
[CO-2] [L-2] 10
b) Explain features of array that helps computational biologists in analyzing sequence data.
[CO-2] [L-2] 10
Q. 4 Show sequence alignment using Smith Waterman algorithm. Where sequences are ACCGTT and TGCGAT and assumptions $+2,-1$ and 0 for match, mismatch and gap penalty respectively?
[CO-3] [L-4] 20

## PART-B

Q. 5 a) Apply Fasta algorithm on pair of sequence to show global alignment. [CO4] [L6] 10
b) Using Perl programming transcribe DNA into RNA.
[CO-2] [L-2] 10
Q. 6 a) How UPGMA method helps in phylogenetic analysis?
[CO-6] [L-3] 15
b) Draw the different types of trees used in phylogenetic prediction.
[CO-6] [L-4] 5
Q. 7 a) Construct multiple sequence alignment using hidden Markov model using suitable genomic sequences.
[CO-5] [L-5] 15
b) Show difference between sequence repeats and inversion.
[CO-5] [L-3] 5

# End Semester Examination, Dec. 2022 <br> M. Tech - First Semester <br> GENETIC ENGINEERING (M-BT-101) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1

> Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) If the double helices comprising all 46 chromosomes in a human cell could be laid end to end, they would reach approximately 2 meters; yet the nucleus, which contains the DNA, is only about 6 um in diameter. How is this challenge of packaging the entire genome in the nucleus met?
[CO-1] [L-2]
b) Although, rNTPs are present at higher concentration than dNTPs in a cell, DNA polymerase discriminates against rNTPs. How?
[CO-2] [L-2]
c) How does DNA replication in a eukaryotic cell differ from DNA replication in Prokaryotes?
[CO-2] [L-2]
d) Compare the process of translation initiation in prokaryotes and eukaryotes.
[CO-2] [L-2]
e) Is it possible to clone a gene without a vector? Explain.
[CO-5] [L-2]
f) List the various types of nucleases that are used in biotechnology and give examples.
[CO-3] [L-2]
g) Describe the PAM (protospacer adjacent motif) sequence.
[CO-3] [L-2]
h) Would you choose agrobacterium mediated DNA transfer method to transform plant cells? Give reasons for your choice.
[CO-5] [L-5]
i) List the ingredients of a PCR mix.
[CO-3] [L-2]
j) Compare the sanger sequencing method with the next-generation sequencing methods.
[CO-5] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Compare the $A, B$ and $Z$ forms of DNA. $\quad[C O-4][L-2] \mathbf{1 0}$
b) Describe the various activities associated with DNA polymerases.
[CO-2] [L-2] 10
Q. 3 a) How is transcription by RNA polymerase II coupled to processing of mRNA?
[CO-2] [L-2] 10
b) During the process of tRNA charging, if an incorrect amino acid gets attached to the tRNA, is there a possibility to correct this mistake? Explain.
[CO-1] [L-3] 10
Q. 4 In E.coli, lac operon contains genes that codes for enzymes used for the hydrolysis and metabolism of lactose. How does the glucose level affect the expression of these genes?
[CO-4] [L-2] 20

## PART-B

Q. 5 How would you use lacZ alpha complementation for selecting clone of your interest, during gene cloning.
[CO-6] [L-3] 20
Q. 6 Design a methodology to clone and express a gene, "gene $X$ ", in E.coli cells.
[CO-6] [L-6] 20
Q. 7 You amplified a gene by PCR and cloned it into an expression vector. Next, you want To confirm the DNA sequence of the cloned gene, would you choose the Sanger method or an NGS method. Give reasons for your choice.

# End Semester Examination, Dec. 2022 <br> M. Tech - First Semester <br> GENETIC ENGINEERING (M-BT-101) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) If the double helices comprising all 46 chromosomes in a human cell could be laid end to end, they would reach approximately 2 meters; yet the nucleus, which contains the DNA, is only about 6 um in diameter. How is this challenge of packaging the entire genome in the nucleus met? [CO-1] [L-2]
b) Although, rNTPs are present at higher concentration than dNTPs in a cell, DNA polymerase discriminates against rNTPs. How?
[CO-2] [L-2]
c) How does DNA replication in a eukaryotic cell differ from DNA replication in Prokaryotes?
[CO-2] [L-2]
d) Compare the process of translation initiation in prokaryotes and eukaryotes.
[CO-2] [L-2]
e) Is it possible to clone a gene without a vector? Explain.
[CO-5] [L-2]
f) List the various types of nucleases that are used in biotechnology and give examples.
[CO-3] [L-2]
g) Describe the PAM (protospacer adjacent motif) sequence.
[CO-3] [L-2]
h) Would you choose agrobacterium mediated DNA transfer method to transform plant cells? Give reasons for your choice.
[CO-5] [L-5]
i) List the ingredients of a PCR mix.
[CO-3] [L-2]
j) Compare the sanger sequencing method with the next-generation sequencing methods.
[CO-5] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Compare the $A, B$ and $Z$ forms of DNA.
[CO-4] [L-2] 10
b) Describe the various activities associated with DNA polymerases. [CO-2] [L-2] 10
Q. 3 a) How is transcription by RNA polymerase II coupled to processing of mRNA?
[CO-2] [L-2] 10
b) During the process of tRNA charging, if an incorrect amino acid gets attached to the tRNA, is there a possibility to correct this mistake? Explain. $\quad[\mathrm{CO}-1][\mathrm{L}-3] \mathbf{1 0}$
Q. 4 In E.coli, lac operon contains genes that codes for enzymes used for the hydrolysis and metabolism of lactose. How does the glucose level affect the expression of these genes?
[CO-4] [L-2] 20

## PART-B

Q. 5 How would you use lacZ alpha complementation for selecting clone of your interest, during gene cloning.
[CO-6] [L-3] 20
Q. 6 Design a methodology to clone and express a gene, "gene X", in E.coli cells.
[CO-6] [L-6] 20
Q. 7 You amplified a gene by PCR and cloned it into an expression vector. Next, you want To confirm the DNA sequence of the cloned gene, would you choose the Sanger method or an NGS method. Give reasons for your choice.

## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester <br> APPLIED MATHEMATICS (MA-441A)

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following questions:
a) Solve $\frac{d y}{d x}+x y=0$
b) Find the Laplace Transform of $f(t)=e^{-2 t} \sin a t$.
c) Find the Eigen values and Eigen vectors of $A=\left[\begin{array}{cc}2 & 1 \\ 0 & -1\end{array}\right]$. 3
d) Find the Fourier series of $f(x)=1 c<x<c+2 l$. 3
e) Write down auxiliary equation for Lagrange's method for $x p+y p=1$.
f) Find the Fourier Transform of $f(t)=2 t$ 3
g) Form a differential equation from $y=m x+c 2$.

## PART-A

Q. 2 a) Solve $\frac{d^{2} y}{d x^{2}}+9 y=e^{x}+\cos 4 x$.
[CO-1] [L-3] 10
b) Solve $\frac{d y}{d t}=2 x, \frac{d x}{d t}=2 z, \frac{d z}{d t}=2 y$
[CO-1] [L-3] 10
Q. 3 a) Solve $L^{-1}\left[\frac{1}{s^{4}-16}\right]$
[CO-2] [L-3] 10
b) Solve the following initial value problems:

$$
\begin{equation*}
\left(D^{2}-4 D+1\right) x=\cos t \text { with } x=2 \frac{d x}{d t}=-1 \text { at } t=0 \tag{CO-2}
\end{equation*}
$$

Q. 4 a) Solve $x+y+z=0, x+2 x+z=0,2 x+y-3 z=0$
[CO-3] [L-3] 10
b) Find the inverse of the matrix $A=\left[\begin{array}{ccc}3 & 2 & -1 \\ 0 & 2 & 6 \\ 0 & 0 & 5\end{array}\right]$
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Expand $f(x)=|\sin x|$ as a Fourier series in the interval $-\pi<x<\pi$
[CO-4] [L-2] 10
b) Express $f(x)=x^{2}$ in half range sine series in the range $0<x<\pi$.
[CO-4] [L-3] 10
Q. 6 a) Using Method of Separation of Variables solve the equation:
$\frac{\partial u}{\partial x}=2 \frac{\partial u}{\partial t}+u$ Given that $u=6 e^{-3 x}$ when $x=0$.
[CO-4] [L-3] 10
b) Solve by Charpits Method $p^{3}-q^{3}=x-y$
Q. 7 a) Find the Fourier transform of $e^{-a t}$.
b) State and Prove Convolution theorem for Fourier Transform.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester <br> APPLIED MATHEMATICS-III (MA-302) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) If $z=x+i y$, find the real and imaginary part of $\cos z$.
b) State the Cauchy Reimann Equation in Polar Form.
c) Write Cauchy's integral formula.
d) Expand $f(z)=\sin z$ about $z=\frac{\pi}{4}$ using Taylor's series.
e) Write the complex form of Fourier Transform.
f) Find the Fourier Sine Transform of $f(t)=\sin t$
g) What is the probability that a number is divisible by 4 ?
h) What is the probability that a letter picked at random is a vowel?
i) Define the Null Hypothesis.
j) A bag contains defective article, the exact number of which is not know. A sample of 100 from the bag gives 10 defective articles. Check whether to accept or reject the null hypothesis.

## PART-A

Q. 2 a) If $\sin (A+i B)=x+i y$ prove that
$\frac{x^{2}}{\cosh ^{2} B}+\frac{y^{2}}{\sinh ^{2} B}=1$
6
b) Determine the analytic function $f(z)=u+i v$,
where, $u(x, y)=x^{3}-3 x y^{2}+3 x^{2}-3 y^{2}+1$
c) Evaluate $\int \frac{e^{z}}{(z-1)(z-2)} d z$, where c is the circle $|z|=3$ by Cauchy's integral formula.
Q. 3 a) Expand $\frac{1}{z^{2}-3, z+2}$ in the region $1<1 z 1<2$ in Laurent's series.
b) Evaluate the following integral by Cauchy's Residue Theorem: ${ }_{C} \frac{12 z-7}{(z-1)^{2}(2 z+3)} d z$; where $C:|z+i|=\sqrt{3}$
c) Evaluate the following real integral:
$\int_{0}^{2 \pi} \frac{d \theta}{1-2 p \sin \theta+p^{z}}$, where $p^{2}<1$.
$\begin{array}{lll}\text { Q. } 4 \text { a) State and prove convolution theorem for Fourier Transform. } & \mathbf{1 0}\end{array}$
b) Find the finite Fourier, cosine Transformof $f(x)=\left(1-\frac{x}{\pi}\right)^{2}, 0 \leq x<\pi$.

## PART-B

Q. 5 a) In a bolt factory, there are four machines $A, B, C, D$ manufacturing $20 \%, 15 \%$, $25 \%$ and $40 \%$ of the total output. Of their outputs $5 \%, 4 \%, 3 \%$ and $2 \%$, in the same order, are defective bolts. A bolt is chosen at random from thy factory's production and is found defective. What is the probability that the bolt was manufactured by machine $A$ or machine $D$ ?
b) Six dice are thrown 729 times. How many time do you expect at least three dice to show five or a six?
Q. 6 a) One type of aircraft is found to developed engine trouble in 5 flights out of a total of 100 and another type in 7 aircrafts out of a total of 200 flights. Is there a significant difference in the two types of aircrafts so far as engine defects are concerned?
b) Fit a Poisson distribution to the following data and test the goodness of fit.

| $x$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $f$ | 275 | 72 | 30 | 7 | 5 | 2 | 1 |

Q. 7 a) Ten students got the following percentage of marks in Economics and Statistics. Calculate the Coefficient of Correlation.

| Marks in Economics | 78 | 36 | 98 | 25 | 75 | 82 | 90 | 62 | 65 | 39 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Marks in Statistics | 84 | 51 | 91 | 60 | 68 | 62 | 86 | 58 | 53 | 47 |

b) Fit a straight line to the following data:

| $X$ | 1 | 2 | 3 | 4 | 5 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $Y$ | 14 | 27 | 40 | 55 | 68 |

## End Semester Examination, Dec. 2022

B. Tech. - Third Semester

CAREER SKILLS - I (MA-301A)
Time: 2 hrs.
Max Marks: 50
No. of pages: 5
Note: All questions are compulsory. Each question has FOUR options with ONE correct answer. Select the correct answer. All questions are of ONE mark each. There is no NEGATIVE marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.

| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 11. | 12. | 13. | 14. | 15. | 16. | 17. | 18. | 19. | 20. |
| 21. | 22. | 23. | 24. | 25. | 26. | 27. | 28. | 29. | 30. |
| 31. | 32. | 33. | 34. | 35. | 36. | 37. | 38. | 39. | 40. |
| 41. | 42. | 43. | 44. | 45. | 46. | 47. | 48. | 49. | 50. |

Q. 1 What is the unit digit of the sum of first 111 whole numbers?
[CO-2] [L-1]
a) 4
b) 6
c) 5
d) 0
Q. 2 If the unit digit of $(433 \times 456 \times 43 N)$ is $(N+2)$, then what is the value of $N$ ?
a) 1
b) 8
c) 3
d) 6
[CO-1] [L-1]
Q. 3 In which position from the right is the first non-zero digit present in 334!?
a) $81^{s t}$
b) $82^{\text {nd }}$
c) $83^{\text {rd }}$
d) $84^{\text {th }}$
[CO-3] [L-1]
Q. 4 Find the highest power of 72 in 100!
[CO-1] [L-1]
a) 22
b) 24
c) 25
d) 27
Q. 5 What is the remainder when $4^{96}$ is divided by 6?
[CO-2] [L-1]
a) 0
b) 2
c) 3
d) 4
Q. 6 Find the remainder when $1!+2!+3!+4!+5!+-1000!$ is divided by 14.
a) 0
b) 2
c) 5
d) 8
[CO-1] [L-1]
Q. 7 Evaluate: $5 \times(2 \times 34) \div 6+7-8$.
a) 134
b) 145
c) 150
d) None of these
Q. 8 The arithmetic mean between two numbers is 75 and their geometric mean is 21. Find the numbers.
[CO-1] [L-1]
a) 133 and 17
b) 63 and 87
c) 3 and 147
d) 73 and 77
Q. 9 Kanmani ranked sixteenth from the top and twenty ninth from the bottom among those who passed an examination. Six boys did not participate in the competition and five failed in it. How many boys were there in the class?
[CO-2] [L-1]
a) 35
b) 45
c) 50
d) 55
Q. 10 The sum of three numbers in a $G P$ is 26 and their product is 216 . Find the numbers.
a) 2,6 and 18
b) 2,6 and 20
c) 4,6 and 18
d) 6,18 and 20
[CO-2] [L-1]
Q. 11 What is the greatest number which divides 639, 1065 and 1491 exactly? [CO-3] [L-1]
a) 193
b) 183
c) 223
d) 213
Q. 12 In a queue of children, Arun is fifth from the left and Suresh is sixth from the right. When they interchange their places among themselves, Arun becomes thirteenth from the left. Then, what will be Suresh's position from the right?
[CO-2] [L-1]
a) $8^{\text {th }}$
b) $14^{\text {th }}$
c) $15^{\text {th }}$
d) $16^{\text {th }}$
Q. 13 Find the side of the largest square slab which can be paved on the floor of a room 5 meters 44 cm long and 3 meters 74 cm broad.
[CO-3] [L-1]
a) 56 cm
b) 42 cm
C) 38 cm
d) 34 cm
Q. 14 If $x$ and $y$ are two digits of the number 653xy such that this number is divisible by 80 , then $x+y=$ ?
a) 2
b) 3
c) 4
d) 5
Q. 15 Without any stoppage, a person travels a certain distance at an average speed of 42 $\mathrm{km} / \mathrm{h}$, and with stoppages he covers the same distance at an average speed of 28 $\mathrm{km} / \mathrm{h}$. How many minutes per hour does he stop?
[CO-3] [L-1]
a) 14 minutes
b) 15 minutes
c) 28 minutes
d) None of these
Q. 16 The average of 17 numbers is 10.9. If the average of first nine numbers is 10.5 and that of the last nine numbers is 11.4 , the middle number is:
[CO-1] [L-1]
a) 11.8
b) 11.4
c) 10.9
d) 11.7
Q. 17 Find the highest power of 24 in 100!
[CO-1] [L-1]
a) 30
b) 32
c) 35
d) 38
Q. 18 Given: $\log _{8}(5)=b$. Express $\log _{4}(10)$ in terms of b.
$[C O-1][L-1]$
a) $(1+2 b) / 2$
b) $(1+3 b) / 3$
c) $(1+3 b) / 2$
d) $(1+2 b) / 3$
Q. 19 Amit started walking positioning his back towards the sun. After some time, he turned left, then turned right and towards the left again. In which direction is he going now?
a) North or South
b) East or West
c) North or West
d) South or West
[CO-1] [L-1]
Q. 20 Sum of first 25 terms in AP is 525, sum of the next 25 terms is 725 , what is the common difference?
[CO-2] [L-1]
a) $8 / 25$
b) $4 / 25$
c) $6 / 25$
d) $1 / 25$
Q. 21 How many three digit numbers are divisible by 5 or 9?
[CO-2] [L-1]
a) 260
b) 280
c) 200
d) 180
Q. 22 Sundar runs 20 m towards East and turns to right and runs 10 m . Then he turns to the right and runs 9 m . Again he turns to right and runs 5 m . After this he turns to left and runs 12 m and finally he turns to right and 6 m . Now to which direction is Sundar facing?
a) East
b) West
c) North
d) South
Q. 23 Suraj has a certain average of runs for 12 innings. In the 13 th innings he scores 96 runs thereby increasing his average by 5 runs. What is his average after the 13th innings?
a) 48
b) 64
c) 36
d) 72
Q. 24 If the 3 rd and the 9th terms of an AP are 4 and -8 , respectively, then which term of this AP is zero.
a) $7^{\text {nd }}$
b) $4^{\text {th }}$
c) $5^{\text {th }}$
d) $6^{\text {th }}$
Q. 25 Solve for $x$ such that $\log _{2} 32+\log _{2} 16=\left(\log _{2} x\right)^{2}$
[CO-2] [L-1]
a) 2
b) 4
c) 6
d) 8
Q. 26 pqr is a three digit natural number such that pqr=p!+q!+r!. What is the value of $(q+r)^{*} p$ ?
a) 1296
b) 3125
C) 19683
d) 9
Q. 27 A woman going with a boy is asked by another woman about the relationship between them. The women replied, "My maternal uncle and the uncle of his maternal uncle is the same. "How is the lady related with that boy?
[CO-1] [L-1]
a) Mother and Son
b) Aunt and Nephew
c) Grandmother and Grandson
d) None of these
Q. 28 The average monthly expenditure of a family for the first four months is Rs 2,750, for the next three months is Rs 2,940 and for the last five months Rs 3,130. If the family saves Rs 5,330 during the whole year, find the average monthly income of the family during the year.
[CO-2] [L-1]
a) Rs 3,800
b) Rs 3,500
c) $\operatorname{Rs} 3,400$
d) Rs 4,200
Q. 29 The sum of 4th and 8th terms of an $A P$ is 24 and the sum of the 6 th and 10 th terms is 44. Find the first three terms of the $A P$.
[CO-3] [L-1]
a) $-12,-7,-2$.
b) $-4,-6,-10$
c) $-6,-10,-5$
d) $-13,-8$ and -3 .
Q. 30 Pointing to a photograph, Vipul said, "She is the daughter of my grandfather's only son. "How is Vipul related to the girl in the photograph?
[CO-1] [L-1]
a) Brother
b) Grandson
c) Cousin
d) Father
Q. 31 Time management refers to a range of skills, tools, and techniques used to manage time when accomplishing specific tasks, projects, and goals.
[CO-2] [L-1]
a) True
b) False
Q. 32 Being busy:
[CO-2] [L-1]
a) Can help you stay more organized
b) Can keep your priorities in order
c) Can be a good thing
d) Wasn't discussed as a part of using time more efficiently
Q. 33 Using a planner or making a "to-do" list every day.
[CO-1] [L-1]
a) Is a waste of paper.
b) Helps keep things "in sight, in mind."
c) Takes too long to fill out
d) None of the above
Q. 34 The 80:20 rule says
[CO-2] [L-2]
a) $80 \%$ of results are achieved with only $20 \%$ the effort
b) Typically $80 \%$ of unfocused effort generates $20 \%$ of results
c) Both of the above are true
d) None of the above
Q. 35 Two other important ways to help manage your time efficiently include [CO-1] [L-1]
a) Doing the best tasks first, and the worst tasks last
b) Having a very structured scheduled and not leaving room to be flexible
c) Being Flexible
d) Doing the worst tasks first while you're alert and not tired
Q. 36 Time management skills include
[CO-2] [L-1]
a) Getting a good nights sleep
b) Procrastinating
c) Having free time
d) Being Flexible
Q. 37 Stress management is about learning
[CO-1] [L-1]
a) How to avoid the pressures of life
b) How to develop skills that would enhance our body's adjustment when we are subjected to the pressures of life
c) Both '1' and '2' are true
d) None of the above
Q. 38 Which of the following are the basic sources of stress
[CO-2] [L-1]
a) The environment
b) Social stressors
c) Physiological
d) All of the above
Q. 39 Always start working on the easiest tasks, even if they are less important. [CO-2] [L-1]
a) True
b) False
Q. 40 Your description of who you are as a person is your
[CO-2] [L-1]
a) Self awareness
b) Self esteem
c) Self concept
d) Self disclose
Q. 41 Which one of the following is a position from which someone is unlikely to move to a higher level of work responsibility?
[CO-1] [L-1]
a) Career goals
b) Career path
c) Career progression
d) Career plateau
Q. 42 Which of the following is not stage in the development of career of any person?
a) Exploration
b) Mid career
c) Exit
d) Late Career
[CO-1] [L-1]
Q. 43 Development of a career of an individual undergoes through a number of
$\qquad$ .
[CO-1] [L-1]
a) Process
b) Series
c) Stages
d) Activities
Q. 44 As soon as a student graduates from the high school, he/she will:
a) Know what he/she wants to do for a career
b) Become a more active participant in the learning process
c) No longer need a high school transcript
d) Begin post-secondary part of the career plan.
Q. 45 Which should not be included as activities on a career plan?
[CO-2] [L-1]
a) Education and training
b) Extra-curricular
c) Job research
d) Work experience
Q. 46 A course of action toward achieving career and educational goals is a
[CO-2] [L-1]
a) Resume
b) Career plan
c) Transcript
d) Learning plan
Q. 47 S in SMART goal stands for $\qquad$ .
a) Simple
b) Short
c) Secure
d) Specific
Q. 48 Which is not a major factor in setting career goals?
a) Value
b) Interests
c) Friends
d) Aptitude
Q. 49 Which goals allow adjustments in the be made as an individual moves through his/her career plan?
a) Long term
b) Medium term
c) Short term
d) Stepping stone
Q. 50 If an ultimate goal is to become a physical therapist, a career plan should include:
a) Completing an internship
b) Getting a masters degree/ phD
c) Going to military
d) Going to a community college

# End Semester Examination, Dec. 2022 

# B. Tech. - Sixth Semester <br> MACHINE DESIGN-II (M-607) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Define 'stress concentration'.
b) What is fatigue failure?
c) What types of stresses are induced in shafts?
d) Define 'equivalent torsional moment'.
e) What are the applications of multi-leaf spring?
f) Explain the term 'spring index'.
g) What is rolling-contact bearing?
h) What are the applications of rolling-contact bearing?
i) What are the two objectives of lubrication?
j) What is pitting in gears?

## PART-A

Q.2. a) A forged steel bar, 50 mm in diameter, is subjected to a reversed bending stress of $250 \mathrm{~N} / \mathrm{mm}^{2}$ The bar is made of steel 40 C 8 (Sut $=600 \mathrm{~N} / \mathrm{mm}^{2}$ ). Calculate the life of bar for a reliability of $90 \%$. Assume, $\mathrm{ka}=0.44, \mathrm{~kb}=0.85, \mathrm{ke}=0.897 \quad \mathbf{1 0}$
b) Explain modified Goodman diagram for components subjected to fluctuating axial or bending stresses.
Q. 3 a) A rotating shaft 40 mm in diameter, is made of steel FeE 580 (Syt $=580 \mathrm{~N} / \mathrm{mm}^{2}$ ). It is subjected to a steady torsional moment of $250 \mathrm{~N}-\mathrm{m}$ and bending moment of $1250 \mathrm{~N}-\mathrm{m}$. Calculate the factor of safety based on:
i) Maximum principal stress theory.
ii) Maximum shear stress theory.
b) A propeller shaft is required to transmit 50 kw power at 600rpm. It is a hollow shaft, having an inside diameter 0.8 times of the outside diameter. It is made of steel (Syt $=380 \mathrm{~N} / \mathrm{mm}^{2}$ ) and the factor of safety is 4 . Calculate the inside and outside diameters of the shaft. Assume Ssy $=0.5 S y t$.
Q. 4 a) What are the applications of multi-leaf spring? Explain the objective of nipping of leaf spring.
b) A direct reading spring balance consists of helical tension spring, which is attached to a rigid support at one end and carries weights at the other free end. The length of the scale is 75 mm . Maximum capacity to measure weight is 500 N . Spring is made of oil-hardened and tempered steel wire with ultimate tensile strength of $1400 \mathrm{~N} / \mathrm{mm}^{2}$. Design the spring and calculate:
i) Write diameter.
ii) No. of active coils.
iii) Mean coil diameter.
iv) Required spring rate and actual spring rate if spring index $=6$, and $G=81370$ $\mathrm{N} / \mathrm{mm}^{2}$.

## PART-B

Q. 5 a) A single-row deep groove ball bearing has a dynamic load capacity of 40500 N andoperates on the following work cycle:
i) Radial load of 5000 N at 500 rpm for $25 \%$ of the time.
ii) Radial load of 10000 N at 700 rpm for $50 \%$ of the time; and
iii) Radial load of 7000 N at 400 rpm for the remaining $25 \%$ of the time Calculate the expected life of the bearing in hours.
b) State any four desirable properties of a good bearing material. ..... 8
Q. 6 a) Derive an expression for beam strength of gear teeth. ..... 10
b) Explain various causes of gear tooth failure. ..... 10
Q. 7 a) Explain the design considerations of casting. ..... 10
b) Explain the design considerations of machining. ..... 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth/Sixth Semester

CAD / CAM (M-602)

Q. 1 Answer the following questions:
a) Explain translation transformation with matrix in 2D and 3D.
b) What is axonometric projection?
c) What do you understand by interpolation and approximation spline in curve shapes governing?
d) Define synthetic curves.
e) What do you mean by fixed zero and floating zero?
f) What are canned cycles?
g) Write the steps of reflection matrix when axis of reflection is $y=m x$.
h) How is automation Implemented.
i) Explain numerical control system.
j) Define 'ruled surface'.

## $2 \times 10$

## PART-A

Q. 2 a) Find the reflection matrix when axis of reflection is $y=3 x+2$.

## 12

b) A line having end points $(3,3)$ and $(5,5)$ is scaled by 3 units in a $x$ direction and 4 units in $y$ direction. Find the transformation matrix and final coordinates of the line.

## 8

Q. 3 a) Write a Parametric Equation for a circle having end points of diameter as $P_{1}(2,3$, 6 ) and $P_{2}(8,7,6)$. Calculate the coordinates of points on circle.

12
b) Draw the Bezier curve with following control points:

$$
(1,2),(3,4),(6,-6) \text { and }(10,8)
$$

Q. 4 a) What is CSG? Explain the Boolean operation used in constructive solid geometry
for solid modeling.
b) Explain the following:
i) B-rep
ii) Sweep representation.

## $5 \times 2$

## PART-B

Q. 5 a) Explain the coordinate system types and also explain the coordinate system used in NC with it G code.
b) What is automation? What are the levels of automation? $\mathbf{1 0}$
Q. 6 a) From a shaft of 25 mm diameter, make a stepped shaft with dimension as shown in the figure below. Take speed 3000rpm and feed $=30 \mathrm{~mm} / \mathrm{min}$.

b) Briefly explain the conferetoofthe *ollowing: * - omm $\frac{1}{}$
i) Drive surface.
ii) Check surface.
iii) Part surface
Q. 7 Write short notes on the following:
a) BOM.
b) MRPI and MRPII.
c) CAPP.
d) Part classification and coding.
e) MPS.

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester

NETWORK PROGRAMMING AND ADMINISTRATION (IT-701)
Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1


#### Abstract

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.


Q. 1 Answer the following in brief:
a) What is the difference between network layer and transport layer delivery?
b) Convert the IP address 129.14.6.8 from the dotted-decimal notation to binary notation.
c) Find the net-id and host-id of 208.34.54.12 IP address.
d) ICMP lies on which layer of TCP/IP and what is its main function?
e) What is the usage of "Ipconfig" troubleshooting command?
f) What is echo service?
g) Differentiate between authentication and authorization.
h) What is a router?
i) What is the function of a firewall?
j) Discuss the client stub.
$2 \times 10$

## PART-A

Q. 2 a) A block of address is granted to a midsize organization. One of the address from a block is "180.190.120.64/28". Answer the following:
i) Define the term "Default mask". Specify the default mask for the associated class in the given IP address.
ii) Find the first address of a block.
iii) Find the last address of a block.
iv) Find the total number of addresses in the block. $\mathbf{1 0}$
b) What is the necessity of "ICMP" at network layer of TCP/IP protocol suite? Discuss the various ICMP message types, with their purpose in internetworking. 7
c) Explain the concept of a VLAN. 3
Q. 3 a) Specify the role of socket in network communication. Give the detailed architecture of client-server communication, based on TCP. Explain role and syntax of each socket call, involved with neat interaction diagram.
b) Specify the role of "Select ( ) and Poll ( )" functions in socket programming. 5
c) Explain ECHO service with respect to TCP and UDP.


#### Abstract

Q. 4 Discuss in detail, the iterative connection oriented server algorithm, with neat process structure diagram. Also, compare it with iterative connection-less server implementation. What is the motivation behind concurrent server implementation? 20


## PART-B

Q. 5 a) What is dynamic port mapping? Write RPC port algorithm.

10
b) Compare the pros and cons of local procedural call and remote procedural call.

10
Q. 6 a) Write short notes on: i) PPP ii) RADIUS ..... $5 \times 2$
b) What is the role of DNS? Explain the steps for configuring a DNS server. ..... 10
Q. 7 a) Explain the different C's of security with the help of a suitable diagram. ..... 10
b) How passwords ensure the authentication of a user? ..... 10

# End Semester Examination, Dec. 2022 <br> B. Tech. - Fourth Semester <br> JAVA PROGRAMMING (IT-402) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) Explain static variable and function.
b) Differentiate between interface and abstract class.
c) Does java support multiple inheritance? If yes, then how?
d) Is java pure object oriented language?
e) Explain run method of threads.
f) Explain finalize keyword in java.
g) How to run a JAR file though command prompt?
h) Explain Serialization.
i) Explain Graphics2D class.
j) Discuss features of JAVA.

## PART-A

Q. 2 a) Design an interface with a method reversal. This method takes a string as its input and returns the reversed string.Create a class string reversal and implement the method.
b) What is constructor overloading? Explain with an example. Which method is used to call base class constructor
Q. 3 a) Write an applet to display an image. ..... 5
b) What are the two ways to execute an applet? Explain. ..... 5
c) Create a user-defined exception named check argument to check the number ofarguments passed through comment line.If the number of arguments is less thanfive, throw the check argument exception, else print the addition of all the fivenumbers.10
Q. 4 a) Write a program to show how mouse motion listener can be used to track mouse movements. ..... 10
b) Write an AWT program to create checkboxes for different courses belonging to auniversity such that the courses selected would be displayed.10

## PART-B

Q. 5 a) What is remote method invocation? Write steps to set up remote method invocation. 10
b) Write short notes on following:
i) CORBA.
ii) SOAP.
Q. 6 a) Write a program to concatenate two files and display the output in new file. $\mathbf{1 0}$
b) What is multithreading? Explain complete life cycle of a thread. Write a program to show the concept of multithreading.
Q. 7 a) Discuss the JDBC drivers.
b) What is the difference between statement, prepared statement, and callable statement? 5
c) Write a program to connect to a database and retrieve the data. $\mathbf{1 0}$

## End Semester Examination, Dec. 2022

## B. Tech. - Seventh Semester <br> HUMAN RESOURCE MANAGEMENT (HM-822)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions
from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer (any four) from the following:
a) Discuss the roles and responsibilities of human resource managers.
b) List the objectives of human resource planning.
c) Recall various purposes of recruitment.
d) List the purposes of training and development.
e) Recall the importance of pay for performance?
f) Assess the need of international human resourcemanagement.

## PART-A

Q. 2 a) What are the various functions of HRM? What is its strategic importance? $\mathbf{1 0}$
b) Discuss the evolution of HRM and what is futuristic HRM going to be.
Q. 3 a) Distinguish between recruitment and selection. 8
b) Explain the processes of recruitment and selection in detail.
Q. 4 a) Explain the process of HR planning. What factors affect HRP? ..... 12
b) How is forecasting of manpower carried out? ..... 8

## PART-B

Q. 5 How would you design and administer a training programme?
Q. 6 What is performance management system? Demonstrate the process of performance management system. ..... 20
Q. 7 a) Evaluate the role of human resource in knowledge industry. ..... 10
b) Discuss the role of human resource in mergers and acquisitions. ..... 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Eighth Semester <br> HUMAN RESOURCE MANAGEMENT (HM-822)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions
from PART-A and TWO questions from PART-B. Marks are indicated against each
question.
Q. 1 Answer (any four) from the following:
a) Discuss the roles and responsibilities of HR managers.
b) Draw the flow chart of Delphi technique for forecasting the manpower.
c) List the importance of Recruitment.
d) Determine the benefits of Succession Planning.
e) Recall the importance of pay for performance.
f) Assess the need of Outplacement.

## PART-A

Q. 2 Define 'HRM'. Comprehend the scope of management. 20
Q. 3 Illustrate various forecasting techniques of Human Resource with suitable examples. 20
Q. 4 Identify various environmental influences on recruitment? State with the necessary
examples.

PART-B
Q. 5 How would you design and administer a training program? 20
Q. 6 State Compensation. How would you determine a compensation structure? 20
Q. 7 a) Evaluate the role of HR in virtual organization. $\mathbf{1 0}$
b) Discuss the role of HR in mergers and acquisitions. $\mathbf{1 0}$

## End Semester Examination, Dec. 2022

## B. Tech. - Sixth Semester SPANISH (HM-608)

Time: 1112 hrs .
Max
Marks: 50
No. of pages: 3
Note: Attempt ALL questions are compulsory. Marks are indicated against each question.
Q. 1 Escribe diez líneas sobre ti mismo y tu familia usando nombre/ adjetivo/ nacionalidad/ profesión/ edad etcétera. (Write 10 sentences about yourself and your family using name/ adjective/ nationality / profession/ age/ etc.) (CO2)(L6) 10
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

## Q. 2 Lee el diálogo y responde las preguntas.

## (CO1)(L6) 7

Read the dialogue and respond to the questions.
iHola! iBuenas tardes!
Me llamo Ángela, soy mexicana pero vivo en Madrid, la capital de España con mis amigos. Yo tengo 30 años y soy profesora de geografía en la escuela. Mi número de teléfono es 9393939 . Tengo un amigo en Madrid que se llama Sergio González. Él es de Perú, es peruano, Sergio tiene 32 años y es doctor. Nosotros vivimos en una casa muy grande.
Responde: (Respond)
a) ¿Es española Ángela?:
b) ¿Cuántos años tiene Sergio?: $\qquad$
c) ¿A qué se dedica Sergio González?: $\qquad$
d) ¿Cuántos años tiene Ángela?: $\qquad$
e) ¿Cómo es la casa de Sergio?: $\qquad$
f) ¿Qué significa grande?: $\qquad$
g) ¿Qué es el número de teléfono? $\qquad$
Q. 3 Mira al dibujo y responde a las preguntas.
(L3) 8
Look at the picture and respond to the questions

e.g. ¿Quién es el padre de mi prima?- Mi tío
a) ¿Quién es la madre de mi padre?
b) ¿Quiénes son los hijos de mis tíos?
c) ¿Quién es la hermana?
d) ¿Quién es el hermana de mi madre?
e) ¿Quiénes son los padres de mi prima?
f) ¿Quiénes son los padres de mi hermano?
g) ¿ Quiénes son los padres de mi padre?
h) ¿Quién es la madre de mi prima?
$\qquad$
Q. 4 Escribe enespañol.
(CO3)(L1) 5
Write numbers in Spanish.
a) $10-$
b) 26 -
c) 35 -
d) $15-$
e) 9 -
Q. 5 Completa las frases siguientes con la forma correcta del verbo ser. Completa las frases siguientes con la forma correcta del verbo ser.
(CO2)(L3) 10
a) Juan $\qquad$ de Colombia.
b) Ellos $\qquad$ profesor.
c) Vosotras $\qquad$ amigas.
d) Él $\qquad$ un alumno serio.
e) Tú y yo $\qquad$ de India.
f) Ella $\qquad$ mi madre.
g) Tú $\qquad$ muy guapo.
h) Susana y María $\qquad$ muy simpáticas.
i) Usted $\qquad$ muy inteligente.
j) Yo $\qquad$ de California.

## Q. 6 Convierte las siguientes frases en plural.

## (CO4)(L3) 5

Convert the following sentences into plural form.
a) La silla $\qquad$
b) La rosa $\qquad$
c) El hombre $\qquad$
d) La camisa $\qquad$
e) El bolígrafo $\qquad$
f) El dedo $\qquad$
g) La hermana $\qquad$
Q. 7 Completa con el artículo indeterminado.
(CO4)(L4) 5
Complete with indefinite article.
a) $\qquad$ estudiante
b) $\qquad$ móvil
c) $\qquad$ mesas
d) $\qquad$ sillas
e) ___ chico
f) $\qquad$ hermana
g) $\qquad$ bolso
h) $\qquad$ mapas
i) $\qquad$ libros
j) ___ teléfono

# End Semester Examination, Dec. 2022 <br> B. Tech. - Fifth Semester <br> SPANISH (HM-608) 

Time: $1 \frac{1}{2}$ hrs.
Max
Marks: 50
No. of
pages: 2
Note: Attempt ALL questions are compulsory. Marks are indicated against each question.
Q. 1 Escribe las preguntas de siguientes respuestas.

Given below are some answers, you have to write the Spanish question to the answers.
(CO2)
(L4) 5
a) $\qquad$
Soy de India.
b)

Tengo 20años.
c)

Estoy bien.
d)

Me llamo María.
Q. 2 Lee y responde a las preguntas:

Read \& answer the questions
iHola! Buenos días. Me llamo Susana, soy de India. Yo vivo en Madrid con mi familia y tengo 15 años. Soy estudiante de idiomas en un colegio muy grande que se llama Escuela de St. Peters. iHasta pronto!
(CO1) (L2) 5
a) ¿Cómo se llama la chica?
b) ¿Dónde vive ella y con quién?
c) ¿Cuántos años tiene?
d) ¿A qué se dedica ella?
e) ¿Qué significa buenos dias?
Q. 3 Conjuga los verbos y traduce:

Conjugate the verb \& translate:
(L3) 5
a) Ellos $\qquad$ (estudiar) español.
b) Yo $\qquad$ (bailar) en la fiesta.
c) $i$ $\qquad$ (vivir) tú en Madrid?
d) Vosotros $\qquad$ (hablar) francés.
e) Nosotros $\qquad$ (viajar) a Perú cada año.
Q. 4 Como se dice las siguientes palabras en inglés.

Write the correct english name in front of Spanish.
(L5) 5
a) Libro
b) Doctor
c) Español
d) Mi nombre es
e) Buenos días
$\qquad$
$\qquad$
Q. 5 Escribe los números en inglés.

Write the numbers in English.
(L6) 5
Eg. Ques. $2+2=$ $\qquad$ $?$
Ans. Dos + dos = cuatro
a) $3+4=$ $\qquad$ ?
b) $5+0=$ $\qquad$
c) $8+1=$ $\qquad$
d) $9-6=$ $\qquad$
e) $6+4=$ $\qquad$ ?
Q. 6 Cambia las palabras a Singular. Change the words to singular
(L3) 5
a) coches $\qquad$
b) Libros $\qquad$
c) Niños $\qquad$
d) Botellas $\qquad$
e) Mesas $\qquad$
Q. 7 Traduce las siguientes frases. (Translate the below lines).
(L4) 10
a) Hola! Mi nombre es Priyanshi.
b) Soy estudiante.
c) Nombre de mi colegio es MRU
d) Vivo en India $\qquad$
e) Soy médico en el hospital $\qquad$
f) Yo tengo 21 anos $\qquad$
g) Nombre de amigo es Navneet $\qquad$
h) Mi colegio es grande $\qquad$
i) Mi madre se llama Sanjana $\qquad$
j) Mi padre se llama Rohit $\qquad$
Q. 8 Elige el significo correcto de la caja para las palabras siguientes. (Write the correct meaning from the box for the below words).
(L6) 10
April
July
Sunday
Tuesday
Wednesday
September
May
Thursday
February Monday
a) Martes
b) Miercoles
c) Septiembre
d) Febrero
e) Abril
f) Mayo
g) Julio
h) Lunes
i) Domingo
j) Jueves

## End Semester Examination, Dec. 2022

## B. Tech. - Sixth Semester <br> GERMAN (HM-607)

Time: 1112 hrs .
Max
Marks: 50
No. of
pages: 4
Note: Attempt ALL questions are compulsory. Marks are indicated against each question.
Q. 1 Verbinden Sie die Sätze.
$(L 3,4) 5$
[Form the sentences using correct modal verbs.]
z.b kann/er/Schwimmen/gut/sehr- Er kann sehr gut Schwimmen.
a) Kann/gut/spielen/kann/Gitarre.
b) Keinen/Tee/möchte/er/trinken.
$\qquad$ .
c) Du/sollst/Medikamente/nehmen.
$\qquad$ .
d) Will/nach/Deutschland/Tina/fahren.
e) für /die/muss/Prüfung/Peter/studieren.
Q. 2 Schreiben Sie die bestimmten Artikel im Akkusativ.
[Write the indefinite articles in accusative.]
a) Steffi braucht $\qquad$ Farbenstift. (der/den/die)
b) Vera sucht $\qquad$ rote Tasche. (die/den/der)
c) Die kinder spielen in $\qquad$ Garten. (der/die/den)
d) $\qquad$ Buch ist sehr interessant. (das/die/der)
e) Ich trinke nicht $\qquad$ Cola. (der/die/das)
f) Wir möchten $\qquad$ Hamburger essen. (den/der/die)
g) Kannst du mir $\qquad$ Lineal geben? (die/das/der)
h) Gehen Sie noch in $\qquad$ Schule? (den/die/das)
Q. 3 Ergänzen Sie die konjugierte Verben.
$(\mathrm{L} 3,4) 5$
[Fill in the conjugated verbs.]
bekommen,lernen,spielen,arbeiten, nehmen
a) Was $\qquad$ du zum Geburtstag?
b) Was $\qquad$ Sie heute Abend? Fußball oder Tennis?
c) Petra $\qquad$ in der Bank.
d) $\qquad$ du Tee oder Kaffee?
e) Ich $\qquad$ lerne Deutsch in der Schule.
Q. 4 Schreiben Sie die Wörter auf Deutsch oder auf Englisch.
[Translate the words in the respective language.]
it's windy, Frühling, winter, autumn, grau, Wolken, rot, gelb, it's sunny, sommer
a) Sommer $\qquad$
b) pink
C) thunder $\qquad$
d) green $\qquad$
e) spring $\qquad$
Q. 5 Ergänzen Sie die Possessiv pronomen.

## (L1, 4) 5

[Fill in the correct possessive pronoun.]
z.B. - Herr Weiß. Ist das Ihre Uhr[f]?- Ja, das ist meine Uhr.
a) Suchst du $\qquad$ Tasche[f]?
[ihre, deine]
b) $\qquad$ (er)Haus ist sehr gro $\beta$ [Sein, deine]
c) $\qquad$ (sie) Buch ist sehr interessant. [ihr, Ihre]
d) Wir besuchen $\qquad$ Eltern Heute Abend. [euer, unsere]
e) Das ist $\qquad$ Uhr [f]. [mein, meine]
Q. 6 Ergänzen Sie um, am oder im.
[Fill in blanks with the correct prepositions.]
a) $\qquad$ Montag habe ich Deutsch.
b) $\qquad$ 9Uhr spielen wir Tennis.
c) $\qquad$ Winter fliegt Maria nach Deutschland.
d) $\qquad$ 11 Uhr geht sie in die Klasse..
e) $\qquad$ Samstag habt ihr frei.
Q. 7 Schreiben Sie die Gegenteile von den folgenden Adjektiven.
$(L 1,4) 3$
[Write the opposites of the given adjectives.]

| billig, gro $\beta$, kurz, hell, <br> unbequem,uninteressant |
| :---: |

a) lang
X $\qquad$
b) teuer $\qquad$
c) bequem
X $\qquad$
d) klein $\qquad$
e) dunkel $\qquad$
f) interessant $x$ $\qquad$

## Q. 8 Ergänze: hatten oder waren.

(L3,4) 5
[Fill in the blanks using past tense.]
a) Maria $\qquad$ im Kino.
[hatte/war]
b) Ich $\qquad$ keine Zeit gestern.
c) Das Konzert $\qquad$ toll?
d) $\qquad$ du viel $\mathrm{Spa} \beta$ letztes mal?
e) Wann $\qquad$ er Pause? [hatte/war]
[hattest/warst]
[hatte/war]

## Q. 9 Setzen Sie die Trennbare Verben in der richtigen Form ein!

[Fill the separable verbs in the correct form.]
a) $\qquad$ du deine CD's $\qquad$ ? [mitbringen]
b) Ihr $\qquad$ neues Auto $\qquad$ .
c) Tina $\qquad$ ihre Freundin $\qquad$ .
[einkaufen]
[anrufen]
[anfangen]
Q. 10 Welches Bild ist das?

$(\mathrm{L} 3,5) 5$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

# End Semester Examination, Dec. 2022 <br> B. Tech. - Sixth Semester <br> FRENCH (HM-606) 

Time: $11 / 2 \mathrm{hrs}$.
Max
Marks: 50
No. of
pages: 5
Note: Attempt ALL questions are compulsory. Marks are indicated against each question.

## Section A

## CompréhensionÉcrite

## Q. $1 \quad$ Lisez le passage et répondez aux questions.

(CO5) (L5)
(Read the passage and answer to the questions)
Bonjour Louise,
Le 18
mai 2022

Ça va ? Je suis en vacances à Rome. Il fait beau et chaud !

Je visite des musées, j'étudie l'italien, je rencontre des personnes tous les jours. C'est super! Le matin, je fais une promenade dans les parcs, le midi je mange des pizzas avec mes amis. L'après-midi, je fais du shopping, je visite des musées ou je fais du vélo dans la ville. J'adore I'Italie!
Je rentre à Paris samedi et je fais une fête dimanche soir. Pour la fête, J'invite nos amis chez moi. Ma maison est grande et belle. Elle est très confortable aussi. Dans la fête, Nous dansons and mangeons des gâteaux et des repas délicieux. Nous nous amuserons beaucoup.
Bisous
Julien
Vocabulaire
rencontre -to meet someone
matin -morning
fais-to do
rentre-return

## A. Répondez aux questions:

2
(Answer to the questions)
i.) Décrivez la maison de Julien en 2-3 lignes?
ii.) Qu'est-ce que Julien fait le matin ?

## B. Dites vrai ou faux :

## 5

(True or False)
i.) Julie habite à Paris.
ii.) Julien étudie le français.
$\qquad$
$\qquad$
iii.) Julien adore L'Italie
iv.) Julien est en vacances à Rome.
$\qquad$
v.) La maison de Julien est grande.
$\qquad$
$\qquad$

## Section-B <br> Expression Écrite

Q. 2 Décrivez votre famille en 7-8 lignes.
(CO2) (L3) 5
(Describe your family)

## Ou

(or)

Décrivez votre journée typique en utilisant les verbs donnés.
(CO3) (L5)
(Describe your daily routine by utilizing these verbs)
(Se lever, se laver, se brosser , manger , prendre , aller , étudier , jouer , se promener, rentrer, se coucher , dormir )
$\qquad$
$\qquad$
$\qquad$
$\qquad$

## Section-C

## Grammaire

Q. 3 Complétez avec les adjectifs possessifs (mon,ma,ton,ta....).
(CO5) (L5) 5
(Complete with possessive adjectives)
a) Ils finissent $\qquad$ devoir.
b) Nous sommes dans $\qquad$ classe.
c) Elle invite $\qquad$ parents.
d) Tu fais $\qquad$ travail.
e) Je regarde $\qquad$ professeur.
Q. 4 Complétez avec les adjectives.
(CO1) (L1) 6
(Complete with the adjectifs)
a) La table est $\qquad$ (red)
b) La télè est $\qquad$ (big)
c) Le dictionnaire est $\qquad$ (thin)
d) Le mur est $\qquad$ (pink)
e) Ils ont des crayons $\qquad$ (black)
f) La fille est $\qquad$ (intelligent)

## Q. 5 Mettez au pluriel.

## (CO1) (L1) 5

(Make these sentences plural)
a) Il est indien.
b) C'est un garçon et une fille.
c) C'est un bon acteur.
d) Elle $a$ un vèlo.
e) Il aime le stylo noir.

## Q. 6 Mettez au féminin.

(CO2) (L2) 5
(Make these sentences feminine.)
a) Le mécanicien est intelligent.
$\qquad$
b) Ils sont anglais.
$\qquad$
c) Le professeur est sympathique.
d) Il est belge.
e) L'architecte est gros.
Q. 7 Complétez avec les prépositions données.
(CO4) (L2) 6
(Complete with the given prepositions)
Près de, avant , sous, à droite de, devant, entre
a) Nous faisons nos devoirs $\qquad$ le dîner. (before)
b) La table est $\qquad$ du lit. (in front of)
c) Il y a une forêt $\qquad$ ma maison. (near)
d) L'armoire est $\qquad$ les tableaux (between)
e) Le chat est $\qquad$ la chaise.(under)
f) Lapis cine $\qquad$ l'hôtel. (on the right of)

## Q. 8 Conjuguez les verbes.

$(L 6,1) 6$
(Conjugate the verbs)
a) $\mathrm{J}^{\prime}$ $\qquad$ la petite fille.(regarder)
b) Vous $\qquad$ demain.(voyager)
c) Les filles $\qquad$ anglais.(parler)
d) Nous $\qquad$ au cricket.(jouer)
e) Ils $\qquad$ dans la salle de bains. (Se laver)
f) Tu $\qquad$ à 7h ? (Se promener)

## Section-D <br> Culture and Civilisation

Q. 9 Réliez les colonnes.
(CO6) (L1) 5
(Match the Columns)

## Colonne A

Les Pyrénées
Le camembert
Dior
La Seine
Le Bordeaux

## Colonne B

Answers
Un fromage
Un vin
Une montagne
Un parfum
Un fleuve

# End Semester Examination, Dec. 2022 <br> <br> B. Tech. - Fifth Semester <br> <br> B. Tech. - Fifth Semester SPANISH (HM-508) 

 SPANISH (HM-508)}

Time: $1 \frac{112}{2}$ hrs.
Max
Marks: 50
No. of
pages: 4
Note: Attempt ALL questions are compulsory. Marks are indicated against each question.
Q. $1 \quad$ ¿Cómo se dice en inglés? [Write the correct English names in front of Spanish?]
(CO2)
(L4) $\mathbf{2 1 / 2}$
a) Martes
b) Cantante
c) Rotulador
d) Hasta luego
e) Alumnos
Q. 2 Escribe los números en español. [Write the numbers in Spanish]
(CO1) (L3) 5
Eg. Ques. $2+2=4$
Ans. Dos + dos = cuatro
a) $4+2=6$ $\qquad$ ?
b) $22+12=34$ ?
c) $6+2=8$ $\qquad$ ?
d) $11+10=21$ $\qquad$
e) $14+35=49$ $\qquad$ ?
Q. 3 Escribe las conjugaciones de 'SER' y su significado. [Write the complete conjugations of
verb ser and it's meaning]
(CO4) (L5) 5

## SER

Significados
I am
Tú eres
Q. 4 Hace cinco oraciones con ser usando números o colores. [Make five sentences with ser using colors or numbers]
(CO2) (L6) 5
a) $\qquad$ .
b)
c)
d) $\qquad$ .
e) $\qquad$ .
Q. 5 Cambia las palabras a plural. [Change the words to plural]
(L4) $21 / 2$
Eg. Mesa = Mesas
f) silla $\qquad$
g) Amiga $\qquad$
h) Niño $\qquad$
i) colegio $\qquad$
j) Chico $\qquad$
Q. 6 Contesta las siguientes preguntas. [Answer the following questions in Spanish]
a) ¿Cómo estás?
$\qquad$ .
b) ¿Dónde vives?
$\qquad$ .
c)
$\qquad$
$\qquad$
Me llamo María.
d) ¿Cuál es tu profesión/ A qúe te dedicás?
$\qquad$ .
e) ¿De dónde eres?
Q. $7 \quad$ Busca los errores en las siguientes frases. [Find the error in the below sentences.]
(L4) $\mathbf{2 1 / 2}$
a) Tus hermano es de India.
b) Mi amigos son inteligentes.
c) Vuestro madre es ama de casa.
d) Nuestras prima es amable.
e) Su coches es de color blanco.
Q. 8 Completa la siguiente tarjeta de identidad con tu información. [Complete the following

Identity card with your information in full sentences] 21/2

Nombre:
Apellido:
Edad:

Nacionalidad:

Profesión:
Q. 9 Traduce las siguientes frases. [Translate the below lines] (CO3) (L1) 10
k) Hola! Me llamo Juan.
I) Soy de México.
m) Estudio en colegio MRU $\qquad$
n) Es un colegio muy famoso $\qquad$
o) Soy un estudiante serio $\qquad$
p) Yo tengo 20 anos $\qquad$
q) Nombre de amigo es Navneet $\qquad$
r) Mi colegio es bonito $\qquad$
s) Susana habla español $\qquad$
t) Mi padre se llama Rohit $\qquad$
Q. 10 Escribe el nombre del miembro de la familia. [Write the name of the family member]
(CO6)
(L2) $\mathbf{2 1 / 2}$
a) Madre de mi madre es mi $\qquad$
b) Hijo de mi tío es mi $\qquad$
c) Esposo de mi madre es mi $\qquad$
d) Hija de mi padre es mi $\qquad$
e) Hijo de mi abuelo es mi $\qquad$
Q. 11 Lee las frases y corrígelas. [Read the sentences and correct it. Write no error in case of no error found]. (CO2) (L6) $\mathbf{2 1 ⁄ 2}$
a) Este lápiz es de Juan. $\qquad$
b) Aquella Bolso es Negro. $\qquad$
c) Ese chica es mi amiga. $\qquad$
d) Esta mesa es nuevo. $\qquad$
e) Esa hombre es mi marido.
Q. 12 Elige los interrogativos correctos, escribe en el espacio y traduce tambien. [Choose the correct interrogative, fill in the blanks and translate also]
(CO6) (L6) 5
Quién
Cómo
Cuántos
Dónde
Cuál
a) $\qquad$ es tu madre?
b) $\dot{~}$ $\qquad$ vives?
c) $\dot{i}$ $\qquad$ es tu número de teléfono?
d) $\dot{i}$ $\qquad$ estás?
e) $\dot{i}$ $\qquad$ estudiantes hay?

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester <br> GERMAN (HM-507)

Time: $11 / 2 \mathrm{hrs}$.
Max Marks: 50
No. of pages: 4
Note: ALL are compulsory. Marks are indicated against each questions:

## Q. 1 Lesen Sie dieTexte und antworten Sie die Fragen! <br> (Read the given texts below and answer the following questions)

I. Freunde

Ricarda ist 21 Jahre alt und wohnt in Lübeck. Lübeck ist eine sehr gute Stadt im Nordern von Deutschland. Ricarda studiert Jura an der Universitat von lübeck. Sie hat viele Freunde dort.
Ricarda beste Freund in heißt Maika. Maika ist 22 und wohnt nicht in Lübeck. Sie wohnt in Hamburg, aber be sucht ihre Freundin oft in Lübeck.
Sie treffen sich gerne im Park.Meistens gehen sie dann zussamen Eis essen.
Danach gehen sie manchmal noch einkaufen. Ricarda kauft am liebsten neuen Schmuck. Am Abend gehen sie gern Einkaufen. Maike ubernachtet dann oft bei Ricarda.

## Kreuzen Sie richtige Antworte an.

(Cross the right answer)
a) Was studiert Ricarda?
i) Lehramt
ii) Medizin
iii) Wirtschaft
iv) Jura
b) Wie alt ist Maike?
i) 19 Jahre
ii) 20 Jahre
iii) 21 Jahre
iv) 22 Jahre
c) Wo wohnt Maike?
i) Sie wohnt in Lübeck.
ii) Sie wohnt in Hamburg.
iii) Sie wohnt in Berlin.
iv) Das steht nicht im Text
d) Was kauft Ricarda am liebsten?
i) Essen und Trinken
ii) Schmuck
iii) neue Schule
iv) Filme
e) Wohin gehen sie gern abends?
i) Kaffee trinken
ii) Eis essen
iii) Einkaufen
iv) ins Kino

## II. MeineFamilie

Zu meiner Familie gehören vier Personen. Die Mutter bin ich und dann gehört natürlich mein Mann dazu. Wir haben zwei Kinder, einen Sohn, der sechs Jahre alt ist und eine drei jährigeTochter.
Wir wohnen in einem kleinen Haus mit einem Garten. Dort können die Kinder ein bisschen spielen. Unser Sohn kommt bald in die Schule, unsere Tochter geht noch eine Zeit lang in den Kindergarten. Meine Kinder sind am Nachmittag zu Hause. So arbeite ich nur shalbtags.
Eigentlichge hören zu unserer Familie auch noch die Großeltern. Sie wohnen nicht bei uns. Sie haben ein Haus in der Nähe. Die Kinder gehen sie oft besuchen.
a) Wie viele Personen hat die Familie?
i) 3
ii) 4
iii) 5

$$
\text { iv) } 6
$$

b) Wo wohnt die Familie?
i) in einem Garten
ii) in einer Stadt
iii) in einer Wohnung
iv) in einem Haus
c) Haben sie Kinder?
i) nein
ii) ja, zwei Kinder
iii) ja, ein Kind
iv) ja, drei Kinder
d) Arbeitet die Mutter?
i) Ja, abernurhalbtags
ii) Ja, sie arbeitet von 9 bis 17 Uhr
iii) Nein, sie ist Hausfrau
iv) Davon steht nichts sim Text
e) Wer gehört noch zur Familie?
i) eine Katze
ii) ein kleiner Hund
iii) Oma und Opa
iv) Onkel und Tante
$[L 1,6] 1 \times 10$

## Q. 2 Beantworten Sie,bitte! <br> (Answer the following):

## A. Übersetzen Sie auf Englisch. <br> (Translate into English)

Erich ist mein Name. ich bin zwölf jahre alt und wohne in Berlin. Ich habe eine Schwester. Sie heißt Lisa. Sie ist zehn und hat viele Freundinnen. Mein Vater heißt Klaus Wohlmann. Er ist 40. Er ist Techniker von Beruf. Er arbeitet viel und verdient viel Geld.

## B. Wer ist das? <br> (Who is this?)


i) Sie ist $\qquad$

ii) Er ist
C. Welches Wort passthier?
(Fill in the blank with suitable word in German.)
(ist/bin/wohne/mein/in/meine/hei $\beta \mathrm{t} / \mathrm{in} / \mathrm{wohnt} / \mathrm{E}-\mathrm{mail}$ addresse)
Servus,__ $\quad$ Name ist Roland Maurer. Ich __ jahre alt. Ich
$\qquad$ in Linz. Linz liegt $\qquad$ Osterreich. $\qquad$ Freundin $\qquad$
Anna. Sie $\qquad$ in Pasing. Das liegt $\qquad$ Munchen. Ihre Telefonnummer
$\qquad$ 0897654323 Meine $\qquad$ ist roland.maurer@gmail.com.
D. Beantworten Sie die folgenden Fragen! (Answer the following questions)
i) Wann ist dein Geburtstag?
ii) Heute ist Montag. Morgan ist?
iii) Wie heißt dein Freund?

3
Q. 3 Schreiben Sie den Artikel (der/die/das)?
(Write the correct article.)
i) Lehrer
ii) Ball
iii) Freundin
iv) $\qquad$ Kuli
v) ___Frau
Q. 4 Ergänzen Sie die richtige verben.
(Fill in the blanks with appropriate verb forms.)
(sein/kaufen/schenken/spielen/bringen)
i) Er $\qquad$ zwei Kilo Zweibeln.
ii) Was $\qquad$ du deine Mutter zum Geburtstag?
iii) Tina $\qquad$ eine Cola und eine Limonade mit.
iv) Sie $\qquad$ die Tante von Tina und Marx.
v) Mein Freund $\qquad$ gern Basketball.

## Q. 5 Ergänzen Sie.

(Fill in the blank with the appropriate information about Germany):
a) When does the Oktoberfest start? $\qquad$
i) early November
ii) mid-September
b) Famous eatable in Oktoberfest is? $\qquad$
i) Wurstchen
ii) Ginger Heart Bread
c) Capital of Germany is
i) Wien
ii) Berlin
d) The famous river of Germany is $\qquad$
i) Rhein
ii) Hudson
e) Lara kommt aus
. Sie spricht Deutsch.
i) Polen
ii) die Schweiz
Q. 6 Schreiben Sie über eins der folgendenThemen.
(Write on any one of the topics given below in 60-80 words.)
i) Mein Hobby
ii) Meine Familie
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

ALLES GUTE!


# End Semester Examination, Dec. 2022 <br> B. Tech. - Fifth Semester FRENCH (HM-506) 

Time: $1 \frac{112}{2}$ hrs<br>Max

Marks: 50
No. of
pages: 4
Note: Attempt ALL questions are compulsory. Marks are indicated against each question.

## Section-A <br> COMPRÉHENSION ÉCRITE

## Q. 1 Lisez le passage et répondez aux questions

(CO5) (L5)
(Read the passage and answer to the questions)
Bonjour, Je m'appelle Akansha. J'ai trente ans et je suis Indienne. J'habite à Paris et je suis journaliste. Je parle Hindi et Français. Je vous présente ma famille. Mon père est professeur de maths et ma mère est professeur d'anglais. J'ai trois frères et quatre sœurs. C'est une grande famille, Mon mari est architecte et nous avons deux fils et une fille. Nous sommes contents. Mes fils sont beaux. Ma fille est très intelligente. J'aime beaucoup ma famille. Au revoir!

## Vocabulaire

1. sœurs- sisters
2. Fils-Sons
3. Mari-husband
4. Beaux- Handsome
3.Contents- Happy
a) Dites vrai ou faux :

4
(Tell True or False)
i.) La fille, elle s'appelle Akansha.
ii.) Elle est française.
iii.) Elle a cinq enfants.
iv.) Son mari est architecte.
b) Répondez aux questions suivantes:

2
(Respond to the questions)
i.) Quelle est la profession d'Akansha ?
ii.) Quelle est la profession de la mère d'Akansha?
$\qquad$

## Section B EXPRESSION ÉCRITE

Q. 2 Présentez - vous en 7-8 lignes (Present yourself in 7-8 lines)
3) (L6) 5

OU
Décrivez votre ami(e) (Describe your friend)

## Section-C

## Grammaire

Q. 3 Conjuguez les verbes.
(CO3,4) (L2) 5
(Conjugate the verbs)
a) Je $\qquad$ le film anglais.(Regarder)
b) Ils $\qquad$ en vacanes. (Aller)
c) Elle $\qquad$ Indienne. (Être)
d) Tu $\qquad$ en Inde? (Habiter)
e) Nous $\qquad$ le gateau au chocolat.(Faire)
Q. 4 Quelle heure est-il ?
(CO3) (L1) 5

## (What time is it ?)

a) 07:45:-
b) $06: 30$ :- $\qquad$ .
c) $02: 55:-$ $\qquad$ .
d) $04: 10:-$ $\qquad$ .
e) $03: 05$ :- $\qquad$ .

## Q. 5 Complétez avec les nombres ordinaux.

(CO2) (L3) 5
(Complete with ordinal numbers)
a) Samedi est le $\qquad$ jour de la semaine.
b) Septembre est le $\qquad$ mois de l'année.
c) Mai est le $\qquad$ mois de l'année.
d) Lundi est le $\qquad$ jour de la semaine.
e) Jeudi est le $\qquad$ jour de la semaine.
Q. 6 Remplissez les blancs :
(CO2) (L3) 4
(Fill the blanks)
a) $\qquad$ est le troisième jour de la semaine.
b) $\qquad$ est le onzième mois de l'année.
c) $\qquad$ est le deuxième mois de l'année.
d) $\qquad$ est le septième jour de la semaine.
Q. 7 Complétez avec les articles définis.
(L4) $\mathbf{2 1 / 2}$
(Complete with definite articles -le, la, $I^{\prime}$, les)
a) J'adore $\qquad$ glace et $\qquad$ bonbons.
b) Nous regardons $\qquad$ télévision.
c) $\qquad$ étudiant est dans la classe.
d) Il aime $\qquad$ gâteau.
Q. 8 Complétez avec les articles indéfinis :
(L4) $\mathbf{2 1 / 2}$
(Complete with indefinite articles - un,une, des)
a) Elle a $\qquad$ stylo.
b) Ce sont $\qquad$ garçons.
c) J'ai $\qquad$ trousse.
d) Il a $\qquad$ chapeau.
e) Nous avons $\qquad$ crayons.
Q. 9 Traduisez en français:
(CO5) (L4) 4
(Translate into french)
a) It is cold.
b) It's hot. $\qquad$ .
c) It's raining. $\qquad$ .
d) It's pleasant. $\qquad$ .
Q. 10 A) Traduisez les mots.
(CO1) (L1) 4
(Translate the words)
a) Enchantée :-
b) À Demain :-
c) Bonne Chance :- $\qquad$
d) Merci beaucoup :-
B) Complétez avec les pronoms sujets.

2 (Complete with subject pronouns)
a) $\qquad$ chantons bien.
b) $\qquad$ jouent ensemble.
c) $\qquad$ aimez la glace ?
d) $\qquad$ parles deux langues?

## Section-D <br> Culture and Civilisation

Q. 11 Complétez les phrases.
(CO6) (L1) 5

## (Complete the sentences)

a) $\qquad$ est la monnaie unique Européenne.
b) $\qquad$ est la capitale de la France.
c) $\qquad$
$\qquad$ et $\qquad$ sont les couleurs de drapeau Français.



## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester

CAREER SKILLS-II (HM-402)
Time: 2 hrs.
Max Marks: 50
No. of pages: 4
Note: The paper consists of FIFTY multiple questions; each question has FOUR options with one correct answer. Select the correct answer.
Attempt all questions. All questions are of ONE mark each. There is no negative marking. Calculator is not allowed.
Mention the correct option for each question in the blank answer key given herein below. (Answer sheets with empty answer keys despite the correct options being ticked, will not be evaluated)

| 51. | 52. | 53. | 54. | 55. | 56. | 57. | 58. | 59. | 60. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 61. | 62. | 63. | 64. | 65. | 66. | 67. | 68. | 69. | 70. |
| 71. | 72. | 73. | 74. | 75. | 76. | 77. | 78. | 79. | 80. |
| 81. | 82. | 83. | 84. | 85. | 86. | 87. | 88. | 89. | 90. |
| 91. | 92. | 93. | 94. | 95. | 96. | 97. | 98. | 99. | 100. |

Q. 1 The average of five numbers is 12. What will be the new average, if each of the numbers is multiplied by 4?
a) 60
b) 20
c) 48
d) 4
Q. 2 If 35\% of a number is 112. Then what is the number?
a) 380
b) 300
c) 320
d) 350
Q. 3 If $40, x, x, 40$ are in proportion, then find the value of $x$.
a) 40
b) 50
c) 30
d) 25
Q. 4 Two numbers are in the ratio 3:4. The difference between their squares is 28.

Find the greatest number.
a) 12
b) 8
c) 24
d) 16
Q. 5 In a group of persons, 70\% of the persons are male and $30 \%$ of the persons are married. If two-seventh of the males are married, what fraction of the females is single?
a) $2 / 7$
b) $1 / 3$
c) $3 / 7$
d) $2 / 3$
Q. 6 An airplane covers a certain distance at a speed of 240 kmph in 5 hours. To cover the same distance in
1 hours, it must travel at a speed of:
a) 300 Kmph
b) 360 kmph
c) 600 kmph
d) 720 kmph
Q. 7 The CP of an article is $5 / 6$ of the SP. What is the percentage profit or loss?
a) $20 \%$ loss
b) 16.66 profit
c) $16.66 \%$ loss
d) $20 \%$ profit
Q. 8 A man sold an umbrella for `1800 and incurs a loss of \(20 \%\), then what is the cost price of the umbrella? a) 1440 b) 2160 c) 2250 d) 2320 Q. 9 The smallest three digits divisible by 3 is: a) 103 b) 100 c) 102 d) None of these Q. 10 The side of a square is 20 cm . What is the area of the square? a) \(400 \mathrm{~cm}^{2}\) b) \(300 \mathrm{~cm}^{2}\) c) \(40 \mathrm{~cm}^{2}\) d) \(480 \mathrm{~cm}^{2}\) Q. 11 What is the LCM of \(8,12,15\) ? a) 150 b) 100 c) 120 d) 180 Q. 12 To complete a piece of work \(A\) and \(B\) take 8 days, \(B\) and \(C 12\) days. \(A, B\) and \(C\) take 6 days. \(A\) and \(C\) will take: a) 7 days b) 7.5 days c) 8 days d) 8.5 days Q. 13 A tank is 25 m long, 12 m wide and 6 m deep. The cost of plastering its walls and bottom at 75 paise per sq.m is? a) \({ }^{\circ} 456\) b) \({ }^{\wedge} 458\) c) \(` 558\)
d) `568 Q. 14 The ratio between the perimeter and the breadth of a rectangle is 5:1. If the area of the rectangle is 216 sq. cm , what is the length of the rectangle? a) 16 cm b) 18 cm c) 24 cm d) 20 cm Q. 15 A mixture of water and milk contains \(80 \%\) milk. In 50 litres of such a mixture, how many litres of water is required to increase the percentage of water to \(50 \%\) ? a) 20 b) 15 c) 30 d) 45 Q. 16 What is the probability of getting an even number in single throw of a dice? a) \(2 / 5\) b) \(1 / 2\) c) \(1 / 3\) d) \(5 / 6\) Q. 17 A shopkeeper has 50kgs of rice, part of which he sells at 8\% profit and the rest at \(18 \%\) profit. On the whole, he gains \(14 \%\) profit. What quantity of rice is sold at 18\% profit ?(in kgs) a) 40 b) 35 c) 30 d) 45 Q. 18 Amit started a business by investing`30,000. Rahul joined the business after some time and invested '20,000. At the end of the year, profit was divided in the ratio of 2:1. After how many months did Rahul join the business?
a) 9
b) 3
c) 4
d) 5
Q. 19 Three unbiased coins are tossed. What is the probability of getting at most two heads?
a) $3 / 4$
b) $1 / 4$
c) $3 / 8$
d) $7 / 8$

Each of the questions 20-21 given below consists of a statement and / or a question and two statements numbered I and II given below it. You have to decide whether the data provided in the statement(s) is / are sufficient to answer the given question. Read the both statements and

- Give answer (a) if the data in Statement I alone are sufficient to answer the question, while the data in Statement II alone are not sufficient to answer the question.
- Give answer (b) if the data in Statement II alone are sufficient to answer the question, while the data in Statement I alone are not sufficient to answer the question.
- Give answer (c) if the data even in both Statements I and II together are not sufficient to answer the question.
- Give answer(d) if the data in both Statements I and II together are necessary to answer the question.
Q. 20 What is Sonia's present age?
I. Sonia's present age is five times Deepak's present age.
II. Five years ago her age was twenty-five times Deepak's age at that time. Answer $\qquad$
Q. 21 How much time did $X$ take to reach the destination?
I. The ratio between the speed of $X$ and $Y$ is $3: 4$
II. $Y$ takes 36 minutes to reach the same destination Answer $\qquad$
Q. 22 16. Look at this series: 2, 4, 8, 16, ... What number should come next?
a) 64
b) 48
c) 45
d) 32
Q. 23 Two pipes can fill the cistern in 10hr and 12 hrs. respectively, while the third empty it in 20hr. If all pipes are opened simultaneously, then the cistern will be filled in
a) 7.5 hrs .
b) 8 hrs .
c) 8.5 hrs .
d) 10 hrs .
Q. 24 Which of the following diagrams indicates the best relation between Earth, Sea and Sun?
a)

b)

c)

d)

Q. 25 In how many different ways can the letters of the word 'OPTICAL' be arranged so that the vowels always come together?
a) 120
b) 720
c) 4320
d) 2160
Q. 26 In how many different ways can the letters of the word 'GAMER' be arranged?
a) 8 !
b) $6!$
c) $3!\times 2$ !
d) 5 !
Q. 27 Find the remainder when 103 is divided by 3?
a) 2
b) 1
c) 3
d) 7
Q. 28 If a quarter kg of potato costs 60 paise, how many paise will 200 gm cost?
a) 48 paise
b) 54paise
c) 56 paise
d) 72 paise
Q. 29 Which of the following diagrams indicates the best relation between India, Haryana and World?
a)

b)

c)

d)

Q. 30 The length of a rectangle is halved, while its breadth is tripled. What is the percentage change in area?
a) $25 \%$ increase
b) $50 \%$ increase
c) $50 \%$ decrease
d) $75 \%$ decrease
Q. 31 To make a presentation impressive and effective you should use:
a) Jargons
b) Complex sentences
c) Passive sentences
d) A simple and active form of sentences
Q. 32 Self-assessment in career planning helps you to know
a) What your talents \& strengths are
b) The activities you get most satisfaction from
c) The talents you achieve most with
d) All of the above
Q. 33 Which of these is a characteristic of high performance team where members believe in the integrity, character and ability of each other?
a) Openness
b) Worthiness
c) Trust
d) Loyalty
Q. 34 Which of these is the fundamental pattern of cultural differences?
a) Communication styles
b) Clothing Styles
c) Decision making style
d) All of the above
Q. 35 I pass others' work as in my own work I am indulging in:
a) Compassion
b) Altruism
c) Plagiarism
d) Benevolence
Q. 36 Which of the following could be considered as a stress?
a) Noise
b) Commuting to work
c) Crowd
d) All of the above
Q. 37 Effective teams can
a) Be bought
b) Be faked
c) Be created through trust and competency
d) Exist without having a common goal
Q. 38 In a self-awareness process, research can be done by
a) Shopping
b) Speaking with people involved in your area of interest
c) Joining a dance school
d) Participating in GD
Q. 39 Which of these is an unhealthy way of coping with stress?
a) Listen to music
b) Physical exercise
c) Over eating or under eating
d) Talking it out with family \& friends
Q. 40 The visual aids used in a presentation needs to be:
a) Simple
b) Have an impact
c) Easy to read
d) All of the above
Q. 41 Creativity is related to ___ brain
a) Left
b) Posterior
c) Right
d) Rear
Q. 42 Good presenters will
a) Keep their hands on the podium
b) Gesture with their hands
c) Keep their hands in their pockets
d) Does not make a difference
Q. 43 Urgent and Important activities will find place in your Schedule as
a) Could
b) Must
c) Should
d) None of these
Q. 44 The idea of effective cross cultural communication is to:
a) Respecting cultural differences and working together.
b) Stereo typing a culture.
c) Delegate work to the other person.
d) Changing oneself as per the other culture.
Q. 45 What is the tendency to postpone things called?
a) Overreaching
b) Procrastination
c) Delegation
d) Remuneration
Q. 46 Career Plan is
a) Life long process
b) Acquiring skills
c) Changing Careers
d) All of the above
Q. 47 SWOT analysis helps you
a) Plan Better
b) Identify things that go in your favour
c) Identify pitfalls
d) All of the above
Q. 48 Diversity in teams are caused best by
a) Religion
b) Gender
c) Educational back ground
d) Competencies
Q. 49 I like to break complex tasks in to sequential simpler tasks. This makes me
a) Process Oriented
b) Resourceful
c) Smart
d) Pragmatic
Q. 50 Plagiarism is
a) Unethical
b) Passing of others' work as your own
c) Both
d) None of the above


# End Semester Examination, Dec. 2022 <br> <br> B. Tech. - First/Second Semester <br> <br> B. Tech. - First/Second Semester <br> BASIC ELECTRICAL ENGINEERING (ESC-EE-101/BEE-101/BEE101A) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Find the impedance of a coil whose resistance and reactance are 8 and 6 ohms respectively.
[CO-1] [L-3]
b) Define mesh of a network.
c) State Kirchoff's current law. [CO-1] [L-1]
d) The slip of three phase induction motor at starting is $\qquad$ .
e) In a pure inductive circuit $\qquad$ lags $\qquad$ .
[CO-1] [L-2]
f) State the condition of resonance in a series RLC network.
g) Name two power semiconductor devices.
h) Field system is rotating in $\qquad$ machines.
i) Write down the emf equation of the transformer.
j) What is an auto transformer?
[CO-1] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Explain Superposition Theorem
b) Find the current in $8 \Omega$ resistor using Superposition theorem.

Q. 3 a) An alternating voltage of 220 V is applied to an RLC network of resistance 10 $\Omega$,
inductance 25 mH and capacitance $15 \mu \mathrm{~F}$. Find:
i) impedance.
ii) current
iii) power factor
iv) voltage drop across capacitance.
b) Derive the relation between line voltage and phase voltage for a three phase star connected system. Also draw the phasor diagram.
c) Differentiate between star and delta connected system
Q. 4 a) Derive the emf equation of a transformer.
b) Differentiate between shell type and core type single phase transformer. [CO4][L2] 5
c) Explain the BH curve and hysteresis loop of a magnetic material.
[CO-4] L-2] 10

## PART-B

Q. 5 a) Draw and explain the parts of a dc machine.
b) Explain the speed control of a dc shunt motor
Q. 6 a) Explain the working of a three phase induction motor.
[CO-5] [L-2] 10
b) Explain any two single phase induction motor.
Q. 7 a) What is the necessity of earthing? Explain plate earthing with the help of a diagram.
[CO-1] [L1] 10
b) Explain the charging and discharging procedure of a Lead acid battery with the relevant equations.

# End Semester Examination, Dec. 2022 

## B. Tech. - Second Semester PROGRAMMING FOR PROBLEM SOLVING (ESC-CS-101)

Time: 3 hrs.
Max Marks: 100 No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Differentiate between pre-increment and post increment operator.
b) What will be the output of the following code?
main ()
\{
int $x=15$
if ( $x \% 2=0$ );
printf("no is even");
else
print("no is odd");
\}
c) Why are translators needed in computer system? Justify it.
d) Differentiate between a structure and a union.
e) Demonstrate the use of do-while loop.
f) Give five predefined string functions in ' C ' language.
g) Compare an array and strings.
h) What you meant by header files? Give example with their function of any two
i) What is CPU? Draw and explain CPU cycle.
j) Write an algorithm to swap two integers without using third variable.
$\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) What you mean by operating system? State various types of operating
systems.
$\mathbf{1 0}$
b) Design an algorithm and a flowchart for largest of three numbers. $\mathbf{1 0}$
Q. 3 a) List and explain loop control (or) iteration statements in C. $\mathbf{1 0}$
b) Write a program to perform arithmetic operations (atleast 6) using conditional branching.
Q. 4 a) Define 'sorting'. Explain different types of sorting algorithms along with their
complexity.
b) Write a program to calculate the roots of quadratic equation.

## PART-B

Q. 5 a) Compare call by value and call by reference by citing examples. $\mathbf{1 0}$
b) Write a Pseudocode for selection sort. Explain its further working and complexity.
Q. 6 a) Write a recursive function to print Fibonacci series of $n$ natural numbers. ..... 10
b) Write a C program to implement $\operatorname{strcmp}()$, $\operatorname{strcat(),~strcpy()~and~strlen().~}$ ..... 10
Q. 7 a) What are the different file opening mode and functions available in ' $\mathrm{C}^{\prime}$ language. Explain in detail. ..... 10
b) Define 'pointer'. Explain declaration and initialization with the help of a program.

# End Semester Examination, Dec. 2022 

## B. Tech. - First/Second Semester

 ELEMENTS OF ELECTRICAL ENGINEERING (EE-101A/EE-101B/ESC-EE-101)Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Define 'impedance'.
[CO1] [L2]
b) State Kirchoff's voltage Law.
[CO1] [L2]
c) State any two advantages of three phase system over single phase system.
[CO2] [L2]
d) Define mesh and node of a network.
[CO1] [L2]
e) Write an expression for slip of an induction motor.
f) Moving Iron voltmeter has $\qquad$ scale.
[CO1] [L2]
g) What is a shell type transformer?
[CO3] [L2]
h) What is an auto transformer?
[CO4] [L2]
i) State the condition for resonance of a series RLC network.
[CO4] [L2]
j) What are different types of excitation of a dc machine?
[CO1] [L2]

## PART-A

Q. 2 a) State and explain Thevenin's theorem.
[CO1] [L2] 10
b) Find the current in 12 ohm resistance using Thevenin's theorem for the network given in the figure. All the resistances are in ohms.
[CO1] [L3] 10

Q. 3 a) $A$ voltage $e=220 \mathrm{~V}$ is applied to a network having $R=100$ ohm and $L=10 \mathrm{mH}$ and $c=100 \mu F$. Find the impedance, current, power factor and the power dissipated in the network and voltage drop across each element.
[CO1] [L2] 10
b) Derive the expression for resonant frequency for a series RLC circuit. [CO1] [L2] 4
c) Differentiate star and delta connected three phase system.
[CO2] [L2] 6
Q. 4 a) Explain construction of permanent magnet moving coil voltmeter.
[CO3] [L2] 10
b) Explain the construction of induction type energy meter.
[CO3] [L2] 10

## PART-B

Q. 5 a) State and explain the working principle of a transformer.
b) Explain the various losses of a transformer.
[CO4] [L2] 5
c) Define efficiency of a transformer. Derive the condition for maximum efficiency of a transformer.
Q. 6 a) Explain the parts of a dc machine with a neat diagram.
b) Differentiate between dc shunt generator and dc series generator.
c) State the applications of a dc series motor.
Q. 7 a) Explain the working of any two types of single phase induction motor. [CO5] [L2] 10
b) Explain the working principle of three phase induction motor.
[CO5] [L2] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - First Semester ELEMENTS OF ELECTRICAL ENGINEERING (EE-101) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Define mesh in an electrical network.
b) State the condition of resonance of a RLC series circuit.
c) State Kirchoff's voltage law.
d) Differentiate Power and energy.
e) Name two methods of providing controlling torque in a measuring instrument.
f) Name the types of excitation in dc machine.
g) What are the different losses in a transformer?
h) Write down the expression for synchronous speed.
i) If a inductor of 40 mH is connected across a $200 \mathrm{~V}, 50 \mathrm{~Hz}$ supply. What will be its inductive reactance?
j) Name the two types of three phase induction motors.

## PART-A

Q. 2 a) Find the current in the $4 \Omega$ for the network given in the figure.

b) State and Explain Superposition theorem.
Q. 3 a) A coil of resistance $10 \Omega$ and an inductance of 100 mH is connected in series with a capacitance of $40 \mu \mathrm{~F}$ across $200 \mathrm{~V}, 50 \mathrm{~Hz}$ supply. Find inductive reactance, capacitive reactance, impedance, current and power factor in the above circuit.
b) Derive the relationship between line voltage and phase voltage in a star
connected system.
$\mathbf{1 0}$
Q. 4 a) Explain the working and construction of PMMC voltmeter.
b) Explain the working and construction of induction type wattmeter.

## PART-B

Q. 5 a) Explain the working principle of a single phase transformer. $\mathbf{1 0}$
b) Differentiate shell type and core type transformer.
$\begin{array}{lll}\text { Q. } 6 \text { a) Draw the parts of a dc machine and explain in detail. } & \mathbf{1 0}\end{array}$
b) Derive the emf equation of a dc machine.
$\begin{array}{lll}\text { Q. } 7 & \text { a) Explain the working principle of } 3-\Phi \text { induction motor. } & \mathbf{1 0} \\ \text { b) Explain the working principle of Synchronous generator. } & \mathbf{1 0}\end{array}$

# End Semester Examination, Dec. 2022 

# B. Tech. - Fourth Semester <br> HARDWARE DIGITAL DESIGN (EC-422) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt anyTWO questions from PART-A and TWO questions from PART-B.Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Write different types of data objects used in VHDL.
b) List various advantages of VHDL.
c) Define 'entity'. How it is different from architecture?
d) Write the entity for half subtractor.
e) Differentiate between transport and inertial delay with an example.
f) How PLA is different from PAL?
g) Differentiate between 'asynchronous'and 'synchronous counter'.
h) Draw the state table and state diagram for MOD-6 Counter.
i) What is the purpose of an Assertion statement in VHDL?
j) Write the VHDL code for latch?

## PART-A

Q. 2 a) Design a flow logic for implementing digital circuits in digital VLSI design.
b) Differentiate behavioral and dataflow modeling using suitable examples.
c) What are different hardware description languages? Compare them to be used for different applications.

Q. 3 a) What is a signal driver? Also, discuss the impact of inertial delay model on a
signal driver.
b) How can a memory space of $32 \times 8$ bit be declared in VHDL? 8
c) Explain various modes declared for a port in an entity.
Q. 4 a) Design a BCD to excess 3 code converter using behavioral modeling. ..... 10
b) Design a 4-bit full adder with the help of generate statement. ..... 10

## PART-B

Q. 5 a) Design an asynchronous decode counter in VHDL using structural modeling. $\mathbf{1 0}$
b) Write VHDL code of SR flip-flop using behavioural modeling.
c) Write VHDL code of SISO shift register using behavioural modeling.

Q. 6 a) What are type conversion functions? Write a type conversion function to convert
a binary number to a decimal number.

b) Design a state machine for 4-bit synchronous up counter and write its VHDL
code.
Q. 7 a) Design a simple microcomputer system using VHDL. $\mathbf{1 0}$
b) Write VHDL code for 2-byte ROM in behavioural modeling. 5
c) Differentiate FPGA and CPLD.

# End Semester Examination, Dec. 2022 

## B. Tech. - Fourth Semester <br> ELECTROMAGNETIC THEORY (EC-421)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory, Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Give the physical significance of divergence.
b) Given $\vec{A}=x^{2} y \hat{a} x+(x-y) \hat{a}_{z}$. Find the curl of $\vec{A}$.
c) State coulomb's law of force.
d) What is the value of tangential component of $\vec{E}$ at boundary?
e) Prove that $\int_{s} \vec{B} \cdot \overrightarrow{d s}=0$.
f) Write the equation off continuity for static and time varying field.
g) What is poynting vector? Explain its significance.
h) Calculate the depth of penetration in copper at a frequency of $3 \times 10^{6} \mathrm{~Hz}$ and resistivity of $3 \times 10^{-3} \mathrm{ohm}-\mathrm{cm}$.
i) What are the conditions for short circuited line?
j) Define characteristic impedance of a transmission line.

## PART-A

Q. 2 a) Transform the vector:
i) $r\left(\hat{a}_{\phi}+\hat{a}_{z}\right)$ and
ii) $r\left(\hat{a}_{\theta}+\hat{a}_{\phi}\right)$ in Cartesian coordinate system.
b) Check validity of divergence theorem for vector $\vec{A}=4 x \hat{a}_{x}-2 y^{2} \hat{a}_{y}+z^{2} \hat{a}_{z}$ taken over a cube bounded by $x=0 ; x=1, y=0 ; y=1, z=0 ; z=1$.
Q. 3 a) Derive an expression for electric field intensity due to a straight and uniformly charged wire of length 'L' meters and with a charge density of ' $\rho_{L}{ }^{\prime} \mathrm{c} / \mathrm{m}$.
b) Derive the Laplace's equation and Poisson's equation in all coordinate systems.
Q. 4 a) Obtain magnetic field intensity $(\vec{H})$ due to infinitely long straight filament of current 'I', using Ampere's circuital law.
b) Explain the magnetic boundary conditions for static field. $\mathbf{1 0}$

## PART-B

Q. 5 a) Show Maxwell's equation for static fields. Explain how they are modified for time varying electric and magnetic fields.
b) State and prove Poynting theorem and discuss about the Poynting vector, average power and instantaneous power.
Q. 6 a) Derive the transmission line equation in exponential and hyperbolic form. $\mathbf{1 0}$
b) Write a short note on smith chart and write the condition for lossless, lossy, open circuit and short circuit line.
Q. 7 a) Examine the wave equation starting from the Maxwell's equation for free space. 10
b) The electric field intensity of uniform plane wave in free space is given by $\mathrm{E}=94.25 \cos (\omega \mathrm{t}+6 \mathrm{z})$ âx $\mathrm{V} / \mathrm{m}$. Calculate the:
i) Velocity of propagation.
ii) Wave frequency.
iii) Wavelength.
iv) Magnetic field intensity.
v) average power density in the medium.

# End Semester Examination, Dec. 2022 

# B. Tech. - Fourth Semester MICROPROCESSOR AND INTERFACING (EC-401B) 

Time: 3 hrs.
Max Marks: 100 No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Illustrate the use of control bus in microprocessor.
b) Differentiate between microprocessor and microcontroller.
c) List addressing modes of 8085 microprocessor with example.
d) Explain the following instructions of 8086 microprocessor: i) LOCK ii) TEST
e) Justify the significance of pipelining in 8086 microprocessor.
f) How the 20 bit effective address is calculated in 8086 microprocessor?
g) Differentiate between memory mapped I/O and peripheral mapped I/O.
h) Find out the number of address lines required to interface a 4 KB RAM with 8085 microprocessor.
i) Discuss single transfer and demand transfer modes of operation of DMA controller.
j) List the different types of command words used in 8259 .

## PART-A

Q. 2 a) Explain the architecture, data flow and instruction execution of 8085 microprocessor.
b) With timing diagram, explain the memory read operation in 8085 microprocessor.
c) Describe the instruction format and addressing modes of 8085 5
microprocessor.
Q. 3 a) Draw Architecture of microprocessor 8086 and label it. 8
b) Show the memory organization and interfacing with 8086 microprocessor. Explain how the memory is accessed.
c) Name the general purpose register of 8086 and describe their function
Q. 4 a) Explain the following instructions of 8086 microprocessor with suitable example and addressing mode: i) LAHF ii) XLAT iii) NOP iv) DAA v) ROR
b) Write a program in 8086 for hexadecimal to gray code conversion using lookup table.

## PART-B

Q. 5 a) Interface 4 K ROM and 8 K RAM with 8085 microprocessor. Draw interfacing circuit and write its memory map too.
b) What is the advantage of partial decoding over absolute decoding? Also specify its disadvantages.
Q. 6 a) Write down the control word to configure 8255 in model with port A and B as I/P ports. Write the set of instructions to read from port A and then store the received byte at location 3200 H . Use control register and port address of 8255 as $80 \mathrm{H}, 81 \mathrm{H}, 82 \mathrm{H}$ and 83 H respectively.
b) Explain the following terms:
i) Programmed I/O ii) Interrupt driven I/O iii) Burst mode iv) Cycle stealing mode.
Q. 7 a) Draw the block diagram of 8259 PIC and explain its working.
b) How the control word registers and various counters are selected in 8253 IC? State the various modes of operation in 8253 and explain any two modes using timing diagram.

## End Semester Examination, Dec. 2022

## B. Tech. - Third Semester

ANALOG ELECTRONICS CIRCUITS-I (EC-321)
Time: 3 hrs.

Max Marks: 100
No. of pages: 2

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Among common base, common emitter and common collector which configuration is preferred and why?
b) Define base spreading resistance of a transistor.
c) Distinguish between JFET and BJT.
d) State Millers theorem and its dual.
e) Interpret 3 dB .
f) Can two diodes be connected back to back to work as a transistor? Justify.
g) Calculate $I_{C}$ and $I_{E}$ given $\alpha_{d c}=0.98, I_{C B 0}=4 \mu A$ and $I_{B}=50 \mu \mathrm{~A}$.
h) Deduce the relation between a.c. drain resistance $\left(r_{d}\right)$, transconductance $\left(g_{m}\right)$ and amplification factor $(\mu)$.
i) Elaborate the need of cascading.
j) Justify the advantage of push pull amplifier.
Q. 2 a) Describe Input and Output characteristics of Common Emitter configuration of BJT.
b) Figureshows that a silicon transistor with $\beta=100$ is biased by base resistor method. Draw the d.c. load line and determine the operating point. Also evaluate stability factor.

Q. 3 a) Explain small signal high frequency hybrid $\pi$ model of common emitter configuration.
b) Justify emitter follower at high frequency is good to drive capacitive loads. Determine voltage gain, upper 3dB frequency and input admittance of emitter follower at high frequency.
Q. 4 a) Describe in details construction, drain and transfer characteristics of n channel JFET. Also sketch Transfer curve defined by IDSS =10mA \&Vp = 4V.
b) Derive Expression for Drain Current of $n$ - Channel JFET.

## PART-B

Q. 5 a) Give the approximate analysis of common emitter amplifier:
i) Without $R_{E}$
ii) With $R_{E}$
and discuss the effect of emitter resistance on amplifier performance.
b) For CE amplifier, hie $=2000 \Omega$, hre $=1.6 \times 10^{-4}$, hfe $=49$, hoe $=50 \mu \mathrm{~A} / \mathrm{V}$. Determine the current gain, voltage gain, input resistance and output resistance if $\quad R_{L} \quad 30 \mathrm{k} \Omega$, $R_{S}=600 \Omega$.
Q. 6 a) Draw and explain two stage R-C coupled amplifier with expression of lower and upper cut-off frequency. Also, draw frequency response curve for it.
b) Draw and explain Darlington amplifier.
Q. 7 a) Explain class B Push-Pull amplifier with the help of a circuit diagram. Also, calculate its efficiency.
b) What is harmonic distortion in amplifier? Derive expression for it.

# End Semester Examination, Dec. 2022 

## B. Tech. - Second Semester

DIGITAL ELECTRONICS AND CIRCUITS (EC-202)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Implement the given function using NAND gates only. $F(X, Y, Z)=\sum m(0,6)[C O-1][L-6]$
b) If $A \& B$ are Boolean variables and if $A=1 \& A+B=0$, determine $B$.
[CO-1] [L-3]
c) Express the function $Y=A+B C$ in canonical POS.
[CO-1] [L-3]
d) What is meant by Prime Implicant and Essential prime implicants?
[CO-2] [L-1]
e) Find the minimized Boolean expression of this function $F=X Y+X(Y+Z)$ $+Y(Y+Z)$.
[CO-2] [L-3]
f) What is the difference between toggling and race around condition? How race around condition is avoided?
[CO-3] [L-2]
g) Differentiate between 'synchronous' and 'asynchronous' counters with examples.
h) What is the requirement of $\mathrm{A} / \mathrm{D}$ and $\mathrm{D} / \mathrm{A}$ converters? Explain with examples. [CO4][L1]
i) What are the characteristics of digital ICs?
[CO-1] [L-1]
j) List two differences between open drain output and open emitter output of a Digital IC.

## PART-A

Q. 2 a) With the help of De' Morgan's law statement, realize the function $y=x^{\prime}(y+z)^{\prime}$ using
i) Single 3-input AND gate and a NOT gate only;
ii) Minimum number of 2 -input AND gates and a single NOT gate only.
iii) 2-input NAND gates only.
[CO-1] [L-6] 10
b) Find the following:
i) $(23.625) 10=(?)_{8}$
ii) $(235.2) 10=(?)_{4}$
iii) (AFC4)16 X (B9C) $)_{16}=(?)_{16}$
[CO-1] [L-3] 10
Q. 3 a) Simplify the given expression using K-map: $\sum \mathrm{m}(0,1,2,3,5,7,8,9,10,12,13)$.
b) Design a 32:1 mux using two 16:1 mux.
c) Implement using PLA:
$F 1(A, B, C)=\Sigma m(0,1,2,4)$
$F 2(A, B, C)=\sum m(0,5,6,7)$
Q. 4 a) Design and explain the working of a master-slave J-Kflip-flop. Show that $Q n+1=J Q^{\prime}+K Q n$ represents J-K flip-flop.
[CO-3] [L-6] 10
b) Convert i) S-R flip-flop to D flip-flop, and ii) S-R flip-flop to J-K flip-flop. [CO3][L6] 10
Q. 5 a) Explain in detail a four bit bidirectional shift register.
b) Design asynchronous mod-6 counter and explain its working.
Q. 6 a) Explain R-2R ladder digital to analog converter in detail.
[CO-4] [L-2] 10
b) With the help of a diagram explain successive approximation analog to digital converter.
Q. 7 a) Explain the basic ECL OR/NOR gate with a neat circuit diagram. Why does ECL family have the lowest propagation delay among all logic families?[CO-5] [L-2] 10 b) Draw and explain CMOS inverter gate with a circuit diagram.

## End Semester Examination, Dec. 2022

## B. Tech. - Second Semester <br> DIGITAL ELECTRONICS AND CIRCUITS (EC-202)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Convert the following into min terms:
[CO-2] [L-4]
i) $A^{\prime} B+C D$
ii) $A B C+C^{\prime} D+A B^{\prime} C$
b) List various advantages of digital signals.
[CO-1] [L-2]
c) Write the gray code and excess-3 code for (32) 10
[CO-2] [L-1]
d) Convert the following hexadecimal number (3FB5.F) $\mathbf{1 6}$ into its equivalent:
i) Binary ii) Decimal iii) Octal number
[CO-2] [L-1]
e) Discuss with an example showing positive \& negative logic systems. [CO2][L2]
f) Design AND gate using NAND gate.
[CO-2] [L-6]
g) Differentiate between latch and flip flop. [CO-2] [L-2]
h) Design half sub tractor circuit using PAL.
[CO-2] [L-6]
i) Differentiate between decoder and demultiplexer.
[CO-3] [L-2]
j) Define resolution (step size) \& \% resolution of a D/A converter.
[CO-4] [L-1] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Subtract the following decimal numbers using 2's complement?

$$
\text { i) } 14 \text { from } 29 \text { ii) } 42 \text { from } 19 .
$$

[CO-2][L-3] 10
b) The seven bit hamming code is received as 1101001 . Assume that even parity has been used, check whether it is correct or not. If not, find the correct code.
[CO-2][L-2] 10
Q. 3 a) Minimize the following function using K-map and QM method:
$F(A, B, C, D)=n M(1,3,7,8,9,11)$
[CO-2][L-4] 10
b) Design full subtractor using: i) ROM ii) PAL iii) PLA. [CO-2] [L-6] $\mathbf{1 0}$
Q. 4 a) Design the following using 16:1 Multiplexer:
$F(A, B, C, D)=\sum m(1,5,8,12,13,14)$
[CO-2][L-6] 10
b) Design $B C D-7$ segment decoder using gates. Mention its applications.
[CO-2] [L-6] 10

## PART-B

Q. 5 a) Convert the following flip flop conversion:
i) $J K$ to $D$
ii) $T$ to $S R$
[CO-3][L-4] 10
b) Draw and explain the working of ring counter with its timing diagram.
[CO-3][L-2] 10
Q. 6 a) What is the major advantage of the R/2R ladder digital-to-analog (DAC), as compared to a binary-weighted digital-to-analog DAC converter? [CO4][L-5] 10
b) Design and explain the working of Flash type A/D converter. [CO-4][L-2] $\mathbf{1 0}$
Q. 7 a) How TTL can be configured in totem-pole output? Mention the advantages and limitations of this configuration.
[CO-5][L-2] 10
b) Design all logic gates by using CMOS technology.

## End Semester Examination, Dec. 2022

B. Tech. - First / Second Semester

ELEMENTS OF ELECTRONICS ENGINEERING (EC-101A)
Time: 3 hrs
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Which device produces voltage variable capacitance? How the capacitances vary with the change in voltage across it?
b) Differentiate between 'zener' and 'avalanche' breakdowns.
c) Differentiate between 'unipolar' and 'bipolar' transistors.
d) What are the universal logic gates? Why they are called so?
e) Differentiate between 'combinational' and 'sequential circuits'.
f) Explain the concept of virtual ground.
g) What is the major advantage of R-2R ladder type digital to analog converter as compared to a binary weighted type digital to analog converter?
h) How many memory location can be addressed by a microprocessor with 20 address line?
i) What is emitter follower? Why is it called so?
j) Differentiate between 'latch' and 'flip-flop'.

## PART-A

Q. 2 a) Explain the working principle of:
i) Varactor diode.
ii) LED.
with their applications.
b) Explain various breakdown mechanisms in P-N junction diode. 5
c) Draw and explain working of a bridge rectifier.
Q. 3 a) Draw and explain the input and output characteristics of a transistor in common emitter configuration.
b) Draw and explain working of n-channel MoSFET. 10
Q. 4 a) Prove that:
i) $A+A B=A$
ii) $\mathrm{A}+\overline{\mathrm{A}} \mathrm{B}=\mathrm{A}+\mathrm{B}$
iii) $(\mathrm{A}+\mathrm{B})(\mathrm{A}+\mathrm{C})(\mathrm{B}+\mathrm{C})=\mathrm{AB}+\mathrm{AC}+\mathrm{BC}$
iv) $\mathrm{AB}+\mathrm{ABC}+\mathrm{ABCD}+\mathrm{ABCDE}=\mathrm{AB}$
v) $A B \bar{C} \bar{D}+\bar{A} B \bar{C} \bar{D}+B \bar{C} D=B \bar{C}$
b) Draw and explain with truth table:
i) NoR Gate.
ii) XoR Gate.
iii) S-R Flip-Flop.
Q. 5 a) Describe the basic elements of operational amplifier with block diagram.
b) Draw and explain working of op-amp as:
i) Differentiator. ii) Integrator.
iii) Subtractor.
$5 \times 3$
Q. 6 a) Draw and explain working of weighted register type digital to analog converter. 10
b) Draw and explain working of successive approximation type analog to digital converter.
10
Q. 7 a) Draw and explain block diagram of 8085 microprocessor. $\mathbf{1 0}$
b) Differentiate between microprocessor and microcontroller.
10

# End Semester Examination, Dec. 2022 

# B. Tech. - Seventh / Eighth Semester BIG DATA ANALYTIC (CS-828 / CS-828A / CS-828B) 

Time: 3 hrs.
MaxMarks:100
No. of pages:1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions
from PART-A and TWO questions from PART-B.Marks are indicated against
each question.
Q. 1 Answer the following in briefly:
a) List four sources of big data.
b) Discuss clustering?
c) What is Machine Learning?
d) Differentiate between Hadoop and RDBMS.
e) Brief out benefits of Big Data Analytics.
f) Differentiate between Supervised and Unsupervised learning.
g) Discuss features of Hive.
h) Explain the pros and cons of Sqoop.
i) Discuss how YARN is different from Map Reduce.
j) Explain the functionality of Pig.

PART-A
Q. 2 a) Write down the benefits and barriers of big data analytics. Also justify whey big data analytics is better than simple business process.
b) Define the form structured, unstructured and semi-structured data in big data.

c) Give three examples of big data case studies indicate which V's are satisfied
by these case studies.
Q. 3 a) Draw the Hadoop ecosystem and explain all of its components. $\mathbf{1 0}$
b) Explain the working procedure of MapReduce with an example.
c) Write down the goals of Hadoop distributed file system.
Q. 4 a) Through examples illustrate how JaqL works to perform join operation. 5
b) List out and explain at least five operators and expression of JagL with
suitable examples.
c) Explain all the features of Hive through an example. $\mathbf{1 0}$

## PART-B

Q. 5 a) Explain the role of Hadoop in the Business Intelligence environment.
b) Differentiate between reporting and analysis. Discuss various Big Data Access Technologies used during reporting and analysis.
c) Draw and discuss Big R architecture and the CRAN repository.
Q. 6 a) Cite five domains where Streams is suitable for building solutions.

b) Stream Operators cannot be deployed to an instance; in this view discuss
Processing Elements (PEs).

c) Brief out the working of Stream Processing Language and its Primitive
Operators.
Q. 7 a) Define the need of collections in SPL. Discuss List, Map, Set collections and their operations.
b) Write short notes on types and polices used in Window.
c) Discuss DeDuplicate, Throttle, Pair and Sort operators in Window.

# End Semester Examination, Dec. 2022 

## B. Tech. - Eighth Semester

DISTRIBUTED OPERATING SYSTEM (CS-825)
Time: 3 hrs.

Max Marks: 100

No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) Explain clock synchronization.
[CO-2] [L-1]
b) What are the various causes of deadlock?
[CO-2] [L-1]
c) Discuss advantages of DOS over centralized systems.
[CO-1] [L-2]
d) State the issues to be kept in mind while designing file system for a distributed environment.
[CO-4][L-1]
e) Relate "Port" with "message" in context of mach system.
[CO-6][L-4]
f) Name any one consistency model and give a small example.
[CO-5][L-2]
g) Differentiate between task and thread.
[CO-6][L-4]
h) Discuss a common problem associated with distributed systems that employ cache.
i) Difference between user level and kernel level threads.
[CO-3] [L-2]
j) Discuss atomicity meaning in group communication.
[CO-2] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Discuss in detail the layered architecture of distributed systems. Relate the issues addressed at each.
[CO-1] [L-3] 10
b) What are remote procedure calls? Illustrate working of RPC in detail.
[CO-1][L-4] 10
Q. 3 a) Explain bully election algorithm in distributed operating system and write one usage.
[CO-2] [L-1] 10
b) Why mutual exclusion is required in DOS? Discuss the various algorithms used for implementing mutual exclusion in distributed systems. [CO-2] [L-5] 10
Q. 4 a) Enumerate the various issues in real time distributed systems. . [CO-3] [L-1] 10
b) Define term 'threads' in detail. Explain various threads packages used in distributed systems.
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Distinguish file service from file server. Analyze the two models available for distributed file service implementation.
[CO-4] [L-5] 10
b) Evaluate the models as analyzed in part (a) and identify the best one on the basis of their pros and cons.
[CO-4] [L-5] 10
Q. 6 a) Sketch a model in which five CPUs are there where each is having an associated cache and one memory unit. They are shown connected in a
circular arrangement. Name the arrangement and explain how communication will take place?
[CO-5] [L-6] 10
b) Compare shared variable and object based distributed shared memory systems.
Q. 7 a) How process management can be applied in mach systems?
[CO-5] [L-4] 10
b) Discuss inter process communication in the context of mach.
[CO-6] [L-3] 10
[CO-6] [L-3] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Eighth Semester <br> MACHINE LEARNING TECHNIQUES (CS-808) 

Time: 3 hrs.
Max Marks: 100

No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) Write the properties of expectation.
b) Discuss the need of feature selection.
c) Explain ensemble learning.
d) Define 'dimensionality reduction'.
e) Discuss two application areas of machine learning.
f) Describe reinforcement learning.
g) Explain the need of factor analysis.
h) A card is drawn at random from a deck of cards. Find the probability of getting the 3 of diamond.
i) What do you understand by model selection?
j) State Bayes theorem.
$2 \times 10$

## PART-A

Q. 2 a) Define probability, Random variables and conditional probability. Explain different types of random variable in detail.
b) Explain the Bayes theorem in detail. $\mathbf{1 0}$
Q. 3 a) Describe the working behavior of Support Vector Machine with Diagram. $\mathbf{1 0}$
b) Discuss .linear Regression with help of example.
Q. 4 a) Summarize k-means algorithm and group the points ( $1,1,1$ ), (1.1,0). (0.1.0) and ( $1,1,1$ ) using K-Mcans.
b) Describe the dimensionality reduction. Discuss the steps of PCA Algorithm

## PART-B

Q. 5 a) Illustrate with example marker decision process in reinforcement learning. $\mathbf{1 2}$
b) Explain the terms: Value iteration, policy iteration.
Q. 6 a) Explain the steps of back propagation algorithm in detail. 12
b) Discuss artificial neural network with suitable example.
Q. 7 a) Define 'inductive learning'. Why is inductive leaning an ill-posed problem? Explain.
b) Write short notes on:
i) Generative methods
ii) Support rector machine.

# End Semester Examination, Dec. 2022 

# B. Tech. - Eighth Semester ADVANCED COMPUTING (CS-806) 

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) Compare cloud and grid computing.
b) Compose the situations where IaaS may not be ideal.
c) Differentiate between the cloud provider and cloud broker.
d) Describe data grids.
e) Explain quantum phenomena-entanglement.
f) Identify examples of two pervasive computing devices from the daily life.
g) Assess the role of smart sensors and actuators in ubiquitous computing.
h) Compare load balancing and load sharing in distributed computing.
i) Analyze how transparent computing can be applied in ubiquitous computing.
j) Discuss the necessity of the distributed computing environment in the era of computing.

## PART-A

Q. 2 a) Explain the different technologies available for Network Based Systems. Describe each in brief.
b) Demonstrate the NIST cloud computing reference architecture.
Q. 3 a) Elaborate the functionalities of various layers in grid computing architecture with
the help of hourglass model.
[CO-2] [L-2] 10
b) Categorize various applications of Grid computing according to its generations.

Analyze autonomic computing belongs to which generation of grid computing.
[CO-2] [L-4] 10
Q. 4 a) Discuss how quantum computing is different from conventional computing.
[CO-3] [L-2] 10
b) Design the framework to support teleportation and no cloning in quantum computing.
[CO-3] [L-5] 10

## PART-B

Q. 5 a) Explain the architecture of pervasive computing with diagram. Describe each component in detail.
[CO-4] [L-2] 10
b) Consider a research scenario for pervasive computing and assess the role of
sensors
and actuators in that scenario.
$[C O-4][L-6] 10$
Q. 6 a) Differentiate between the features of ubiquitous computing and pervasive computing. Give examples for both.
[CO-5] [L-4] 10
b) Discuss the different interfaces in ubiquitous computing which helps in bringing the revolution in this area.
[CO-5] [L-2] 10
Q. 7 a) Compare and contrast the features of different algorithms for load sharing.
[CO-6][L-4] 10
b) Create a framework for the use of distributed shared memory for any application.
[CO-6] [L-5] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester SIMULATION AND MODELLING (CS-805/BCS-DS-721)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following briefly:
a) What is difference between animation and simulation?
[CO-1][L- 4]
b) Enlist any four components of a system. [CO-1][L-2]
c) Write the formula for linear congruential method. [CO-3][L-1]
d) Identify the criteria for selection of simulation package/software. [CO-2][L-2]
e) A bank operates between 10.00-4.00 on working days. What probability distribution can be used to simulate the arrival of customers and service times?
f) Explain any four terms related to inventory management system.
[CO-2][L-4]
g) How simulation can help in starting a business? [CO-3][L-2]
h) Define the following terms: system, queue. [CO-2][L-1]
i) Enumerate any two properties of random numbers. [CO-1][L-1]
j) Define 'multivariate analysis'. Explain two methods in detail.

## PART-A

Q. 2 a) A team of software developers have been asked to develop an online portal for online pizza booking and delivery. What kind of queuing system exists in this system? What all factors need to be taken care of while designing the software for parallel booking, so that it is never overstressed? [CO-4][L-4] 10
b) Consider an hair saloon with a single chair and a single barber that starts at time $t=10$ A.M. After the saloon opens, ten customers arrive at 1.5,1.8,2.2, $3.8,6.1,6.5,7.1,7.6,8.6$ and 9.2 hours. Their jobs takes following time in minutes to complete: $60,75,90,35,55,69,45,25,50,55$. Simulate the system and find when the fifth customer enters
i) The average delay in the waiting line ( 6 marks).
ii) The utilization of the barber (4 marks).
[CO- 4][L-3] 10
Q. 3 a) Explain the concepts related to event based scheduling vs. fixed time advance algorithms.
[CO-1][L-1] 5
b) Enumerate and explain any two methods to generate random numbers. [CO-2][L-2] 5
c) Illustrate and explain the auto correlation test for random numbers with example. Mention the purpose of autocorrelation also.
[CO-2][L-4]10
Q. 4 a) Explain the procedure to generate the samples from (a) Erlang distribution (b) Exponential distribution.
[CO-5][L-5] 10
b) Explain acceptance-rejection process for poission distrbution. Generate 5 poission variates with mean alpha $=0.25$, random numbers: $0.073,0.693$, $0.945,0.739,0.014,0.342$.
[CO-5][L-5] 10

## PART-B

Q. 5 a) A hospital want to install MRI system, which is a costly affair. What are the parameters required to simulate the system, so that the return on investment (time taken /break-even time) can be estimated?
[CO2][L-3] 10
b) Evaluate the need for the chi-square goodness of fit test to accept or reject a candidate distribution. Also assess the following statement with chi-square goodness of fit test: The number of automobile accidents per week in certain community are as follows $12,8,20,2,14,10,15,6,9,4$. Are these frequencies in agreement with the belief that accident conditions were same during this 10 week period?
Q. 6 a) Explain how probabilities and quantiles can be estimated from summary data?
[CO-3][L-3] 10
b) Any simulation can be termed as terminating or non-terminating depending on the objective of simulation. Explain with the help of suitable example.[CO3][L-3] 10
Q. 7 a) Formulate and discuss the simulation for water reservoir system. [CO4][L-6] $\mathbf{1 0}$
b) Compare and Contrast the various coordinate systems. Also define the various modes for simulating autopilot systems.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Sixth / Seventh Semester <br> SYSTEM PROGRAMMING AND SYSTEM ADMINISTRATION (CS- <br> 703) 

Time: 3 hrs.
Max Marks:
100
No. of
pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) What are text editors?
b) Discuss any four assembly mnemonics.
c) Why assemblers are required?
d) What is the function of UNIX editors?
e) What are wild cards?
f) Discuss any two file operations.
g) Discuss the booting process in detail.
h) What are drivers?
i) Discuss conditional macro expansion.
j) What are inodes?

## PART-A

Q. 2 a) What do you mean by macro? Explain conditional macro expansion with example.
b) Write short notes on text-editors and programming environment.
Q. 3 a) Define an assembler. Explain in detail the designing of an assembler as pass 2.
b) Write short notes on:
i) Absolute loader.
ii) Linkers.$5 \times 2$
Q. 4 a) Differentiate between absolute and relative path name. ..... 5
b) How CPU scheduling is carried out is UNIX? ..... 5
c) Explain the unix file system tree. ..... 10

## PART-B

Q. 5 a) Write a shell script to find the largest of three numbers. 7
b) Write the difference between borne and C-shell.
c) Explain the UNIX command for comparing and sorting files with example.
Q. 6 a) What are the roles and responsibilities of system administrator? Explain the system administrative commands for user management.
b) Explain any five filter commands with example.
c) Discuss the mechanism of process creation.
Q. 7 a) Differentiate between system software and application software.
b) Write short notes on:
i) Virus control management.
ii) Re-directional files.
iii) I/O devices and drivers. $4 \times 3$

## End Semester Examination, Dec. 2022

# B. Tech. - Seventh Semester SOFTWARE DEVELOPMENT PROCESS(CS-702) 

Time: 3 hrs.
MaxMarks:100
No. of pages:1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B.Marks are indicated against each question.
Q. 1 a) Explain encapsulation using UML notation.
b) Why we will use swimlanes in activity diagram?
c) What do you mean by reflexive relationship?
d) How inheritance is created in rational rose?
e) What are the goals of iterative planning process?

## PART-A

Q. 2 a) Give the advantages of object oriented methodologies over traditional methodologies. 5
b) Explain different types of concepts used in object oriented methodologies by using UML
notations.
Q. 3 a) Draw and explain activity diagram of ATM. $\mathbf{1 0}$
b) Explain different components of use case diagrams and their relationships with the help of example.
Q. 4 a) Explain "naming relationships" and "role names". 5
b) Draw and explain the class diagram of ATM.

## PART-B

Q. 5 a) Draw and explain the sequence diagram of online shopping. $\mathbf{1 0}$
b) Draw and explain the collaboration diagram of online shopping.
Q. 6 a) Explain the need and different views of architecture in detail. $\mathbf{1 5}$
b) Explain the requirement of combining classes, splitting classes and eliminating classes.
Q. 7 a) Explain iteration planning process. 15
b) Explain emergence of pattern.

# End Semester Examination, Dec. 2022 

B. Tech.- Sixth Semester

BCA / MCA / B. Com. (Hons.) / B. Com (Hons.-II) / BBA (GENERAL) / BBA (BANKING) / BBA (G) IB-Fourth Semester / Sixth Semester

BUSINESS PROCESSES (CS-610)
Time: 2 hrs.
Marks: 50

Max
No. of
pages: 1
Note: Attempt FIVE questions in all; PART-A is compulsory. Attempt any FOUR questions from PART-B. Marks are indicated against each question.

## PART-A

Q. 1 Answer the following:
a) List at least Three Cross Industry or Industry applications of SAP.
b) What does "R" 4 " 3 " symbolizes in R/3 system?
c) List few components of SAP Net weaver.
d) List all the information mentioned on 'status bar of a SAP system'.
e) What is meant by Master Data? Give an example.
f) What is SAP SRM?
g) List all functions available in SAP ERP financials.
h) Which all functions are included in SAP HCM?
i) Write any two advantages of SAP NetWeaver.
j) What is the significance of Business Intelligence tool?

## PART-B

Q. 2 Explain in detail SAP ERP system and the various solutions it incorporates. Also explain different products offered by SAP.

## 10

Q. 3 State the purpose of organizational Structure in SAP system. Using a diagram, explain every element involved in organizational structure.

## 10

Q. 4 Explain how SAP ERP supports key process in sales order management. 10
Q. 5 Explain in detail the tasks associated with a procurement cycle in SAP. 10
Q. 6 What is General Ledger Accounting in SAP Financials? Explain with the help of diagram, various tasks in Financial Accounting in SAP.

## 10

Q. 7 Differentiate between OLTP and OLAP environment. Also, describes the advantages of SAP Net Weaver System.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Fifth Semester <br> PHYSICAL SECURITY (CS-541) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following questions:
a) What are the four ways to put a fire?
b) How do technology ensure the relationship between physical security and cyber security?
c) Define 'cryptography'.
d) What does 'Class $A^{\prime}$ fire consists of?
e) Write a short note on 'vandals'.
f) What do you mean by UI standard 217?
g) Compare difference between CPHI and PIV.
h) What do you mean by Hazard assessment?
i) Define 'CIA Trade'.
j) Write down the characteristics of CCTV biometric.

## $2 \times 10$

## PART-A

Q. 2 a) What is the influence security and also explain in detail?
b) Define 'hazard assessment'. What are the principles of hazard assessment?
Q. 3 a) Explain the vulnerability assessment under physical security process. $\mathbf{1 0}$
b) What are the terminology of vulnerability assessment process?
Q. 4 a) Define 'physical security audit'. What are the four objectives of physical security audit?
b) Explain the phases of five safety inspection.

## PART-B

Q. 5 a) Describe the different categories of layers of security.
b) Design the three category of various alarm system.

Q. 6 a) Determine the different tools and the techniques available for video
technology. Explain with a neat diagram.
b) Define LPCB? And also explain the different LPS security ratings. $\mathbf{1 0}$
Q. 7 a) Explain the types of internal resources. $\mathbf{1 0}$
b) Differentiate between fire detection and fire extinguishers. $\mathbf{1 0}$

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester WEB TECHNOLOGY AND CYBER SECURITY (CS-504)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1

> Note: Attempt FIVE questions in all; Q. $\mathbf{1}$ is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) What is the function of web browser? List the different types of browsers.
b) Why document Trail is essential in cyber forensics?
c) What are the attributes of list tag?
d) Write a JavaScript program for displaying Fibonacciseries.
e) What are the drawbacks of client side scripting?
f) Write advantages of e-mail system.
g) What do you mean by identity theft?
h) How do we create a table in HTML?
i) Differentiate between LAN, WAN and MAN.
j) What is a web server? How a web server is different from an application server?

2x10
PART-A
Q. 2 a) What is URL? Can one access a web without URL?
b) Give different types of search engines andexplain their working.

13
Q. 3 a) Design XML schema for Book information.

10
b) What are meta tags? How to give meta tags in an HTML page? Write a program in support.

## 10

Q. 4 a) What is an event and explain how events can be handled in Java Script? Demonstrate with an example.
b) How HTML forms can be validated with Java Script?

10

## PART-B

Q. 5 a) Discuss the life cycle of servlets, also explain its advantages.
b) Write a program in JavaScript for displaying factorial of a number using do
while loop.
Q. 6 a) Explain various forensics guidelines which are defined by FBI.
b) Discuss how to find evidence in browser. List various steps to protect it.
Q. 7 Write short notes on the following:
a) SQL injection.
b) Cyber forensics.
c) Cyber crime.
d) Cyber security.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Fifth Semester <br> COMPUTER GRAPHICS (CS-502A) 

Time: 3 hrs.
Max Marks:
100
No. of
pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) What is the difference between raster and random scan systems?
b) What is computer graphics? Write some applications of computer graphics.
c) How a 2D fixed point rotation is carried out? Give the matrix representation.
d) Write pseudo code for flood fill algorithm.
e) What is clipping? Explain point clipping.
f) Write the matrix representation of reflection of a 3D object.
g) What do you mean by projection?
h) What are polygon meshes?
i) What do you mean by image filtering and image processing?
j) What do you mean by hidden surface removal? Why do we need to remove hidden surfaces?

## PART-A

Q. 2 a) Explain midpoint circle drawing algorithm in detail with the help of a suitable
example.
b) Compare and contrast between Raster Scan and Random Scan in detail. $\mathbf{1 0}$
Q. 3 a) Write composite transformation in detail. $\mathbf{1 0}$
b) What will be new coordinates if we are applying shearing by 2 and 4 on an object with coordinates $A(0,0), B(2,0), C(2,2), D(0,2)$.
Q. 4 a) Describe 4 Bit code algorithm in detail with the help of a suitable example. $\mathbf{1 0}$
b) Analyze window, viewport and window to viewport mapping in detail.

## PART-B

Q. 5 a) The pyramid defined by the coordinates $A(0,0,0), B(1,0,0), C(0,1,0)$ and $D(0,0,1)$ is rotated $45^{\circ}$ about the line passing from $C$. Find the coordinates of rated figure.
b) Differentiate between parallel and perspective projection. Which one of these is more realistic and why?
Q. 6 a) What are B-spline curves? Explain in details the representation of B-spline curves and their properties.
b) Explain the representation of curve using Hermite Interpolations.
c) How can weuse Hermite blending functions?
Q. 7 a) Explain in detail scan line hidden surface removal algorithm.
b) Why interpolative shading methods are better to implement? Discuss various interpolative shading method in detail. 12

## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester

ANALYSIS AND DESIGN OF ALGORITHMS (CS-402)

Time: 3 hrs.
Marks: 100
No. of

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt anyTWO questions from PART-A and TWO questions from PART-B.Marks are indicated against each question.
Q. 1 Answer the following questions:
a) What is an algorithm? List its characteristics.
b) State Master's theorem. Solve $T(n)=9 T(n / 3)+0\left(n^{3}\right)$.
c) Describe space complexity of an algorithm.
d) Explain the concept of a dynamic programming.
e) What is the difference between fraction knapsack and $0 / 1$ knapsack problems?
f) What do you understand by recursive algorithms? Give example.
g) Discuss the concept of NP complete problems.
h) What is the use of pre-processing in string matching? Give example.
i) What do you understand by divide and conquer technique?
j) State sum of subsets problem.

## PART-A

Q. 2 a) Solve the following recurrence relation using recursion tree and find the complexity.
$T(n)=2 T(n / 2)+n$
b) Write the algorithm for insertion sort and analyse its complexity.
Q. 3 a) Search the following Pattern "AABA" in the Text "AABAACAADAABAABA" using KMP for string matching. Write its algorithm also. 10
b) Write the algorithm of Rabin karp string matching.
Q. 4 a) State and analyse the strassen's matrix multiplication algorithm.
b) Write the algorithms for binary search using recursion and analyse its complexity.

## PART-B

Q. 5 a) Write Krushkal's algorithm for minimum spanning tree and solve the following, using prim's algorithm.


## 12

b) Write and explain greedy algorithm to solve Krapsack problem.

## 8

Q. 6 a) How to find the single source shortest path,using dynamic programming? Explain with example.
b) Write and explain dynamic approach to find matrix chain multiplication.
$\begin{array}{lll}\text { Q. } 7 \text { a) Explain the solution of } n \text { queen problem using backtracking. } & \mathbf{1 0}\end{array}$
b) What are NP problems? Differentiate between NP hard and NP complete problems.

# End Semester Examination, Dec. 2022 

## B. Tech.-Third Semester <br> INFORMATION SECURITY FUNDAMENTALS (CS-322)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer in brief:
a) Define 'web security'.
b) Define 'data reduction'.
c) Differentiate between hotfixes, service packs and patches.
d) What is cryptography?
e) Define 'file suppression'.
$2 \times 10$

## PART-A

Q. 2 a) Explain RSA Algorithm with example.

## 10

b) Differentiate symmetric key cryptography and asymmetric key cryptography. 10
Q. 3 a) Differentiate MD5 and SHA-I.

10
b) What do you mean by digital certificate? How it is used?

$$
10
$$

Q. 4 a) Explain DES in detail.

## 10

b) What is the role of SSL in securing a network connection?

10

## PART-B

Q. 5 a) What are the various types of operating systems? Explain them briefly.
b) Differentiate between viruses, worms and Trojans.
Q. 6 a) Explain information security audit process with the help of diagram.
b) Explain the following standards of information security auditing:
i) SAS 70 audit.
ii) Sarbanes-oxley Act of 2002.
Q. 7 Define the term 'GRC' and state the various tools used for GRC.

# End Semester Examination, Dec. 2022 

B. Tech.-Third Semester

INTRODUCTION TO IT INFRASTRUCTURE LANDSCAPE (CS-308)
Time: 3 hrs.
Marks: 100
Max
No. of
pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) What is DIT?
b) Define'RAID'.
c) Write an example of SQL query using "Difference (except)" command?
d) What is Zoning?
e) Briefly explain secure messaging.
f) What is a firewall?
g) Define Middleware?
h) How Datawarehouse differ from DBMS?
i) What are Indexes in DBMS?
j) What is DCL? Name the commands considered under it?

## $2 \times 10$

## PART-A

Q. 2 a) What is relational DBMS? Explain its terminology with the help of labeled diagram.

## 5

b) What are constraints in DBMS? Explain unique, primary key, referential and check constraints.

## 5

c) What is JDBC? What are its components? Explain its architecture in detail.

10
Q. 3 a) What is storage network technology? Differentiate between SAN and NAS.

5
b) Explain the following:
i) Switched FABRIC.
ii) FC-AL
iii) Storage Virtualization.

## $5 \times 3$

Q. 4 a) Explain in detail the concept of virtualization along with its benefits. Also, explain the role of 'Hypervisors'.
b) What are server availability concepts and techniques? Explain in detail.

## PART-B

Q. 5 a) What is LDAP protocol? Give its overview along with process of LDAP client server interaction.
b) Explain briefly LDAP functional model.
c) What is replication in LDAP? Discuss all major replication topologies in detail. $\mathbf{1 0}$
Q. 6 a) Explain briefly the various network security zones found in an organization. 5
b) What are switching concepts in computer network? What are functions and limitations of layer 2 switching?
c) What is virtual LAN? How can one create virtual LAN in computer network? What are different types and benefits of VLAN. Explain difference between static VLAN and dynamic VLAN.
Q. 7 a) Explain middleware, message oriented middleware with its applications in detail.
b) What is IBM websphere MQ and what are its objects? 5
c) What is data warehouse? Explain its dimensional model with help of an example, including basic concepts of dimensional modeling.

# End Semester Examination, Dec. 2022 

# B. Tech. - Third Semester <br> DATABASE MANAGEMENT SYSTEM (CS-305A) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all. Q. 1 is compulsory. Attempt any TWO questions from PART-A and any TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) Differentiate between multivalued, composite and derived attributes with notations and example.
b) Define cardinality and degree of a relation.
c) Explain sequential file organization along with advantages and disadvantages.
d) Give any two reasons to allow concurrent executions of transactions.
e) Explain cascade-less schedule.

## $4 \times 5$

## PART-A

Q. 2 a) Define "Database and DBMS". What are the advantages of using DBMS over traditional file system?
b) Explain three level architecture of DBMS. Why is data independence needed?
Q. 3 a) Construct an ER diagram for a car insurance company whose customers own or more cars each. Each car has associated with it zero to any number of recorded accidents. Each insurance company covers one or more cars and has one or more premium payments associated with it. Each payment is for a particular period of time and has an associated due date and the date when the payment was received. 10
b) Explain in detail about various key constraints used in database system.
c) What is the functionality of network model?
Q. 4 a) Explain insertion, deletion and updationof anomalies with suitable examples.
b) Explain about weak entity, entity integrity, primary key and foreign keys.
c) What are the guidelines to design a database system? Explain it briefly.

## PART-B

Q. 5 a) Consider the following relations with primary keys underlined.

Salesperson (SNo, Sname, Designation)
Area (ANo, Aname, ManagerNo)
Product (PNo, Pname, Cost)
SAP (SNo, ANo, PNo)
i) Define the schema in SQL specify the attributes, and keys assuming that ManagerNo is a foreign key. Specify the constraint that the cost of a product cannot be greater than Rs.10000/-.
ii) Answer using SQL
a) Get the names of all the products that are sold.
b) Get the product numbers which are marketed by alteast two sales persons.
c) Get the names of all salespersons who are not Managers.

b) Define the term Tuple Relational Calculus. How it is different from Domain
Relational Calculus. Explain with example.
Q. 6 Explain the structure of an index sequential file organization, with a suitable diagram. Write five differences between index sequential and B-tree file organization.
Q. 7 a) Explain concurrency control with locking method. Explain with examples. $\mathbf{1 0}$
b) Define deadlock. Explain the various deadlock detection and recovery schemes.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester <br> DATA STRUCTURES AND ALGORITHMS (CS-302) 

Time: 3 hrs.
Max Marks:100

No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) What do you mean by balance factor of a height balance tree?
b) Give time complexity of insertion sort and selection sort.
c) What is the need of priority queue?
d) Explain adjacency matrix.
e) What is recursion?
f) Give the difference between array and link list.
g) What is meant by collision in hashing?
h) Give the applications of queue computers.
i) Define minimum spanning tree
j) Explain shell sort?
$2 \times 10$

## PART-A

Q. 2 a) What do you understand by a queue? Write algorithms for inserting and deleting of a data element from the queue. Also describe the applications of queues.
b) Write a program that takes two ordered linked lists as input and merge them into single ordered linked list.
Q. 3 a) Translate the following infix expression to its postfix equivalent expression:
$J-K / G \uparrow H+(N+M)$
Also write the algorithm that you used for this conversion and evaluate the postfix expression's value for $J=20, K=27, G=3, H=5, N=4$ and $M=2$.
b) Explain overflow and underflow conditions of a stack.Support yours answer with a well quoted algorithm.
Q. 4 a) Discuss various operations that can be applied on a binary search tree. Present an algorithm that searches a key in BST. Take a suitable binary search tree and search for a particular key in the tree by applying the discussed algorithm.
b) When does a BST becomes a skewed tree? How will you handle this skewed situation? Also, create a balanced tree for nodes $50,75,40,85,60,20,90$ and then perform the following operations:
i) Delete 75
ii) Insert 99

## PART-B

Q. 5 a) Write and explain the Kruskal's algorithm for minimum spanning tree with an example.
b) Explain Krushkal algorithm to find shorted path.
c) Differentiate between depth-first and breadth-first traversal with an example. 8

# End Semester Examination, Dec. 2022 

## B. Tech. - Third Semester

## DISCRETE STRUCTURES (CS-301A)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Determine the power set of set $A=\{1,2,\{\phi\}\}$.
b) Define multi-graph.
c) Draw Venn diagram for $A^{\prime} \cap B^{\prime} \cap C^{\prime}$.
d) Define existential quantifier with example.
e) How many lines can be drawn through 10 points in a circle?
f) Find particular solution of the difference equation:
$2 a_{n+1}-a_{n}=12$
g) State lagrange's theorem.
h) State binomial theorem.
i) Find the chromatic number of graph.

j) Define ring $(R,+,$.$) and give its example.$

## PART-A

Q. 2 a) Consider the function $f, g: R \rightarrow R$ defined by:
$f(x)=x^{2}+3 x+1 \quad, g(x)=2 x-3$
find the composition function 'gof' and 'fog'.
b) Among the first 500 positive integers:
i) Determine the integers which are not divisible by 2 , nor by 3 , nor by 5 .
ii) Determine the integers which are exactly divisible by one of them.
Q. 3 a) Prove by truth table:
i) $(p \leftrightarrow Q) \cong[(p \rightarrow q) \cup(\sim p \cap \sim q)]$
ii) $[(p \cap q) \rightarrow r] \cong[p \rightarrow(q \rightarrow r)]$
b) From the following formulae find tautology, contigencyandcontradiction:
i)
ii) $P \leftrightarrow Q \cong(P \wedge Q) \vee(\sim P \wedge \sim Q)$
Q. 4 a) Prove by mathematical induction
$1+2+3+4 \ldots \ldots n=\frac{n(n+1)}{2}$
b) In a box, there are 6 balls of which 3 are white and three are black. They are drawn successively. i)Without replacement ii) With replacement. What are the chance that color are alternate?

## PART-B

Q. 5 a) Solve the differential equation:
$a_{r}+4 a_{r-1}+4 a_{r-2}=r^{2}-3 r+5$.
10
b) Solve the recurrence relation $a_{r+2}-3 a_{r-1}+2 a_{r}=0$ by the method of generating functions with the initial conditions $a_{0}=2$ and $a_{1}=3$.
Q. 6 a) Explain various properties of binary operations.

10
b) Consider an algebraic system $(\mathrm{Q}, *)$, where Q is the set of rational numbers and * is a binary operation defined by:
$a * b=a+b-a b, \forall . a, b \in Q$.
Determine whether $(\mathrm{Q},+)$ is a group.
Q. 7 a) Draw the unique binary tree for the given in-order and post-order traversal:
$\begin{array}{cccccccccccccc}\text { In-Order } & 4 & 6 & 10 & 12 & 8 & 2 & 1 & 5 & 7 & 11 & 13 & 9 & 3 \\ & 12 & 10 & 8 & 6 & 4 & 2 & 13 & 11 & 9 & 7 & 5 & 3 & 1\end{array}$
b) Write Dijkstra's algorithm to find shortest path in a graph and find shortest path from a to $f$ in following graph:


# End Semester Examination, Dec. 2022 

## B. Tech. - Second Semester <br> WEB PROGRAMMING THROUGH PHP AND HTML (CS-205)

Time: 3 hrs.
Max
Marks: 100
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A. and any TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) What is server side scripting?
b) What are cookies? How to create cookie in PHP?
c) Differentiate between echo and print statements.
d) Explain superglobals.
e) Give an example defining class in PHP.
f) Specify XML syntax rules.
g) How do you start and destroy a session in PHP?
h) Write WAP in PHP to calculate square root of a number
i) Write WAP in PHP to print odd numbers from 1 to 10.
j) What are exceptions? Explain.

## PART-A

Q. 2 a) How a PHP script can be embedded in HTML code? Explain with an example.
b) Write a PHP code to check whether a given character is vowel or not.
c) Differentiate between echo and print statement.
Q. 3 a) Write a program to check whether a number is palindrome or not.
b) Write the syntax to define function in PHP and also write a program to demonstrate it.
c) Write different string manipulation functions available in PHP.
Q. 4 a) Write a program to modify elements of an associative array.
b) Differentiate between 'foreach' and 'for-statement'.
c) What are different array sorting functions available in PHP?

## PART-B

Q. 5 a) What do you mean by exception propagation? Give an example to create custom exception.
$\begin{array}{ll}\text { b) Explain the concept of break and continue statement by giving a suitable } \\ \text { example. } & \mathbf{1 0}\end{array}$
Q. 6 a) What are cookies? Create an HTML form and apply validations on various fields using JavaScript.
b) What is DOM passer? Give an example to read an XML file. $\mathbf{1 0}$
Q. 7 a) Write down the features of SQL. Create a table in SQL and apply all the aggregation functions on it.
b) Explain the various views of PHP.

## End Semester Examination, Dec. 2022

# B. Tech. - First Semester <br> ELEMENTS OF COMPUTER AND PROGRAMMING (CS-101) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) What is ASCII code?
b) Differentiate between RAM and ROM.
c) Write the syntax of for loop.
d) Explain conditional operator.
e) Define preprocessor directives.
f) Give the difference between array and structure.
g) Define header files.
h) Convert $(345)_{8} \rightarrow(?)_{10}$.
i) What is function prototype?
j) Define enumerated data types.

## PART-A

Q. 2 a) Explain in detail different components of computer system.

## 5

b) Explain hierarchy of memory.

## 5

c) Convert:
i) $(.0101)_{2}=()_{10}$
ii) $(720)_{8}=()_{10}$
iii) $(4 \mathrm{BF} . \mathrm{BC})_{16}=()_{2}$
iv) $(1101 \times 101)_{2}=()_{2}$
v) Find 2's complements of 230.

## $2 \times 5$

Q. 3 a) Explain programming language. Differentiate between high level and low level language.
b) Write an algorithm and draw a flowchart for finding smallest of 3 numbers.

8
c) Differentiate between following:
i) Problem oriented and procedural oriented language.
ii) Compiler and interpreter.
Q. 4 a) Discuss for loop, while loop, do-while loop with syntax.

## 6

b) Write a C program which reads a list in reverse order.

## 8

c) Discuss operators in C with example.

## PART-B

Q. 5 a) Give the difference between actual and formal parameters with example.
b) What do you understand by function prototype?

## 5

c) Write a C program to print name, cost and pages of N books using structures. 10
Q. 6 a) Explain string handling functions in C .

## 5

b) Write a C program to swap two numbers using call by value and call by reference. 10
c) Write a short note on pointer array.

## 5

Q. 7 a) Explain the procedure of opening and closing of files.
b) Write short notes on:
i) Pre-processor directives.
ii) Error handling during file operations.

# End Semester Examination, Dec. 2022 

# B. Tech. - Seventh Semester ENTREPRENEURSHIP DEVELOPMENT (COM-0306) 

Time: 3 hrs.
Max
Marks: 100
No. of
pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q.1. Answer the following in briefly:
a) Give any four reasons cause the New Product Development.
[CO-2][L-2]
b) List the methods of market research.
[CO-3][L-2]
c) Is it important to target the particular market?
[CO-2][L-3]
d) What are the motivations for the entrepreneurs?
[CO-1][L-3]
e) Name any four qualities of an entrepreneur.
[CO-1][L-2]
f) Comment on design thinking.
[CO-2][L-2]
g) Name the Five Forces given by Porter.
[CO-5][L-2]
h) Comment on the importance of informal networks by entrepreneurs to gather the information. [CO-4][L-3]
i) In entrepreneurship, list the importance of tenure stability of workers to work in cooperation and coordination.
[CO-5][L-3]
j) Discuss the role of forecasting in planning for resources in Entrepreneurial Setups.
[CO-4][L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Summarize the debt funding sources for financial assistance to the entrepreneurial setups in detail.
[CO4,5] [L-3] 12
b) Explain bootstrapping in detail.
[CO5] [L-2] 8
Q. 3 Discuss market research. List the importance of Market Research in entrepreneurship.
[CO2,3] [L-4] 20
Q. 4 a) What is meant by Team? Why team building is necessary and how it helps in entrepreneurial growth?
[CO2] [L-5] 13
b) Enlist the essential characteristics of leaders.
[CO1] [L-1] 7

## PART-B

Q. 5 a) Enlist and explain the various sources for good business ideas.
b) Why to craft value among new products?
[CO1] [L-2] 8
Q. 6 Draw and brief the business canvas model with suitable example.
[CO1,4,5] [L-6] 20
Q. 7 Explain the functional principle of management in detail.

# End Semester Examination, Dec. 2022 <br> COMMAN FOR ALL BRANCHES - Fifth Semester <br> ENTREPRENEURSHIP DEVELOPMENT (COM-O306A) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Choose the correct option:
a) An individual who starts, creates and manages a new business can be called
i) A leader
ii) A manager
iii) A professional
iv) $A n$
entrepreneur
b) Trademarks relate to $\qquad$ .
i) Practice and knowledge acquired through experience
ii) The protection of proprietary information of commercial value
iii) The right to reproduce ones own original work
iv) Brand identity
c) The activity which occurs when the new venture is started is called:
i) Motivation
ii) Business skills
iii) Departure point iv) Goal orientation
d) Members of distribution channels are excellent sources for new ideas because:
i) They earn a handsome profit from new business
ii) They are familiar with the needs of the market
iii) They do not bother if entrepreneur bears a loss
iv) They have well-developed sales force
e) Which one of the following is the next stage to the concept stage of product Planning and development process?
i) Idea stage
ii) Product planning stage
iii) Product development stage
iv) Test marketing stage
f) Entrepreneurs are motivated by $\qquad$ .
i) Money.
ii) Personal values
iii) Pull influences
iv) All of the above.
g) Individuals influencing an entrepreneur's career choice and style are known as
which of the following?
i) Role model
ii) Moral-support network
iii) Professional support network
iv) Support system
h) Which of the following is a recognized disadvantage of setting up as a startup
compared with other routes to market entry?
i) Less satisfaction of the owners.
ii) Less help from various agencies.
iii) There are more funds required.
Iv) There is a high failure rate.
i) Which one of the following is the most important characteristic of a successful business website?
i) Innovation
ii) Speed
iii) Graphics
iv) Products
j) ___ is the first development bank of the country.
i) ICICI
ii) IDBI
iii) SFC
iv) IFCI [CO-1] [L-1-4]

## $2 \times 10$

## PART-A

Q. 2 a) State the various functions of Entrepreneur.
[CO-1] [L-1] 10
b) Enlist the essential characteristics of leaders.
Q. 3 a) What questions should be asked from a prospective client?
[CO-2] [L-3] 10
b) How industry and competitor analysis leads to better control of business environment?
[CO-2] [L-3] 10
Q. 4 a) How can a business be sustained in the best way? List various measures to follow.
[CO-3] [L-3] 10
b) What are the legal aspects of a business? Who should be consulted for best results?
[CO-3] [L-3] 10

## PART-B

Q. 5 Why manpower planning and staffing is important for success of an organization?
[CO-4] [L-4] 20
Q. 6 How can business leadership and control change the scenario of an organization? Illustrate with an example.
[CO-4] [L-4] 20
Q. 7 Write short notes on any two of the following:
a) Equity funding from business angels/venture capitalists.
b) Seed money.
c) Alternative sources of finance.
[CO-6] [L-1,3,5] $\mathbf{1 0 \times 2}$

# End Semester Examination, Dec. 2022 <br> COMMON FOR ALL BRANCHES - Second Semester <br> ENVIRONMENTAL STUDIES (CH-202B) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Illustrate the goal of environmental education.
b) Discuss the Structure and function of ecosystem.
c) Differentiate between grazing food chain and detritus food chain.
d) What are the causes of deforestation.
e) State two examples of biological weapons.
f) List important points about Montreal Protocol.
g) Write the impact of acid rain on agriculture.
h) Explain any two impacts of mining.
i) Define species and genetic biodiversity.
j) Compare In-Situ and Ex-situ Conservation of Biodiversity. [CO-1-5] [L-1,2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Differentiate between primary and secondary succession with examples.
b) Describe Multidisciplinary nature of environmental studies.
[CO1][L1] 10
Q. 3 a) Discuss various types of alternate energy sources of energy along with their limitations. Why renewable sources of energy should be preferred to non-renewable sources?
[CO-2] [L-2] 10
b) Discuss the different types of floods. Describe some important points about flood management.
[CO-2] [L-2] 10
Q. 4 a) Explain in detail about importance and significance of Biodiversity.
[CO-2] [L-2] 10
b) Discuss the threats to Biodiversity in detail.
[CO-2] [L-2] 10

## PART-B

Q. 5 a) Write the different causes and effects of water pollution and soil pollution.
[CO-4] [L-3]10
b) Define 'Ozone Depletion'. How it is caused? Discuss two methods that can be used to control Ozone depletion.
[CO-4] [L-3]10
Q. 6 a) Discuss wild life protection act and water prevention and pollution protection act. Explaining their salient points.
[CO-5] [L-2] 10
b) Illustrate "disaster management and solid waste management". List out some environmental movements taken place in India with special reference to them.
[CO-5] [L-2] 10
Q. 7 a) Define 'CWC (Chemical Weapons Convention)'. Why did it come in to force and what are its responsibilities?
b) Explain the following: i) Chipko movement ii) Weapons of mass destruction.

# End Semester Examination, Dec. 2022 COMMON FOR ALL COURSES ENVIRONMENTAL STUDIES (CH-202B) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Enlist the role of "Wildlife (Protection) Act, 1972".
[CO-5] [L-3]
b) Differentiate between hazardous and non-hazardous waste.
c) Write down two effects of noise pollution.
[CO-3] [L-1]
d) Define the multidisciplinary nature of environmental studies.
e) Appraise the $10 \%$ rule of energy flow in an ecosystem.
[CO-1] [L-1]
f) What do you mean by disarmament?
g) What are the disadvantages of resettlement and rehabilitation?
[CO-6] [L-1]
h) Justify roles and responsibilities of CPCB in environmental protection.
[CO-1] [L-1]
i) Define 'species biodiversity'.
j) Write any four points which can be used for environmental protection.
[CO-6] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) How environmental studies are useful for sustainable development? Support your answer with some facts.
[CO-1] [L-4] 10
b) Write a note on:
a) Multidisciplinary nature of environmental studies.
b) Desert ecosystem.
[CO-1] [L-3] 10
Q. 3 a) Classify renewable and non-renewable resources present in environment. Explain any four alternate energy resources in detail.
[CO-2] [L-3] 10
b) What are the major types of floods? Discuss their consequences and measures to control.
[CO-2] [L-4] 10
Q. 4 a) Compare in-situ and ex-situ conservation of biodiversity? List out any three national parks and two Hotspots in India.
[CO-2] [L-3] 10
b) Analyze various levels of biodiversity. Explain the values of biodiversity with examples
[CO-2] [L-4] 10

## PART-B

Q. 5 a) Demonstrate following with causes, effects and controls
[CO-3] [L-3] 10
i) Air pollution.
ii) Solid waste management.
b) Differentiate between primary and secondary pollutants with examples. Explain the causes, effects and control of noise pollution.
[CO-3] [L-4] 10
Q. 6 a) Explain the following with examples:
i) Global warming and ozone layer depletion.
ii) Air (Prevention and Control of Pollution) Act.
[CO-4] [L-3] $5 \times 2$
b) Discuss the salient features of wildlife protection and forest conservation acts.
[CO-4] [L-4] 10
Q. 7 a) Explain in detail:
i) Chipko movement.
ii) Bishnoi.
[CO-5] [L-3] 5×2
b) Categorize various chemical weapons on the basis of their functions. Discuss the function of chemical weapon convention (CWC).

# End Semester Examination, Dec. 2022 COMMON FOR ALL COURSES - Second Semester ENVIRONMENTAL STUDIES (CH-202B) 

Time: 3 hrs.
Max Marks: 100

No. of pages: 1
Note: Attempt FIVE questions in all. Q.No. 1 (PART-A) and Q.No. 2 (PART-B) are compulsory. Attempt any THREE questions from PART-C. Marks are indicated against each question.

## PART-A

Q. 1 Answer the following questions:
a) Which is the major cause of global warming?
b) Name two renewable sources of energy.
c) Define the term biodiversity.
d) What is meant by deforestation?
e) Mention two major objectives of environmental education.
f) Differentiate between producers and consumers.
g) What is meant by population explosion?
h) Define the term 'poaching'.
i) Expand the term 'AIDS'
j) What is the chemical formula of ozone?

$$
2 \times 10
$$

## PART-B

Q. 2 Answer any four of the following:
a) What are the major threats to biodiversity?
b) Define food chain, food web and ecological pyramids.
c) What are the causes of water pollution and how to prevent water pollution?
d) Describe the factors that affect human population growth rate.
e) With the help of examples for each explain the 3Rs. Principle of waste management.

## PART-C

Q. 3 Enumerate the effects of various climatic changes with special emphasis one;
a) Global warming.
b) Ozone layer depletion.

$$
10 \times 2
$$

Q. 4 a) Discuss the scope and importance of environmental studies as a part of formal education.

10
b) What are the different methods to prorogate environmental consciousness in younger generation?
Q. 5 a) What do you mean by eco-system? Explain different components of an ecosystem in detail.

10
b) What are natural resources? Give a detailed account of forest resources. 10
Q. 6 a) What is the role of women welfare and empowerment in population control? 10
b) What is population explosion? Discuss the preventive measures of population explosion.

10
Q. 7 a) What is meant by biodiversity? Why it is important to conserve biodiversity? 10
b) Give a detailed account of causes, effects and control measures of air pollution. 10

# End Semester Examination, Dec. 2022 

# B. Tech. - First Semester <br> INDUSTRIAL CHEMISTRY (CH-101B) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Define 'phase rule'. How many numbers of phases and components is/are present in mixture of water and benzene.
b) What do you understand by cloud point and pour point? By which instrument it is calculated.
c) How corrosion is minimized by barrier protection?
d) Write down the application of eutectic system.
e) Classify the types of water as per salinity.
f) Analyze the term "Extreme pressure lubricants". Write down two examples of extreme pressure lubricants.
g) Apply any two significant uses of Scanning electron microscopy.
h) If oxide layer is porous then corrosion is possible or not. Justify your answer.
i) Create examples of conducting polymers along with its definition.
j) Describe two applications of UV spectroscopy.

## PART-A

Q. 2 a) Describe Electro-dialysis process. What are the advantages of this process?
b) Analyze the method used for determination of hardness of water.
Q. 3 a) Explain Wet corrosion with suitable chemical reactions and mechanism.
b) Discuss the following:
i) Factors affecting corrosion.
ii) Bimetallic corrosion.
Q. 4 a) Justify Pb-Ag system with suitable phase diagram and the application of phase rule.
b) Write short notes on:
i) Phase.
ii) Component.
iii) Triple point.
iv) Critical point in water system.

## PART-B

Q. 5 a) Discuss the principle and applications of Atomic force microscopy. $\mathbf{1 0}$
b) Explain i) Beer-Lambert's law ii) IR spectroscopy
Q. 6 a) Define electrically conducting polymers and outline their classification. Write their important properties and applications in engineering.
b) Write the properties and applications of conducting and liquid crystal polymers.
Q. 7 a) Describe any five principles of green chemistry.
b) Write short notes on:
i) Bio-based plastics.
ii) Green polymers.

# End Semester Examination, Dec. 2022 COMMON FOR ALL COURSES - Second Semester ENVIRONMENTAL STUDIES (CH-202B) 

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all. Q.No. 1 (PART-A) and Q.No. 2 (PART-B) are compulsory. Attempt any THREE questions from PART-C. Marks are indicated against each question.

## PART-A

Q. 1 Answer the following questions:
a) Which is the major cause of global warming?
b) Name two renewable sources of energy.
c) Define the term biodiversity.
d) What is meant by deforestation?
e) Mention two major objectives of environmental education.
f) Differentiate between producers and consumers.
g) What is meant by population explosion?
h) Define the term 'poaching'.
i) Expand the term 'AIDS'
j) What is the chemical formula of ozone?
$2 \times 10$
PART-B
Q. 2 Answer any four of the following:
a) What are the major threats to biodiversity?
b) Define food chain, food web and ecological pyramids.
c) What are the causes of water pollution and how to prevent water pollution?
d) Describe the factors that affect human population growth rate.
e) With the help of examples for each explain the 3Rs. Principle of waste management.

## PART-C

Q. 3 Enumerate the effects of various climatic changes with special emphasis one;
a) Global warming.
b) Ozone layer depletion.
Q. 4 a) Discuss the scope and importance of environmental studies as a part of formal education.
b) What are the different methods to prorogate environmental consciousness in younger generation?
Q. 5 a) What do you mean by eco-system? Explain different components of an ecosystem in detail.
b) What are natural resources? Give a detailed account of forest resources.
Q. 6 a) What is the role of women welfare and empowerment in population control? $\mathbf{1 0}$
b) What is population explosion? Discuss the preventive measures of population explosion.
Q. 7 a) What is meant by biodiversity? Why it is important to conserve biodiversity?
b) Give a detailed account of causes, effects and control measures of air pollution.

# End Semester Examination, Dec. 2022 

# B. Tech. - First Semester <br> INDUSTRIAL CHEMISTRY (CH-101B) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Define 'phase rule'. How many numbers of phases and components is/are present in mixture of water and benzene.
b) What do you understand by cloud point and pour point? By which instrument it is calculated.
c) How corrosion is minimized by barrier protection?
d) Write down the application of eutectic system.
e) Classify the types of water as per salinity.
f) Analyze the term "Extreme pressure lubricants". Write down two examples of extreme pressure lubricants.
g) Apply any two significant uses of Scanning electron microscopy.
h) If oxide layer is porous then corrosion is possible or not. Justify your answer.
i) Create examples of conducting polymers along with its definition.
j) Describe two applications of UV spectroscopy.

## PART-A

Q. 2 a) Describe Electro-dialysis process. What are the advantages of this process?
b) Analyze the method used for determination of hardness of water.
Q. 3 a) Explain Wet corrosion with suitable chemical reactions and mechanism.
b) Discuss the following:
i) Factors affecting corrosion.
ii) Bimetallic corrosion.
Q. 4 a) Justify $\mathrm{Pb}-\mathrm{Ag}$ system with suitable phase diagram and the application of phase rule.
b) Write short notes on:
i) Phase.
ii) Component.
iii) Triple point.
iv) Critical point in water system.

## PART-B

Q. 5 a) Discuss the principle and applications of Atomic force microscopy. $\mathbf{1 0}$
b) Explain i) Beer-Lambert's law ii) IR spectroscopy
Q. 6 a) Define electrically conducting polymers and outline their classification. Write their important properties and applications in engineering.
b) Write the properties and applications of conducting and liquid crystal polymers.
Q. 7 a) Describe any five principles of green chemistry.
b) Write short notes on:
i) Bio-based plastics.
ii) Green polymers.

## End Semester Examination, Dec. 2022

## B. Tech. - Seventh Semester

EARTHQUAKE RESISTANT DESIGN OF STRUCTURE (C-829)
Time: 3 hrs.

Max Marks: 100
No. of pages: 2

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) Define an 'earthquake'.
b) What are the different types of seismic waves?
c) Explain different types of dynamic loading.
d) Define natural time period and frequency.
e) Differentiate between free and forced vibration system.
f) Define 'ductility'.
g) Define 'retrofitting'.
h) Define out of plane failure of masonry wall.
i) What do you understand by "Importance factor" of a building?
j) Define 'seismograph'.

## PART-A

Q. 2 a) Explain the interior of the earth with diagram
b) What are the causes of earthquake? Explain in details.
Q. 3 a) A vibrating system consisting of mass of 50 kg and a spring of stiffness $4 \times 10^{4}$ $\mathrm{N} / \mathrm{m}$ is viscously damped. The ratio of two consecutive amplitudes is 20:18. Determine the natural frequency of un-damped system. Also determine the damping ratio and damped natural frequency.
b) Explain the free vibration response with graphs in case of earthquake vibration.
Q. 4 The plan and the elevation of a three-storey RCC school building are shown below in figure (i).The building is located in seismic zone V. The type of soil encountered is medium stiff and it isproposed to design the building with special moment resisting frame. The intensity of $D L$ is $10 \mathrm{kN} / \mathrm{m}$ and the floors are to cater to an IL of $3 \mathrm{kN} / \mathrm{m}^{2}$. Determine the design seismic loads on thestructure by static analysis.

(a) Pian

(b) Elevation

## PART-B

Q. 5 a) What is shear wall and explain its behavior?
b) A fixed-ended RC beam of rectangular section has to carry a distributed live load of $20 \mathrm{kN} / \mathrm{m}$ in addition to its own weight and a dead load of $25 \mathrm{kN} / \mathrm{m}$. The maximum bending moment and shear force due to the earthquake are 60 kNm and 40 kN respectively. Centre-to-center distance between supports is 6 m . Design the beam using $\mathrm{M}-20$ grade concrete and Fe-415 steel.
Q. 6 a) Explain the methods for assessing seismic performance of the structures in respect of earthquake engineering.
b) Elaborate the different methods for Seismic retrofitting of steel structures and masonry structures in respect of earthquake engineering.

10
Q. 7 Determine the frequency and design seismic coefficient for an ordinary masonry shear wall in a school building at Allahabad, for the following data:
Roof load $P=15 \mathrm{kN} / \mathrm{m}$
Height of wall $h=3.0 \mathrm{~m}$
Width of wall $b=0.2 \mathrm{~m}$
Unit weight of wall $\mathrm{w}=19.2 \mathrm{kN} / \mathrm{m} 3$ Soil is medium.

# End Semester Examination, Dec. 2022 

# B. Tech. - Sixth Semester <br> ENVIRONMENTAL ENGINEERING (C-605) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) List any two pollutants emitted from natural processes taking place in environment.
b) Give the characteristics of dust.
c) What are various benefits of waste recycling?
d) Differentiate between 'biodegradable' and 'non-biodegradable' waste citing relevant examples.
e) Give the objective of solid waste management.
f) Explain the purpose of providing manhole in a sewer network.
g) What is bio-chemical oxygen demand?
h) What challenges are posed by oils and grease in treatment plant?
i) Expand the following ASP, COD, MLSS, and SBR.
j) List a few organic water pollutants.

$$
2 \times 10
$$

## PART-A

Q. 2 a) Compute the effective height of stack for the given data:
i) Physical stack is 200 m tall with 1.0 m internal diameter.
ii) Wind velocity is $3 \mathrm{~m} / \mathrm{sec}$.
iii) Air temperature is $25^{\circ} \mathrm{C}$.
iv) Biometric pressure is 1000 millibars.
v) Stack gas velocity is $12 \mathrm{~m} / \mathrm{sec}$.
vi) Stack gas temperature is $150^{\circ} \mathrm{C}$.
b) Discuss the various methods which can be adopted for controlling air pollution at source.
Q. 3 a) Discuss the effects of improper waste management on human health and environment.
b) Explain various categories of biomedical waste according to the management and handling rules.
Q. 4 a) A certain district of a city has a projected population of 50,000 residing over an area of 40 hectares. Compute the design discharge of the sewer line for the following given data: rate of water supply 200 Ips, average impermeability coefficient for the entire area 0.3 , time of concentration 50 minutes. The sewer line is to be designed for a flow equivalent to the wet weather flow plus twice the dry weather flow (DWF).
b) What is dry-weather flow? Discuss the factors affecting dry-weather flow.

## PART-B

Q. 5 a) If the per capacita contribution of suspended solids and BOD is 100 gms and 60 gms respectively, find the population equivalents of:
i) A combined system serving 12000 persons and having $80 \mathrm{gms} /$ capacita daily BOD.
ii) 200,000 litres daily of industrial waste water containing $1500 \mathrm{mg} / \mathrm{l}$ of
suspended solids.

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b) What is Bio-chemical oxygen demand and how are the test results of the same useful?
Q. 6 a) Design a bar screen for a peak average flow of 40 million litres per day. Make suitable assumptions as required.
b) What are the objectives of sewage treatment?
c) Explain the function and purpose of providing grit chambers.
Q. 7 a) Discuss the role of following in control of water pollution:
i) Public consciousness and awareness.
ii) Industrial cooperation.
iii) Legislative control.
b) Discuss various causes of water pollution.
c) Give a few prevention measures for control of eutrophication.

# End Semester Examination, Dec. 2022 

# B. Tech. - Sixth Semester <br> DESIGN OF STEEL STRUCTURE-II (C-602) 

Time: 3 hrs.
Max
Marks: 100
No. of
pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Use of IS 800:2007, IS-875 (Part-3); IS 804-1958 is allowed.
Q. 1 Answer the following questions:
a) Define 'plastic modulus section'.
b) Numerical value of shape factor triangular and diamond section.
c) Write down different components of trussed roof.
d) Briefly explain design loads in industrial building.
e) Write down permissible stresses in water tank.
f) Define 'tower and explain their purpose'
g) Define 'self-supporting stack' with neat sketch.
h) Explain single diagonal bracing with neat sketch.
i) Briefly explain flat-width ratio.
j) Explain effective design width.

## PART-A

Q. 2 a) Briefly explain basic theorems of plastic analysis.
b) A two span continuous beam of uniform section loaded with ultimate loads as shown in figure. Determine the required plastic moment of resistance.

$\mathrm{EI}=$ Constant throughout.
Q. 3 a) Explain internal wind pressure in rectangular clad building with help of permeability.
b) An industrial building is situated near a wide road close to Faridabad. It has length of 28.3 m and breadth of 18.3 m measured externally. The height from ground to eaves is 12 m . Pitch of truss is $1 / 5$ and the roof overhangs by 300 mm on horizontal beyond the walls. Determine the design pressure on various faces of walls and roof for low permeability.
Q. 4 a) Design top and lower stay of a rectangular pressed steel tank $7.5 \mathrm{~m} \times 6.25 \mathrm{~m} \times 2.5 \mathrm{~m}$ deep supported at 9.0 m above ground level. The design seismic coefficient may be taken as 0.06 .
b) Analyse intermediate longitudinal beams of pressed tank as shown in figure:


Evaluate bending moment and draw bending moment diagram.

## PART-B

Q. 5 A self-supporting steel stack is 80 meters high and its diameter is 3 m at top. Find the design wind pressure at intervals of 10 m from base as per IS: 875 (part 3). The location of place is such that the intensity of wind pressure upto 30 m height
Q. 6 a) List down the points to check for feasibility of construction of tower.
b) Explain the following:
b) Explain the following:
i) Lattice type structure.
ii) Pole type structure.
Q. 7 a) What are the advantages of cold formed steel sections? 10
b) Draw atleast four types of individual structural framing members. $\mathbf{1 0}$

# End Semester Examination, Dec. 2022 

B. Tech. - Fifth Semester

DESIGN OF CONCRETE STRUCTURES-II (C-601 / C-601A)
Time: 3 hrs.
100
Max Marks:
No. of
pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B.Marks are indicated against each question.
Q. 1 Answer the following questions:
a) What is the grade of concrete required for post tensioning work?
b) Assumptions of cantilever method.
c) Give advantages of a flat slab.
d) Define bundled tube structure.
e) What is redistribution of moments?
f) Mention the code used for design of a water tank.
g) What is the purpose of constructing retaining wall?
h) Draw the labeled cross-section of a flat slab.
i) Briefly describe substitution method of analysis.
j) Which failure is predominant in raft footing, one way shear or two way shear?

## PART-A

Q. 2 Analyze the frame by Portal method as shown in the figure:


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Q. 3 Design a continuous beam of span 5 meters carrying imposed load of $10 \mathrm{kN} / \mathrm{m}$ and a live load of $12 \mathrm{kN} / \mathrm{m}$. The beam is continuous over three supports. Allow for a redistribution of $30 \%$. Use M20 and Fe415 grade of concrete and steel respectively.
Q. 4 a) Draw a neat sketch of plan of flat slab and label and also explain the following terms:
i) Column strip
ii) Middle strip
iii) Panel

## 5x3

b) Explain the following terms:
i) Rise and Tread
ii) Nosing

## PART-B

Q. 5 Design a raft foundation for the layout as shown in the figure net bearing capacity of the soil is $60 \mathrm{kN} / \mathrm{m}^{2}$. Use M25 grade of concrete and Fe 415 grade of steel. Take the column load and column spacing from following fig and and columns size is $300 \mathrm{~mm} \times 400 \mathrm{~mm}$.

Q. 6 Design a rectangular tank of size $2 m \times 5 m \times 3 m$ resting on the ground using M25 concrete and Fe 415 steel. Use approximate method and also illustrate reinforcement detailing of long wall and short wall.
Q. 7 Determine the various stresses set up at mid span in a pretensioned beam 250 $\mathrm{mm} \times 500 \mathrm{~mm}$, subjected to an initial prestress of 1600 kN and a uniformly distributed superimposed load of $5 \mathrm{kN} / \mathrm{m}$ over a span of 18 m . Assume total loss of prestress as $12 \%$ and eccentricity of prestress at midspan is 100 mm and also show stress diagram of various loads.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Fifth Semester <br> IRRIGATION ENGINEERING-I (C-503A / C-503B) 

Time: 3 hrs.
Max Marks:
100
No. of
pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Write short notes on the following:
a) Consumptive use of water.
b) Kor watering and paleo irrigation.
c) Advantages of lining.
d) Most economical section and its condition.
e) Layout plan of diversion head works.
f) Cross head regulator and distributary head regulator.
g) Hydraulic gradient line.
h) Classification of dams according to material used.
i) Phreatic line.
j) Cavitation.

## PART-A

Q. 2 a) Define duty and delta.Extablish the relationship between the two.
b) Define and differentiate consumptive irrigation requirement and net irrigation requirement.
c) The culturable command area for a distributary is 15000 hectares. The intensity of irrigation for Rabi is $40 \%$ and for kharif is $15 \%$ if the total water requirement of the two crops are 37.5 cms and 120 cms and their period of growth are 160 days and 140 days respectively:
i) Determine the outlet discharge from average demand of consideration.
ii) Also, determine the peak demand discharge assuming the Kor water depth fortwo crops are 13.5 cmsand 19 cms and their kor periods are 4 weeks and 2 weeks respectively.
Q. 3 a) What do you understand by initial regime and final regime?
b) Design a regime channel for a discharge of 50 cumecsand silt factor 1.1, using Lacey's theory.
c) Explain the steps of designing an irrigation channel.
Q. 4 a) Show the typical layout of diversion head works clearly mentioning all the components.
b) Design a 1.5 mts .Sarda type fall for a canal having a discharge of 12 cumecs with following data:
Bed level upstream $=103.0 \mathrm{~m}$, Side slopes of channel $=1: 1$, Bed downstream $=101.5 \mathrm{~m}$ Full supply level upstream=104.5' Bed width U/S and $\mathrm{D} / \mathrm{S} \quad=\quad 1.0 \mathrm{~m}$, Soil = Good loam, Assume Blight's coefficient=6.

## PART-B

Q. 5 a) What do you understand by head regulator? State function of distributory
head regulator and cross regulator.
b) Explain with sketches for different type of off take alignments of head and cross regulator.
c) Differentiate between i) siphon aqueduct and canal aqueduct ii) aqueduct and Super passage.
d) Describe selection of suitable type of cross drainage work.
Q. 6 a) Justify with neat sketches classification of Dam according to Hydraulic Design and advantage and disadvantage. b) Evaluate the factors on which selection of site for a dam depends.
Q. 7 a) Explain with, plan view of chute or Trough spillway and Conduit or tunnel spillway.

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b) Design an ogee spillway for concrete gravity dam for the following data. Average River bed level $=278.00 \mathrm{~m}$ and RL of the crest is 378 m , slope of D/S face of the gravity is $0.75: 1$, Design of discharge $6600 \mathrm{~m} 3 / \mathrm{sec}$, length of the spillway 5 spans with a clear length of 9 m , thickness of pier 2 m . Draw enlarged crest and section of spillway.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Fifth Semester WATER SUPPLY AND TREATMENTPLANT (C-502) 

Time: 3 hrs.
Max
Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B.Marks are indicated against each question.
Q. $1 \quad$ Answer the following question:
a) Give the Kuchling's formula for computing fire demand.
b) The water demand for flushing of toilets as per IS:1172-1993 is $\qquad$ .
c) The permissible limit of TDS in water is $\qquad$ .
d) Physical analysis of water comprises of $\qquad$ .
e) Write the chemical formula of alum.
f) Detention time in sedimentation tank ranges from $\qquad$ to $\qquad$ hours.
g) What is double chlorination?
h) Water softening refers to $\qquad$ .
i) Size of distribution pipes depends on $\qquad$ .
j) Grid iron system is also known as $\qquad$ .

## PART-A

Q. 2 a) What is meant by design period and population forecasting? Discuss differentmethods for population forecasting?
b) The population of a locality as obtained from census report is as follows:

| Census Year | 1911 | 1921 | 1931 | 1941 | 1951 |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Population | 350000 | 466000 | 994000 | 1560000 | 1623000 |

Estimate the population of the locality in the year 2001 by arithmetic increasemethod and geometric increase method?
Q. 3 a) Write short notes on the following:
i) pH value of water.
ii) Hardness.
iii) Fluorides.
iv) Colour.
$21 / 2 \times 4$
b) A treated wastewater having the fluoride concentration $250 \mathrm{mg} / \mathrm{l}$ with a discharge of
$1.5 \mathrm{~m}^{3} / \mathrm{sec}$ enters into a stream which has also the fluoride concentration of $10 \mathrm{mg} / \mathrm{l}$ with the
discharge of $20 \mathrm{~m}^{3} / \mathrm{s}$. Determine the concentration of fluoride of the stream after the point of
injection of the waste water?
c) Explain Jar test with diagram?
Q. 4 a) Define Filtration and discuss the design features of rapid sand filter?
b) Design the dimensions of a set of rapid sand gravity filter for treating water for a population of 60000. The water demand is 200 lpcd and max demand is 1.8 times average daily demand. Assume filtration rate $6000 \mathrm{l} / \mathrm{hr} / \mathrm{m}^{2}$ and assume 40 min is lost in backwashing and $5 \%$ of filtered water is required for backwashing?
Q. 5 a) Explain briefly the various removal processes of temporary hardness andpermanent hardness.
b) Define aeration. Explain the removal process of iron and manganese in brief.
c) Determine the quantity of alum required in order to treat 13MLD of water per day at a treatment plant, where $12 \mathrm{mg} / \mathrm{l}$ of alum dose is required. Also determine the amount of $\mathrm{CO}^{2}$ gas.
Q. 6 a) Describe the purpose of using valves in the pipe line. Explain different valves used in the pipe line distribution system.
b) Design a clear water rising main line from water treatment plant to overhead tank for the following data:
Capacity of pump = 1 no @ 50,000 GPH.
Total length of pipeline $=200 \mathrm{~m}$.
Suction head of pump $=5 \mathrm{~m}$.
Static head of tank $=2.5 \mathrm{~m}$. Ground level difference $=0.5 \mathrm{~m}$.
Q. 7 a) Calculate the storage required to supply the demand shown in the following table if the inflow of water to the reservoir is maintained at a uniform rate throughout 24 hours.

| Time (hrs.) | $00-04$ | $04-08$ | $08-12$ | $12-16$ | $16-20$ | $20-24$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Demand in million litres | 0.48 | 0.87 | 1.33 | 1.00 | 0.82 | 0.54 |

b) Describe the factors affecting losses and wastage of water. How are the leaks andwastage of water in the distribution systems detected?

# End Semester Examination, Dec. 2022 <br> B. Tech. - Fourth / Fifth Semester <br> SOIL MECHANICS (C-406) 

Time: 3 hrs.
Max Marks:
100
No. of
pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following questions:
a) Bulk density and Dry density.
b) Degree of saturation and Density index.
c) Seepage Pressure and Quicksand.
d) Piping and design filter.
e) Isobars under uniformly loaded circular area.
f) Compaction curves and air voids lines.
g) Comparison of standard proctor test and modified proctor test.
h) Primary and Secondary Consolidation.
i) Location of pole in Mohr circle.
j) Principle of vane shear test.

## PART-A

Q. 2 a) What is the use of classification of soils? Discuss Indian Standard Classification System.

## 10

b) The mass of a chunk of moist soil is 20 kg and its volume is $0.011 \mathrm{~m}^{3}$. After drying in an oven, the mass reduces to 16.5 kg . Determine the water content, density of moist soil, the dry density, void ratio and porosity. Take $G=2.70$.

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$$

Q. 3 a) What is Darcy's law? What are its limitations?
b) Discuss the effect of particle size, void ratio and properties of water on permeability of soil.

5
c) Determine the average coefficient of permeability in the horizontal and vertical directions for a deposit consisting of three layers of thickness $5 \mathrm{~m}, 1 \mathrm{~m}$ and 2.5 m and having $K_{1}=3 \times 10^{-2} \mathrm{~mm} / \mathrm{sec}, \quad K_{2}=3 \times 10^{-5} \mathrm{~mm} / \mathrm{sec}$, $K_{3}=4 \times 10^{-2} \mathrm{~mm} / \mathrm{sec}$ respectively. Assume the layers are isotropic.
Q. 4 a) Describe the method of calculating the stress at a point below the corner of a rectangular load. How is this method used for finding the stress at points other than that below the corner?
b) State the assumption in use of Boussinesq's theory to determine he vertical stress in a soil due to point load.

## 5

c) Write expression for vertical stress at a point due to point load, line load.

## PART-B

Q. 5 a) What kind of improvement of the engineering properties of a soil mass can be brought about through compaction?
b) The laboratory test result of a light compaction test performed on a soil is:

Volume of mould $=1000 \mathrm{~cm}^{3}$.
Empty mass of mould $=2475 \mathrm{gm}$.

| Trial no. | 1 | 2 | 3 | 4 | 5 | 6 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Mass of mould + wet 50 g | 4219 | 4330 | 4407 | 4387 | 4339 | 4268 |
| Moisture content (\%) | 10.1 | 12.3 | 13.9 | 15.8 | 18.3 | 20.4 |

Draw the compaction curve and determine maximum dry density and the corresponding optimum moisture content.
Q. 6 a) Explain graphical methods to find out pre-consolidation pressure. $\mathbf{1 0}$
b) Define the terms: coefficient of compressibility, normally consolidated soil, compression index, primary settlement, pore water pressure.
Q. 7 a) Explain direct shear test of determining the shear strength of soils. $\mathbf{1 0}$
b) How do we define failure in soil? According to Mohr - Coulomb criterion, how is the failure plane recognized and how is shear strength defined?

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester <br> SOIL MECHANICS (C-406)

Time: 3 hrs.
Marks: 100

Max
No. of
pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt anyTWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) What is a block diagram?
b) Which method is used to determine water content of the soil?
c) What is relation between void ratio, specific gravity, water content and degree of saturation?
d) List properties of flow net.
e) What is Darcy's law? State its limitations.
f) What do you mean by placement water content?
g) What are the causes of pre consolidation of soils?
h) Differentiate between primary and secondary consolidation.
i) What is unconfined compression test?
j) Define pore water pressure.

## PART-A

Q. 2 a) Discuss Indian standard classification system.
b) The bulk unit weight of a soil is $19.2 \mathrm{kN} / \mathrm{m}^{3}$, specific gravity of soil solids (Gs) is 2.68 and the water content (w) of the soil is $14 \%$. Calculate the dry unit weight. saturated unit weight and submerged unit weight of the soil. Assume unit weight of the water as $9.81 \mathrm{kN} / \mathrm{m}^{3}$. Use phase diagram.
Q. 3 a) What will be the ratio of average permeability in the horizontal direction to that in the vertical direction for a soil deposit consisting of three horizontal layers, if the thickness and permeability of the second layer is twice of those of the first and those of the third layer twice that of second?
b) What are the different methods to determine the permeability of a soil sample? Describe its merits and demerits.
Q. 4 a) Explain vertical pressure distribution on horizontal and vertical plane given by Boussinesq' s stress distribution theory.
b) What is an Influence diagram? What is its use in practice?
c) What do you understand by Contact pressure? What are the factors effect contact pressure distributions?

## PART-B

Q. 5 a) Discuss the effect of compaction on various properties of soil. $\mathbf{1 0}$
b) Explain Modified Proctor Test.
Q. 6 a) Define the following:
i) Compression index.
ii) Expansion index.
iii) Coefficient of volume compressibility.
iv) Coefficient of compressibility.
v) Coefficient of consolidation.
$2 \times 5$
b) Explain any one method of determining pre-consolidation pressure. $\mathbf{1 0}$
Q. 7 a) What is Mohr's theory for soils? Sketch typical strength envelopes for clean sand. $\mathbf{1 0}$
b) Explain unconfined compressive strength test. $\mathbf{1 0}$

# End Semester Examination, Dec. 2022 <br> B. Tech. - Fourth / Sixth Semester <br> DESIGN OF STEEL STRUCTURES-I (C-405A) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO
questions from PART-A and TWO questions from PART-B. Marks are indicated
against each question. Use of IS $800-2007$ and steel tables is allowed.
Q. 1 Answer the following questions:
a) Write full form of MOT and EOT.
b) Differentiate lap joint and butt joint by figure.
c) Draw the diagram of tension failure of plate.
d) Differentiate edge and end distance by figure.
e) "End batten is provided in latticed columns" it's true or false.
f) Describe web buckling.
g) Draw the cross section of diagram of built up beams.
h) Enlist types of columns base.
i) Explain stiffeners.
j) Write full form of ISA.

## $2 \times 10$

## PART-A

Q. 2 a) Write any five assumptions of riveted joints.
b) Write any four disadvantages of welded joints.
c) A 16 mm thick plate is joined by double cover butt joint using a 10 mm thick cover plate. The steel of main and cover plate having permissible tensile stress of 150 MPa , bearing stress 300 MPa , shearing stress 100 MPa . Determine the strength and efficiency of the joint per pitch of 90 mm if 20 mm dia power driven shop rivets arc used.
d) Two flats (Fe 410 Grade steel), each $210 \times 8 \mathrm{~mm}$, are to be jointed using 20 mm dia, 4.6 grade bolts and Fe 410 grade of steel, to form a lap joint. The joint is supposed to transfer a factored load of 250 kN . Design the joint and determine suitable pitch for the bolts.
Q. 3 Design a built up column 10 m long to carry factored axial load of 1080 kN . The column is restrained in position but not in direction at both the ends. Provide single lacing system with bolted connections. Assume steel of grade Fe 410 and bolts of grade 4.6 , design upto compressive strength of lacing flat if channels are placed back to back.
Q.4 A column ISHB 350 @ $661.2 \mathrm{~N} / \mathrm{m}$ carries an axial compressive factored load of 1700 kN . Design a suitable bolted gusset base. The base rests on MI5 grade concrete pedestal. Use 24 mm dia bolts of grade 4.6 for making the connections.

## PART-B

Q. 5 Design a laterally simply supported steel beam of effective span 6 m subjected touniformly distributed load of $20 \mathrm{kN} / \mathrm{m}$.
Q. 6 a) What are the different loads on a plate Girder?
b) Explain in details step by step design procedure for the plate Girder.
Q. 7 a) What are the load carrying stiffeners?
b) Determine the plastic section moduli of the section shown below:


## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester <br> SURVEYING-II (C-403)

Time: 3 hrs.
Max
Marks: 100
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A. and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer briefly:
a) What is mean by curvature and refraction?
b) Classify the triangulation system.
c) State the concept of axis signal correction.
d) Explain independent quantity.
e) Define weight of an observation.
f) Recall the concept of spherical triangle.
g) What is mean by hour angle?
h) How to identify the filled photograph.
i) Compare aerial and terrestrial photographs.
j) Name the types of remote sensing.

## PART-A

Q. 2 a) In order to ascertain the elevation of the top Q of the signal on a hill, observations were made from two instrument stations $P$ and $R$ at a horizontal distance 100 m apart the stations $P$ and $R$ being in line with $Q$ at $P$ and $R$ were $28042^{\prime}$ and $1806^{\prime}$ respectively. The staff readings upon the bench mark of elevation 287.28 were respectively 2.870 and 3.750 when the instrument was at $P$ and at $R$, the telescope being horizontal. Determine the elevation of the foot of the signal if the height of the signal above its base is 3 m .
b) Explain in detail with demonstration about curvature and refraction correction.
Q. 3 Compute the value of ( $D-C$ )/D for the following triangulation figures if all the stations have been occupied and all lines have been observed in both directions:
i) A single triangle.
ii) A braced quadrilateral.
iii) A four- sided central point figure without diagonals.
iv) A four- sided central point figure with one diagonals.
$\begin{array}{lll}\text { Q. } 4 & \text { a) List out the laws of accidental errors. } & \mathbf{1 0}\end{array}$
b) Show the most probable value of the following:

$$
\begin{aligned}
& A=28^{\circ} 24^{\prime} 27.4^{\prime \prime \prime} \\
& B=32^{\circ} 14^{\prime} 16.3^{\prime \prime \prime} \\
& C=51^{\circ} 18^{\prime} 18.8^{\prime \prime} \\
& A+B=60^{\circ} 38^{\prime} 45.6^{\prime \prime \prime} \\
& B+C=83^{\circ} 32^{\prime} 28.2^{\prime \prime}
\end{aligned}
$$

## PART-B

Q. 5 a) Define the following terms:
i) Altitude and co-altitude.
ii) Horizon.
iii) North and South points.
iv) Azimuth.
v) Declination.
b) Determine the azimuth and altitude of a star from the following data:
i) Latitude of observer $=48^{\circ} \mathrm{N}$.
ii) Hour angle of star $=43^{\circ}$.
iii) Declination of star $=18^{\circ} 20^{\prime} \mathrm{N}$.
Q. 6 a) Explain with reference to aerial photographs. What is meant by overlap why they are provided?
b) Summarize the radial line method in detail for plotting the details form photograph. 10
Q. 7 a) Illustrate in detail about remote sensing data processing and analysis. $\mathbf{1 0}$
b) What are the various applications in the field by using GIS and remote sensing survey?

# End Semester Examination, Dec. 2022 

# B. Tech. - Fourth Semester <br> STRUCTURAL ANALYSIS - II (C-401B) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all;Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) What are indeterminate structures?
b) Write down the general equation of Clapeyron's theorem of three moments.
c) What do you understand by first theorem of castigliano?
d) What are the properties of analogous column?
e) Define 'Betti's law'.
f) State Maxwell's reciprocal theorem.
g) Define the term 'stiffness'.
h) How does temperature affects horizontal thrust in two hinged arch.
i) What are sign conventions used in moment distribution method.
j) Write the magnitude of bending moment at any point in cable.

## $2 \times 10$

## PART-A

Q. 2 Analyse the following two span continuous beam using slope deflection method. Draw S.F.D; B.M.D and elastic curve. E is same throughout the beam.


Two span continuous beam.
Q. 3 Analyse the following portal frame.

Q. 4 a) A simply supported beam of uniform flexural rigidity carries a eccentric concentrated load. Find the deflection under the load.
b) Find the displacement and slope at the tip of a cantilever beam loaded with uniformly distributed load over the whole span. Assume the flexural rigidity of the beam EI to be constant for the beam. Use strain energy method.

## PART-B

Q. 5 a) Derive the expression for horizontal thrust in two hinged arch.

## 6

b) Show that the horizontal thrust developed in a parabolic arch of span $L$ and rise $h$ subjected to a concentrated load $W$ at a distance ' $a$ ' from a springing is given by:

$$
H=\left[\frac{5}{8}\right]\left[\frac{W}{h L^{3}}\right] a(L-a)\left(l^{2}+l a-a^{2}\right)
$$

Q. 6 A fixed beam of span $l$ carries a point load $W$ at mid-span. The moment of inertia of section is $I$ for left half of the span and $2 I$ for right half of the span. Find fixed end moments using column analogy method.

Q. 7 A fixed beam AB of Span 6 m carries point loads 120 kN and 90 kN at distances 2 m and 4 m from the left end A . Determine the fixing moments at the ends.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Fourth Semester STRUCTURAL ANALYSIS II (C-401A) 

Time: 3 hrs
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) Define 'analogous column'.
b) State clapeynon's theorem.
c) What are sign convention involved in slope deflection method?
d) Define 'distribution factor and stiffness'.
e) Calculate static indeterminacy:

f) Write the expression for horizontal thrust in two hinged arch.
g) Define 'strain energy'.
h) Write castigliano's second theorem.
i) Define ' elastic curve'.
j) What is radial shear and write the expression involved in it?
$2 \times 10$

## PART-A

Q. 2 a) A train of 5 wheeled loads are shown in the figure crosses a simply supported beam of span 25 m .
i) Calculate maximum positive and maximum negative shear force at 12 m from left support.
ii) Calculate absolute maximum bending moment.


10
b) A distributed live load of $80 \mathrm{kN} / \mathrm{m}$ run may occupy any position on girder as shown in the figure. Find max positive bending moment that can occur on section 'C'.

Q. 3 Find the reaction at supports and draw bending moment diagram using strain energy for figure. Frame is having uniform flexural rigidity.


20
Q. 4 Analyse the continuous beam using moment distribution method:


## 20

## PART-B

Q. 5 Analyse the beam using column analogy method for the given figure.


20
Q. 6 a) A semi circular arch of radius $R$ is subjected to udl of 'w' $\mathrm{kN} / \mathrm{m}$ length over entire span. Assume EI to be constant. Determine Horizontal thrust.

## 14

b) Two hinged parabolic arch of span 50 m and rise 5 m is subjected to 60 kN of central load. It has elastic supports which yields by $0.000 / \mathrm{mm} / \mathrm{kN} . \alpha=12 \times 10^{-}$ ${ }^{6} /^{\circ} \mathrm{C} . \mathrm{E}=200 \mathrm{kN} / \mathrm{mm}^{2}, \mathrm{I}=5 \times 10^{9} \mathrm{~mm}^{4}, \mathrm{~T}=20^{\circ} \mathrm{C}$. Calculate horizontal thrust and consider yielding and temperature effect.
Q. 7 The loaded chord ACDEFB has span 50 m . The dip of chord at $\mathrm{D}=7.5 \mathrm{~m}$ below point $A$. The right support $B$ is 6 m higher than support $A$. Find reaction at support. Tension in various parts of cable, inclination of cable and length of cable.


20

# End Semester Examination, Dec. 2022 

## B. Tech. - Third Semester CONCRETE TECHNOLOGY (C-305A)

Time: 3 hrs.
pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. $1 \quad$ Answer the following question:
a) Define "OPC 43 " grade.
b) Define freeze and thaw effect.
c) What is Platten effect?
d) What is dimensional stability?
e) What is the size of specimen for split tensile test?
f) What is curing?
g) What is plasticizer?
h) Define flash set.
i) What are well-graded aggregates?
j) Define fineness modulus.

## PART-A

Q. 2 a) What are the advantage and disadvantages of concrete over other construction material?
b) Mention any five types of cement with their application.
Q. 3 a) Write short notes on the following:
i) Specific gravity of aggregate.
ii) Water absorption of aggregate.
iii) Grading of aggregates.
iv) Fineness modulus.
b) How aggregates can be classified on the basis of particle size, shape and surface texture. Also mention the best suited aggregates for construction.
Q. 4 a) What are the properties of concrete in plastic state? Write Duff-Abram's water cement ratio with its limitations.
b) Define "Workability". What are the factors affecting workability? Can workability of concrete change without changing water cement ratio.

## PART-B

Q. 5 a) How does freeze-thaw damage occur? How can it be prevented?
b) What are the functions, applications and typical compounds present and disadvantages of the following admixtures?
i) Plasticizers
ii) Retarding Admixtures
iii) Accelerators
Q. 6 a) What are the different types fibres used in FRC and how do they affect the properties of concrete?
b) Distinguish between light weight concrete and high density concrete in context of their ingredients and applicability.
Q. 7 Design the concrete mix for the following data: characteristic compressive strength $=25 \mathrm{MPa}$, maximum size of aggregate $=20 \mathrm{~mm} 4$ (angular), Degree of workability $=0.9 \mathrm{CF}$, Degree of quality control $=$ good and type of exposure $=$ severe. Water absorption by $\mathrm{CA}=0.5 \%$ and moisture content in $\mathrm{FA}=2.0 \%$. Assume any suitable missing data.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester <br> STRUCTURAL ANALYSIS-I (C-301A/C-301B) 

Time: 3 hrs.
Max Marks:
100
No. of
pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory, Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following question:
a) What do you understand by bending moment and shear force?
b) How is bending Moment, shear force and loading related?
c) What are shorter than span UDL positions for maximum shear(+ve and -ve) at a particular section?
d) Write two uses of influence line diagram?
e) In a parabolic symmetrical three hinged arch, the bending moment at any section due to dead load is zero. Why?
f) Check determinacy of a three hinged arch and two hinged arch.
g) Draw any two types of roof trusses?
h) How do you differentiate perfect, deficient and redundant trusses?
i) What are the limitations of Euler's formula?
j) State moment area first and second theorem.

## PART-A

Q. 2 Create Shear force and Bending Moment Diagram for the following Beam.

Q. 3 A simply supported beam has a span of 15 m . Uniformlydistributed load of $40 \mathrm{kN} / \mathrm{m}$ and 5 m long crosses the girder from left to right.
a) Draw the influence line diagram for shear force and bending moment at a section 6 m from left end.
b) Interpret these diagrams to calculate the maximum shear force and bending moment at this section.
Q. 4 A three hinged parabolic arch hinged at the supports and at the crown has a span of 24 m and a central rise of 4 m . It carries a concentrated load of 50 kN at 18 m from left support and a udl of $30 \mathrm{kN} / \mathrm{m}$ over the left half portion. Solve
a) The vertical and horizontal reactions at the supports.
b) The moment at a section 6 m from the left support.

## PART-B

Q. 5 Compute the forces in the members $\mathrm{BC}, \mathrm{CD}, \mathrm{BE}$ and CE of the truss shown using any method.

Q. 6 a) Obtain an expression for Euler's crippling load in case of column with both ends fixed. Draw a neat diagram of the deformed shape of the column.
b) A hollow alloy tube 4 m . long with external and internal diameters of 40 mm . and 25 mm . respectively was found to extend 4.8 mm . under a tensile load of 60 kN . Find the buckling load for the tube with ends pinned. Also find the safe load on the tube, taking a factor of safety as 5.
Q. 7 a) What is the relationship between real beam and conjugate beam? 6
b) Find out the maximum slope and deflection of a simply supported beam with UDL onentire length using double integration method?

# End Semester Examination, Dec. 2022 <br> B. Tech. - Second Semester <br> CONSTRUCTION MATERIALS (C-201) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Write short notes on:
a) Rind gall in timber.
b) Types of mortar.
c) Mild steel.
d) Define 'brittleness'.
e) Differentiate between coarse sand and fine sand.
f) Make a sketch of bullnose brick.
g) Properties of glass.
h) Natural bed of store.
i) Ingredients of varnish.
j) Sedimentary Rocks.

## PART-A

Q. 2 a) Enlist the various types of dressing of stones. Explain any four with diagrams. $\mathbf{1 0}$
b) Make a clear diagram of Bull's trench kiln and explain the working of it. $\mathbf{1 0}$
Q. 3 a) What are the various types of lime used in construction work? $\mathbf{1 0}$
b) Write in detail about the functions of cement ingredients mentioning their
percentage as well.
Q. 4 a) Explain various methods to preserve timber in detail. $\mathbf{1 0}$
b) Write the effects of fly-ash on cement concrete briefly.

## PART-B

Q. 5 a) Name and explain the tests carried out for aggregates (at least two).
b) What are the ingredients of paint and respective functions of them? $\mathbf{1 0}$
Q. 6 a) Explain the functions of basic ingredients of cement concrete. $\mathbf{1 0}$
b) Explain the working of vibrators with purpose and functions.
Q. 7 a) Explain various forms of Asphalt and differentiate between Bitumen and Coal Tar.
b) Enlist and explain the various tests (at least two) for bituminous materials.

# End Semester Examination, Dec. 2022 

## B. Tech. - First / Second Semester

INTRODUCTION TO ELECTROMAGNETIC THEORY
(BSC-PH-101/BPH-101)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Write Poisson's and Laplace equations.
b) Give two uses of Faraday's cage.
c) Explain the term 'linear dielectric'.
d) Differentiate between free charges and bound charges.
e) Interpret the term 'div $\mathrm{B}=0$ and curl $\mathrm{B} \neq 0$ '.
f) Give the origin of magnetic vector potential.
g) Derive the relation between magnetic susceptibility and relative permeability.
h) Show how equation of continuity represents the law of conservation of energy.
i) Differentiate between longitudinal waves and transverse waves with examples.
j) Discuss the properties of electromagnetic waves in free space.

## PART-A

Q. 2 a) Given an electric potential $\mathrm{V}=\mathrm{m}\left(\mathrm{x}^{2}+\mathrm{y}^{2}+\mathrm{z}^{2}\right)^{1 / 2}$ here m is constant. Check whether the potential satisfies Laplace equation or not. [CO-1] [L-4] 10
b) Derive an expression for the potential energy of a discrete charge distribution. Do the same for volume charge distribution over entire space.[CO-1] [L-3] 10
Q. 3 a) Calculate an electric potential and electric field at a point at a distance $r$ from the center of the dipole and making an angle $\theta$ between the direction $r$ and the dipole axis.
[CO-2] [L-4] 12
b) Derive boundary relations for static electric fields and displacement vector across a common boundary separated by two different perfect dielectric media.
[CO2] [L2] 8
Q. 4 a) Calculate the value of magnetic field at a point due to a long straight current carrying wire.
[CO-3] [L-3] 8
b) Derive magnetic vector potential in terms of current densities. [CO-3] [L-3] 6
c) Give the expression for vector potential of a solenoid carrying current using Stoke's theorem.
[CO-3] [L-4] 6

## PART-B

Q. 5 a) Calculate the magnetic field due to bar magnet along the axis and on the equatorial plane of the bar magnet.
[CO-4] [L-3] 12
b) Derive an expression for the energy density in a magnetic field over the whole space.
Q. 6 a) Derive Maxwell's equations in differential form.
b) State and prove Poynting theorem. Explain the term 'pointing vector'. [CO5] [L3] 12
Q. 7 a) Calculate reflection and transmission coefficients for electromagnetic wave when it travels from one medium to another provide the mediums are nonmagnetic.
b) State Maxwell's equations and obtain wave equations for electromagnetic waves in vacuum.
[CO-6] [L-3] 8
c) How much pressure does a laser of power 20 mW apply on a surface where it is completely absorbed? The radius of the laser beam is 1 mm .
[CO-6] [L-4] 4

# End Semester Examination, Dec. 2022 <br> B. Tech. - First Semester <br> MATHEMATICS-I (BMA-102 / BSC-MA-102) 

Time: 3 hrs.
Max
Marks: 100
No. of
pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the Following questions:
a) Evaluate:
i) $\Gamma\left(\frac{1}{2}\right)$
ii) $\quad B(3,2)$
b) Evaluate: $\int_{0}^{\frac{\pi}{2}} \sqrt{\cot \theta} d \theta$.
c) If in Cauchy's mean value theorem, $f(x)=e^{x}$, show that C is the arithmetic mean between $a$ and $b$.
d) Find the nth derivative of $f(x)=\cos (a x+b)$.
e) Prove that the sequence $\left\{\frac{2 n-7}{3 n+2}\right\}$ is monotonically increasing.
f) What is the half range cosine series for $f(x)=k$ in $(0,2)$.
g) Find Curl of the vector $\vec{F}=\left(2 x^{2} y+y z\right) \hat{i}+\left(x y^{2}-x z^{2}\right) \hat{j}+\left(2 x y z-2 x^{2} y^{2}\right) \vec{k}$.
h) Find $\frac{\partial u}{\partial r}$ and $\frac{\partial u}{\partial \theta}$, if $u=r \cos (r \sin \theta)$
i) Find the sum and product of the eigen values of $\left[\begin{array}{lll}2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2\end{array}\right]$
j) Find the rank of the identity matrix of order 2.

## PART-A

Q. 2 a) State and prove the relation between Beta and Gamma Function.
b) Using integration, Find the volume of the solid obtained by revolving the ellipse $\frac{x^{2}}{a^{2}}+\frac{y^{2}}{b^{2}}=1$ about x-axis.
Q. 3 a) Find the maximum and minimum values of the following polynomial function by using second order derivative test: $f(x)=8 x^{5}-15 x^{4}+10 x^{2}$.
b) Expand $f(x)=e^{a x} \sin b x, \forall x \in R$.
Q. 4 a) Discuss the convergence of series: $\frac{\mathrm{x}}{1}+\frac{1}{2} \cdot \frac{\mathrm{x}^{3}}{3}+\frac{1.3}{2.4} \cdot \frac{\mathrm{x}^{5}}{5}+\frac{1.3 .5}{2.4 .6} \cdot \frac{\mathrm{x}^{7}}{7}+\ldots .$.
b) Find the Fourier cosine series for $f(x)=x^{3}, 0<x<L$
Q. 5 a) If $\frac{x^{2}}{a^{2}+u}+\frac{y^{2}}{b^{2}+u}+\frac{z^{2}}{c^{2}+u}=1$, prove that
$\left(\frac{\partial u}{\partial x}\right)^{2}+\left(\frac{\partial u}{\partial x}\right)^{2}+\left(\frac{\partial u}{\partial z}\right)^{2}=2\left(x \frac{\partial u}{\partial x}+y \frac{\partial u}{\partial y}+z \frac{\partial u}{\partial z}\right)$
b) Find the directional derivative of the function $f(x, y, z)=x y^{2}+y z^{3}$ at the point $(2,-1,1)$ in the direction of the vector $\hat{i}+2 \hat{j}+2 \hat{k}$
Q. 6 a) Investigate the value of $\lambda$ and $\mu$ so that the equations:
$x+y+z=6 ; x+2 y+3 z=10 ; x+2 y+\lambda z=\mu$ have (i) No solution, (ii) unique solution and (iii) an infinite number of solutions.
b) Find the Eigen values and Eigen vectors of the matrix: $A=\left[\begin{array}{rrr}1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3\end{array}\right]$
Q. 7 a) Let $r^{2}=x^{2}+y^{2}+z^{2}$ and $V=r^{m}$, Prove that $V_{x x}+V_{y y}+V_{z z}=m(m+1) r^{m-2}$
b) Find the characteristic equation of the matrix $A=\left[\begin{array}{ll}1 & 4 \\ 2 & 3\end{array}\right]$ and use it to find the matrix represented by $A^{5}+5 A^{4}-6 A^{3}+2 A^{2}-4 A+7 I$.

## End Semester Examination, Dec. 2022

## B. Tech. - First / Second Semester <br> CHEMISTRY-I (BSC-CH-101/BCH-101)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Calculate no of radial and angular nodes in $2 p$ orbital.
[CO-1][L-3]
b) Arrange $\mathrm{O}, \mathrm{F}$ and S in the order of increasing atomic radius. Explain the order using shielding effect.
[CO-2][L-2]
c) Discuss enantiomers and diastereomers with suitable examples. [CO-3][L-1]
d) Discuss the significance of Van der Waal's constants.
[CO-5][L-1]
e) The enthalpy of fusion for water is $8.01 \mathrm{~kJ} / \mathrm{mol}$. Calculate the entropy change for 1.0 mole of ice melting to form liquid at 273 K .
f) Differentiate between E1 and E2 mechanism.
g) Write the E-Z configuration of following:
[CO-3][L-2]

h) Differentiate between dry and wet corrosion. [CO-5][L-2]
i) Discuss shielding effect with example. 1][L-1]
j) Differentiate between n -doping and p -doping.

## PART-A

Q. 2 a) Derive energy expression for particle in 1-dimensional box.
[CO-1][L-3] 10
b) Compare the bond order of NO and CO with the help of molecular orbital diagram and calculate their magnetic moment.
[CO-1][L3,4] 10
Q. 3 a) Differentiate between polarizing power and polarizability with suitable example. How is the polarizing power linked with the covalent character of an ionic bond, explain with example.
[CO-2][L-3] 10
b) Calculate the effective nuclear charge (Zeff) experienced by valence shell electron in the Chlorine(Cl), Potassium(K), Nickel (Ni) and oxygen(O) atoms. [CO2][L4] 10
Q. 4 a) Discuss the following with diagram and examples:
i) Destro and Levorotatory isomers.
ii) Optical Activity and plane polarised light.
[CO-3][L-2] 5×2
b) Label each stereogenic centers as $R$ or $S$.






[CO-3][L- 3] 10

## PART-B

Q. 5 a) Carbon dioxide gas ( 1.00 mole) at 373 K occupies 536 mL at 50.0 atmosphere pressure. What is the calculated value of the pressure using?
i) Ideal gas equation.
ii) Van der Waals equation.
[Data - Van der Waals constants for carbon dioxide:a $=3.61 \mathrm{~L}^{2} \mathrm{~atm} \mathrm{~mol}^{-2}$; $\left.\mathrm{b}=0.0428 \mathrm{~L} \mathrm{~mol}^{-1}, \mathrm{R}=0.0821 \mathrm{~L} \mathrm{~atm} \mathrm{~K}^{-1} \mathrm{~mol}^{-1}\right]$
b) Compare Stress corrosion and Differential aeration corrosion with reactions, diagrams and examples and discuss four factors affect the corrosion rates with brief description of any four.
[CO-5][L-2]10
Q 6 a) Discuss the principle and applications of AFM technique with suitable block diagram and write the advantages and disadvantages of SEM over AFM.
[CO-4][L-2]10
b) List the different types of transitions involved in UV-Visible spectroscopy and discuss their applications.
[CO-4][L-3]10
Q. 7 a) Compare the mechanism of SN1 and SN2 reactions with reaction and examples.
[CO-6][L-3] 10
b) Discuss the procedure and chemical reactions involved in the preparation of Aspirin.

# End Semester Examination, Dec. 2022 

B. Tech. - First/Second Semester

## CHEMISTRY - I (BSC-CH-101/BCH-101)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Find out the lowest possible energy for a particle in box.
[CO-1] [L-1]
b) State the method to calculate the number of nodes in nth quantum state. [CO2][L2]
c) Discuss enantiomers and diastereomers with suitable examples.
[CO-3] [L-1]
d) Discuss the significance of Van der Waal's constants.
[CO-5] [L-1]
e) Explain optical isomerism with suitable examples.
[CO-4] [L-4]
f) Differentiate between E1 and E2 mechanism.
[CO-6] [L-1]
g) Comments on physical significance of $\Psi \& \Psi 2$.
[CO-3] [L-2]
h) Differentiate between dry and wet corrosion.
[CO-5] [L-2]
i) Calculate no of radial and angular nodes in $2 p$ orbital.
[CO-1] [L-3]
j) Discuss the significance of Ellingham diagram.
[CO-2] [L-3] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Derive energy expression for Particle in 1-dimensional box in terms of particle's
mass $m$, the length of the box $L$, and Planck's constant $h$.
[CO- 1] [L-3] 10
b) Compare the bond order of NO and CO with the help of molecular orbital diagram and write their electronic configuration.
[CO-1] [L3,4] 10
Q. 3 a) Differentiate between ideal and real gas. Explain Vander wall's equation for real gas in details.
[CO-2] [L-2] 10
b) Calculate the effective nuclear charge (Zeff) experienced by valence shell electron
the Chlorine (Cl) Potassium (K), Nickel (Ni) and oxygen (O) atoms. [CO-2] [L-4] 10
Q. 4 a) Which Conformer is most stable in ethane, butane, and cyclohexane? Explain in
[CO-3] [L-3] 10
detail.
b) Label each stereogenic centers as R or S









## PART-B

Q. 5 a) Draw Fischer projection formulas for all isomers of 2,4 dibromohexane giving stereochemical details for each structure.
b) Compare bimetallic corrosion and differential aeration corrosion with reactions,
diagrams and examples. Also, discuss the four factors which affect the corrosion rates.
[CO-5] [L-2] 10
Q. 6 a) Discuss the principle and applications of AFM technique with suitable block diagram
and write the advantages and disadvantages of SEM over AFM? [CO-4] [L-2] 10
b) List the different types of transitions involved in IR Spectroscopy and discuss their
applications?
[CO-4] [L-3] 10
Q. 7 a) Discuss the procedure and chemical reactions involved in the preparation of Aspirin?
[CO-6] [L-1] 10
b) Compare the mechanism of SN1 and SN2 reactions with examples. [CO6][L-3] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - <br> $\qquad$ <br> Semester CHEMISTRY - I (BSC-CH-101/BCH-101) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from Part-A and TWO questions from Part-B. Marks are indicated against each question.
Q. 1 a) Find out the lowest possible energy for a particle in box.
[CO-1] [L-1]
b) State the method to calculate the number of nodes in nth quantum state.
[CO-2] [L-2]
c) Discuss enantiomers and diastereomers with suitable examples.
[CO-3] [L-1]
d) Discuss the significance of Van der Waal's constants?
[CO-5] [L-1]
e) Explain optical isomerism with suitable examples.
f) Differentiate between E1 and E2 mechanism?
g) Comments on physical significance of $\Psi \& \Psi 2$ ?
[CO-3] [L-2]
h) Differentiate between dry and wet corrosion?
i) Calculate no of radial and angular nodes in $2 p$ orbital?
[CO-1] [L-3]
j) Discuss the significance of Ellingham diagram
[CO-2] [L-3] 2x10

## PART-A

Q. 2 a) Derive energy expression for Particle in 1-Dimensional box in terms of particle's
mass $m$, the length of the box $L$, and Planck's constant $h$.
[CO- 1] [L-3] 10
b) Compare the bond order of NO and CO with the help of molecular orbital diagram
and write their electronic configuration.
[CO-1] [L3,4] 10
Q. 3 a) Differentiate ideal and real gas. Explain Vander wall's equation for real gas in details.
[CO-2] [L-2] 10
b) Calculate the effective nuclear charge (Zeff) experienced by valence shell electron
in
the Chlorine (Cl) Potassium (K), Nickel (Ni) and oxygen (O) atoms. [CO-2] [L-4] 10
Q. 4 a) Which Conformer is most stable in ethane, butane, and cyclohexane? Explain in detail.
b) Label each stereogenic centers as R or S






## PART-B

Q. 5 a) Draw Fischer projection formulas for all isomers of 2,4 dibromohexane giving stereochemical details for each structure.
[CO-5] [L-3] 10
b) Compare Bimetallic corrosion and Differential aeration corrosion with reactions, diagrams and Examples and discuss four factors affect the corrosion rates with
brief description of any four.
[CO-5] [L-2] 10
Q. 6 a) Discuss the principle and applications of AFM technique with suitable block diagram
and write the advantages and disadvantages of SEM over AFM? [CO-4] [L-2] 10
b) List the different types of transitions involved in IR Spectroscopy and discuss their applications?
[CO-4] [L-3] 10
Q. 7 a) Discuss the procedure and chemical reactions involved in the preparation of Aspirin?
[CO-6 ] [L-1] 10
b) Compare the mechanism of SN 1 and SN 2 reactions with reaction and examples?
[CO-6 ] [L-3] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - First Semester <br> PHYSICS FOR ENGINEERS (BPH-106) 

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Where is the Fermi level located in n-type semiconductors?
[CO-2] [L-1]
b) Explain the concept of wave packet.
[CO-1] [L-2]
c) What is compton effect?
[CO-1] [L-2]
d) Mention the wavelengths of the radiations emitted by He-Ne laser.
[CO-1] [L-1]
e) Explain the importance of meta-stable states in laser.
f) What are quantum dot and graphene?
[CO-3] [L-2]
g) Give two reasons why the properties of a materials change at nanoscale?
[CO-3] [L-2]
h) The carrier concentration in p-type semiconductor is 1019 per $\mathrm{m}^{3}$. What is the value of Hall coefficient?
[CO-3] [L-4]
i) Write Laplace and Poisson's equations.
[CO-4] [L-1]
j) Which material is used in piezoelectric?
[CO-4] [L-1] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Differentiate between direct and indirect band gap semiconductors. [CO-2] [L-2] 4
b) Write a short note on drift and diffusion of charge carriers in semiconductors.
[CO-2] [L-2] 6
c) Discuss the principle, construction and working of a solar cell. Draw its characteristics and find out the fill factor.
[CO-2] [L-3] 10
Q. 3 a) Derive the expressions for Schrodinger time independent and time dependent wave equations.
b) Differentiate between Bose-Einstein and Fermi-Dirac statistic. [CO-1] [L-2] 6
c) De-Broglie wavelength of an electron is $70 \AA$. What is its velocity?
Q. 4 a) Discuss Einstein's coefficients. Derive the relations between them. [CO-1] [L-3] 8
b) Classify optical fibres on the basis of modes of propagation and index profile.
c) Summarize the characteristics of a laser beam.

## PART-B

Q. 5 a) What are nanomaterials? Discuss the different approaches in building nanomaterials.
[CO-3] [L-2] 6
b) Discuss the physical properties of nanomaterials.
[CO-3] [L-2] 4
c) Define carbon nanotube? What are the types of carbon nanotubes? Explain Laser evaporation method for the synthesis of carbon nanotubes. [CO-3] [L-3] 10
Q. 6 a) Derive Bragg's law for X-ray diffraction. Describe Bragg's spectrometer and explain how it is used to analyze the crystal structure?
b) Write a short note on Rutherford back scattering spectroscopy. [CO-3] [L-2] 8
Q. 7 a) Establish the expression for divergence of electric field.
b) Write and explain the differential form of Maxwell's equations.
c) Elaborate different types of polarization in dielectric materials. What do you understand by dielectric constant?

# End Semester Examination, Dec. 2022 

## B. Tech. - First Semester <br> PHYSICS FOR ENGINEERS (BPH-106)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Reiterate two physical properties of semiconductors.
b) In a LED the active material used is AlGaN with a band gap of 4.5 eV . Find out the wavelength of light emitted.
c) Give the statement of Compton Effect.
d) Explain the importance of meta-stable states in laser.
e) Explain the principle of propagation of light in an optical fiber.
f) What do you understand by nanoparticles?
g) Briefly discuss bottom up approach for nanotechnology.
h) In the Hall Effect, the electric field is in X-direction and the velocity is in Ydirection. What is the direction of the magnetic field?
i) List some applications of piezoelectric materials.
j) Write Laplace and Poisson's equations.

## PART-A

Q. 2 a) Distinguish between i) direct and indirect band gap semiconductors ii) organic and inorganic semiconductors.
[CO-2] [L-2] 10
b) Interpret and analyze the construction and working of pn-junction photodiode.
Q. 3 a) Derive the expressions for Schrodinger time independent and time dependent wave equations.
b) State and explain photoelectric effect. [CO-1] [L-3] 6
c) What is the energy of gamma ray photon having wavelength $1 \AA$ ?
Q. 4 a) Discuss Einstein's coefficients. Derive the relation between them. [CO-1] [L-3] 10
b) Classify optical fibres on the basis of modes of propagation and index profile.
[CO-1] [L-3] 7
c) The numerical aperture of an optical fiber is 0.7 and core refractive index is 1.65. Determine the refractive index of cladding.
[CO-1] [L-4] 3

## PART-B

Q. 5 a) Discuss the different approaches in building nanomaterials. Explain molecular beam epitaxy method to produce nanomaterials.
[CO-3] [L-2] 10
b) Distinguish between single walled and multi-walled carbon nanotubes. Enumerate any six applications of nanomaterials.
[CO-1] [L-1] 10
Q. 6 a) Derive Bragg's law for X-ray diffraction. Also describe Bragg's spectrometer and explain how it is used to analyze the crystal structure?
[CO-3] [L-3] 12
b) Write a short note on Atomic Force Microscope.
Q. 7 a) Distinguish between divergence and curl of a vector field. Derive an expression for divergence of electric field. [CO-4] [L-3] 10
b) Given a potential of the form: $V=m\left(x^{2}+y^{2}+z^{2}\right)^{1 / 2}$, check whether the potential satisfies Laplace equation and find the electric field corresponding to it. [CO4][L4] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - First Semester <br> PHYSICS FOR ENGINEERS (BPH-106) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Give two examples each of direct and indirect band gap semiconductor. [CO-2] [L-1]
b) What do you understand by a black body? [CO-1] [L-2]
c) Which statistics is obeyed by electrons?
[CO-1] [L-1]
d) Explain why GaAs is used for semiconductor laser.
[CO-1] [L-2]
e) How is population inversion achieved in laser?
[CO-1] [L-2]
f) What are Quantum dot and Fullerenes?
[CO-3] [L-2]
g) Differentiate between self-assembly and positional assembly in building nanomaterials.
[CO-3] [L-2]
h) What is the principle of RBS?
[CO-3] [L-2]
i) What is continuity equation for current density?
[CO-4] [L-2]
j) Write any two Maxwell's equations.

PART-A
Q. 2 a) Draw and explain the energy band diagrams for unbiased, forward biased and reverse biased pn-junction.
[CO-2] [L-3] 10
b) Explain the structure, working principle and characteristics PIN diode. [CO2][L-3] 10
Q. 3 a) Write the Schrodinger wave equation for a free particle in a one dimensional box. Determine the energy Eigen states and the Eigen values for the same.
[CO-1] [L-4] 12
b) Write short note on Planck's hypothesis.
[CO-1] [L-2] 4
c) X- Rays of wavelength $1.50 \AA$ are scattered from a thin Al foil. Scattered X rays are observed at an angle $60^{\circ}$ from incident beam. Calculate the wavelength of scattered X -rays and kinetic energy of recoil electron. [CO-1] [L-4]
Q. 4 a) Explain with neat diagram the principle, construction and working of a $\mathrm{He}-\mathrm{Ne}$ laser.
[CO-1] [L-3] 10
b) Derive the expression for the numerical aperture of an optical fibre. [CO-1] [L-3] 6
c) Discuss different types of losses in an optical fibre.
[CO-1] [L-2] 4

## PART-B

Q. 5 a) Explain Molecular beam epitaxy method to produce nanomaterials and also discuss the physical properties of nanomaterials.
[CO-3] [L-3] 10
b) Define carbon nanotube, what are the types of carbon nanotubes? Explain any one method for the synthesis of carbon Nanotubes.
[CO-3] [L-3] 10
Q. 6 a) Derive Bragg's law for X-ray diffraction. Describe Bragg's spectrometer.
[CO-3] [L-3] 10
b) What is Hall Effect? Derive an expression for Hall coefficient (Hall resistance). Discuss some important applications of Hall Effect.
Q. 7 a) Elaborate different types of polarization in dielectric materials. What do you understand by dielectric constant?
[CO-4] [L-2] 8
b) Determine the capacitance of a parallel plate of a capacitor using Laplace equation.
c) Write some applications of piezoelectric materials.

# End Semester Examination, Dec. 2022 

## B. Tech. - First Semester

## SEMICONDUCTOR PHYSICS (BPH-104/BSC-PH-101)

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from Part-A and TWO questions from Part-B. Each question carries equal marks.
Q. 1 a) Differentiate between metals, semiconductor and insulators on the basis of band
gap.
b) Describe density of states?
c) At OK, where is the Fermi level located in n-type semiconductor?
d) Draw the energy band diagram for a pn-junction diode in an unbiased condition.
e) What is meant by Exciton.
f) Differentiate between spontaneous and stimulated emission.
g) Explain radiative recombination.
h) Discuss important applications of LED.
i) Draw a labeled diagram of p-n junction photodetector.
j) What for DLTS is used?

## PART-A

Q. 2 a) Outline the free electron model of metals. What are it's limitations? [CO-1] [L-2] 10
b) Write short notes on the following:
i) Effective mass
[CO-1] [L-3] 4
ii) Occupation probability
[CO-1] [L-2] 3
iii) Density of states
Q. 3 a) Derive an expression for the intrinsic carrier concentration in an intrinsic semi-conductor. Under what conditions will Fermi level is in the middle of the forbidden gap?
[CO-2] [L-3] 14
b) Differentiate between direct band semiconductor and Indirect band gap semiconductors.
[CO-2] [L-2] 6
Q. 4 a) Write short note on photovoltaic effect.
[CO-3] [L-4] 6
b) Elucidating the terms Absorption, Spontaneous emission and Stimulated emission,
establish the relation between Einstein's coefficients.
[CO-3] [L-4] 14

## PART-B

Q. 5 a) Discuss homojunction LED giving the reasons for losses of emitted photon.
[CO-4] [L-2] 10
b) In a LED the active material used is AIGaN with a band gap of 4.5 eV . Find out the
wavelength of light emitted.
[CO-4] [L-4] 4
c) Differentiate SLED and ELED and give one applications of each of these.
Q. 6 a) Using a labeled diagram discuss the working principle, construction and working of PIN photodetector.
[CO-4,5] [L-4] 10
b) Discuss the principle, construction and working of a solar cell. Draw its characteristics and find out the fill factor.
[CO-4,5] [L-2,3] 10
Q. 7 a) How the carrier concentration of p-type semiconductor can be measured using probe measurement technique.
b) Derive suitable expression and explain the Vander Pauw and Four-point probe measurement for carrier density, resistivity and Hall mobility.

# End Semester Examination, Dec. 2022 

## B. Tech. - First / Second Semester

SEMICONDUCTOR PHYSICS (BPH-104/BSC-PH-104)
Time: 3 hrs.
MaxMarks:100
No. of pages:1

## Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B.Marks are indicated against each question.

Q. 1 Answer the following:
a) Explain the term energy band.
b) Write the expression for effective mass of an electron.
c) What are minority carriers in p-type semiconductors? Why?
d) Where is the Fermi level located in n-type semiconductors at OK?
e) Differentiate between spontaneous and stimulated emission.
f) Write the expressions for energy and momentum of a photon.
g) Explain radiative recombination.
h) Name two materials used for LED emitting wavelength in the visible range.
i) Distinguish between photoemissive and photoconductive type photodetectors
j) What for DLTS is used?

## PART-A

Q. 2 a) Discuss the Kronig-Penny model. How it explains the formation of energy bands separated by forbidden energy gap in solids.
b) Write short note on density of states. 5
Q. 3 a) Derive an expression for the intrinsic carrier concentration in an intrinsic semiconductor.
b) Draw the energy band diagram for unbiased and reverse biased pn-junction.
c) Write short note on drift current.
Q. 4 a) Obtain an expression for the rate of spontaneous emission and explain its dependence on temperature.

$$
\begin{aligned}
& \text { b) If light is incident on a semiconductor, obtain the conditions for optical loss } \\
& \text { and gain. }
\end{aligned}
$$

## PART-B

Q. 5 a) Differentiate between radiative and non-radiative recombination.
b) Give the working of a double hetrojunction LED and explain how the extraction efficiency is improved.
Q. 6 a) Describe the working principle, construction and working of $\mathrm{p}-\mathrm{n}$ junction photodetector. Also draw its characteristics.
b) Write a short note on 'Noise limits on performance of photodetectors'. $\mathbf{1 0}$
Q. 7 a) What is DLTS? How we get the information of deep level impurities using this technique?
b) Explain in detail the capacitance voltage measurement method.
c) Hall co-efficient of silicon is found to be $3.66 \times 10^{-4} \mathrm{~m}^{3} \mathrm{c}^{-1}$. The resistivity of the specimen is $8.93 \times 10^{-3} \mathrm{~m}$. Find the mobility and density of the charge carriers.

# End Semester Examination, Dec. 2022 

# B. Tech. - First Semester <br> APPLIED PHYSICS (BPH-103 / BSC-PH-103) 

Time: 3 hrs.

Max Marks: $\mathbf{1 0 0}$
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) How is laser light different from an ordinary light?
b) How the holography is different from photography?
c) Describe the important components of fibre optic system with specific use of each component.
d) Define V number as used in optical fibre and explain its importance.
e) Explain the sensitivity of a photoconductor.
f) Describe photovoltaic process.
g) Draw the planes for given Miller Indices (101), (1 $\overline{1} 1)$.
h) What is Mosley's law?
i) Why X-rays are used to detect crystal structure?
j) Discuss two important approaches for building nanomaterials.

## PART-A

Q. 2 a) With the help of a labeled diagram, describe the principle, construction and working of a $\mathrm{CO}_{2}$ Laser.
[CO-1, CO-2] [L-1, L-2, L-4] $\mathbf{1 0}$
b) Write the principle of holography. With neat sketches, explain recording of a hologram and reconstruction of images.
[CO-1, CO-4] [L-1, L-2, L-4] $\mathbf{1 0}$
Q. 3 a) What is meant by acceptance angle for an optical fibre? Derive how it is related to numerical aperture.
[CO-1, CO-3] [L-1, L-2, L-3] $\mathbf{1 0}$
b) Describe various mechanism of attenuation in optical fibres. $\quad[\mathrm{CO}-1,3][\mathrm{L}-1,2,4] 6$
c) A light ray enters from air to a fiber. The refractive index of air, core and cladding are $1,1.5$ and 1.48 respectively. Find the critical angle and Numerical Aperture.
[CO-4] [L-3] 4
Q. 4 a) What is photoconductivity? Discuss a simple model of photoconductor to show the effect of traps on photoconductivity of a photoconductor.[CO-1, CO-3] [L-4] 10
b) What are photoconductive cells? How are they fabricated? Discuss their main characteristics.
[CO-2] [L-2] 10

## PART-B

Q. 5 a) What is packing fraction? Calculate packing fraction of sc, bcc, fcc and hcp structures.
[CO-1, CO-.3] [L-1, L-2, L-3] 10
b) Derive an expression for inter planer spacing between two parallel planes in a simple cubic crystal. A simple cubic crystal has atomic radius of $1.75 \AA$. Determine the spacing of planes having Miller Indices (200) and (111). [CO-1,4] [L-1,4] 10
Q. 6 a) What is Bragg's law? Derive Bragg's law for X-ray diffraction. Explain the working of Bragg's spectrometer to analyze the crystal structure. [CO-1, 2] [L-1,2,4] 12
b) Write a short note on Rutherford Back Scattering Spectroscopy.
[CO-4] [L-4] 8
Q. 7 a) Describe chemical vapour deposition and Ball milling methods for fabrication of nanomaterials. [CO-4] [L-2, L-4] 8
b) Explain the structure of $\mathrm{C}_{60}$ buckyballs. Discuss the electrical, mechanical and vibrational properties of carbon nanotubes.
[CO-1, CO-.3] [L-1, L-4] 12

# End Semester Examination, Dec. 2022 

# B. Tech. - First Semester <br> MECHANICS (BPH-102/BSC-PH-102) 

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Is scalar quantity changed under the rotation transformation?
b) Write the expressions for velocity and acceleration in cylindrical polar coordinates.
c) Give two examples each of conservative and non-conservative forces.
d) Express relation between the force and the torque.
e) What do you understand by non-inertial frames of reference?
f) Write the equation of motion of forced damped oscillator.
g) What is resonance?
h) Is the velocity of a particle under uniform rotational motion constant?
i) Explain the three dimensional motion of a rigid body.
j) Is the rotations by a finite angle are vector quantities? $\mathbf{2 x 1 0}$

## PART-A

Q. 2 a) Explain the invariance of Newton's second law.
[CO-1] [L-2] 6
b) Derive the Newton's equations of motion in planar polar coordinates. [CO-1] [L-6] 8
c) Discuss the fundamental forces of nature.
Q. 3 a) Show that in the case of a conservative force, the work done around a closed path is zero.
[CO-2] [L-3] 8
b) Write a short note on the law of conservation of angular momentum and its importance in Physics.
[CO-2] [L-4] 7
c) Explain in detail about hyperbolic orbit.
Q. 4 a) Describe the motion of rotating frames of reference (five term acceleration formula).
[CO-3] [L-2] 10
b) Write short note on Foucault pendulum.
c) Discuss in detail about weather systems.

## PART-B

Q. 5 a) Find solution for the differential equation of a simple harmonic oscillator and derive expressions for its time period.
[CO-4] [L-3] 14
b) Define quality factor for a damped harmonic oscillator. Deduce an expression for it.
[CO-4] [L-4] 6
Q. 6 a) Differentiate between rectilinear and rotational motion.
[CO-5] [L-2] 5
b) Show that for a rigid body the angular momentum about the axis of rotation is equal to the product of moment of inertia about that axis and angular velocity.
c) Discuss the Euler's laws of motion.
Q. 7 a) Derive the expression for rate of change of a vector rotating with angular velocity.
b) Evaluate the expression for moment of inertia tensor.

# End Semester Examination, Dec. 2022 

# B. Tech. - First Semester <br> INTRODUCTION TO ELECTROMAGNETIC THEORY 

(BPH-101/BSC-PH-101)
Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 2

## Note: Attempt FIVE questions in all; $\mathbf{Q} .1$ is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.

Q. $1 \quad$ Answer the following:
a) Write Poisson's and Laplace equations.
b) Throw light on "interaction between two charged particles".
c) Define polarization vector in dielectrics.
d) What do you understand by linear dielectric medium?
e) Write Stokes' theorem.
f) What is electric dipole moment of a dipole?
g) Explain the term magnetostatics.
h) Give the relation between speed of electromagnetic waves, $\mu 0$ and $\varepsilon 0$.
i) Write about motional emf.
j) State the continuity equation.

## PART-A

Q. 2 a) Derive an expression for curl of electrostatic field and give it's physical significance.
b) What is method of images? Determine the electric field due to a point charge above a grounded conducting plane.
c) A potential is given by $\mathrm{v}=\mathrm{m}\left(\mathrm{x}^{2}+\mathrm{y}^{2}+\mathrm{z}^{2}\right)$ where m is a constant. Does this
potential satisfies Laplace equation?
Q. 3 a) Obtain the boundary conditions for static electric field across a boundary separated by two different dielectric media.
b) Calculate the electric potential due to a dipole at a point inclined at some angle. 8
c) Explain the term 'Electric Displacement".
Q. 4 a) Calculate the value of magnetic field at a point due to a long current carrying wire using Bio- savart's law.
b) State and derive the expression for divergence of static magnetic field. 6
c) Calculate the expression for vector potential of a solenoid having n turns/unit length and carrying current I.

## PART-B

Q. 5 a) Derive an expression for vector potential in terms of surface bound current and volume bound current?
b) Calculate the magnetic field at a point at the equatorial line of a bar magnet? 6
c) List the differences between diamagnetic and paramagnetic materials with examples.
Q. 6 a) Derive four Maxwell's equations.
b) State and prove Poynting theorem. Explain the term pointing vector.
Q. 7 a) Calculate reflection and transmission coefficients for electromagnetic wave when it travels from one medium to another for nonmagnetic mediums.
b) Solve Maxwell's equations to obtain electromagnetic wave equations for E and $B$ in free space.
c) Show that the electromagnetic waves are transverse in nature.

# End Semester Examination, Dec. 2022 OPEN ELECTIVE - COMMAN FOR ALL BRANCHES QUALITY CONTROL (BME-OE-003) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Explain the variation.
[CO-1] [L-1]
b) Summarize the importance of control charts in decision making.
[CO-2] [L-3]
c) Interpret the Pareto-Chart with neat sketch.
[CO-3] [L-2]
d) Appraise the term customer satisfaction while defining and implementing the quality in an organization.
[CO-2] [L-3]
e) Discuss quality circles formed in organizations.
[CO-1] [L-2]
f) Interpret the quality control importance in the organizations.
[CO-4] [L-3]
g) Distinguish between variables and attributes.
[CO-1] [L-2]
h) Discuss benchmarking.
[CO-4] [L-2]
i) Appraise the term total participation in quality management.
[CO-2] [L-2]
j) Name the various types of sampling used in SQC.

## PART-A

Q. 2 a) Explore and appraise the distinguished roles of quality professional in planning and executing the quality initiatives in the organization. [CO-2] [L-2] 12
b) Express the need of quality in present day context.
[CO-1] [L-3] 8
Q. 3 Interpret the necessities for setting-out the special quality control department in industries. Also, explain the various benefits and limitations for having In-house QC department.
[CO-3, 4] [L-3] 20
Q. 4 List and brief the Basic Quality Tools with neat sketches.
[CO-1, 3] [L-2] 20

## PART-B

Q. 5 Appraise the term total quality management. Also, articulate the new concept emerged in the last two decades resulting the continuous improvement in Industrial Performances.
[CO-2, 4] [L-3] 20
Q. 6 ABS hospital is having 250 beds capacity in total for patient cares. Being the administrator, you are responsible to manage the beds availability and utility as and when demanded. For providing the better services to the patients, a survey was conducted from $01^{\text {st }}$ to $07^{\text {th }}$ November on beds availability count every-day and observed the following:

Dates
No. of Beds Inspected

80
50
80
$01^{5 t}$ Nov
$02^{\text {nd }}$ Nov
$03^{\text {rd }}$ Nov

No. of beds are not conforming the desired requisitions

04
06
03

| $04^{\text {th }}$ Nov | 40 | 04 |
| :--- | :--- | :--- |
| $05^{\text {th }}$ Nov | 70 | 06 |
| $06^{\text {th }}$ Nov | 70 | 00 |
| $07^{\text {th }}$ Nov | 80 | 08 |

$06^{\text {th }}$ Nov 70
08
Draw the neat chars and interpret whether the process is in control or not based on recorded information.
Q. 7 Discuss lean management in brief. Also, list the various tangible and intangible benefits of lean manufacturing approach in manufacturing context.
[CO-4] [L-3] 20

# End Semester Examination, Dec. 2022 

# B. Tech. - Seventh Semester MODERN MACHINING METHODS (BME-DS-722) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all. Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) State the function of Tool Concentrator.
[CO1, L1]
b) Distinguish between conventional and unconventional machining processes.
[CO1, L4]
c) State the effect of stand-off-distance (SOD) on the MRR of AJM.
[CO2, L2]
d) What is self adjusting feature of an ECM process?
[CO.3, L1]
e) Distinguish between cut and peel resists and photographic resists.
[CO.3, L4]
f) What are the applications of Electrochemical Spark Machining process? [CO.4, L2]
g) Define 'duty factor'.
[CO.4, L1]
h) What are thermal and non-thermal types of EBM?
[CO.5, L1]
i) Why tungsten is not used as electrode material in PAM?
[CO.6, L1]
j) What are the limitations of LBM?
[CO.5, L1] $\mathbf{2 \times 1 0}$
PART-A
Q. 2 a) Derive an equation of MRR in USM. Sketch any two types of feeding systems used in USM.
[CO.1, L6] 10
b) Classify different types of Modern Machining Methods. Briefly explain the Modern Machining Processes on the basis of applicability to material and machining characteristics.
[CO.1, L2] 10
Q. 3 a) Diameter of the nozzle is 1.0 mm and jet velocity is $200 \mathrm{~m} / \mathrm{s}$. Find the volumetric flow rate $\left(\mathrm{cmm}^{3} / \mathrm{s}\right)$ of the carrier gas and abrasive mixture. [CO.2, L3] 8
b) What is the principle of a water jet machining? Write a short note on special features of equipment used in this method of machining.
[CO.2, L2] 12
Q. 4 a) Calculate the metal removal rate $\left(\mathrm{cm}^{3} / \mathrm{min}\right)$ in an ECM process of iron if the current available has been 259A. Assume atomic weight of iron to be 56 gm , its valency 2 and density $7.8 \mathrm{gm} / \mathrm{cm}^{3}$.
[CO.3, L5] 10
b) Explain the main steps of chemical machining process. Explain in brief the chemical blanking.
[CO.3, L2] 10

## PART-B

Q. 5 a) Derive an expression for the material removal rate of R-C relaxation circuit used for the EDM power supply.
[CO.4, L6] 12
b) Explain the working principle of wire cut EDM with a neat sketch.
[CO.4, L2] 8
Q. 6 a) Describe, with the help of a neat sketch, the constructional features of an electron gun used for generating an electron beam in EBM.
[CO.5, L6] 10
b) Explain the working principle of LBM with a neat sketch. State the applications of LBM.
[CO.5, L2] 10
Q. 7 Explain the working principle of plasma arc machining. Write safety precautions to be followed in PAM.
[CO.6, L2] 20

# End Semester Examination, Dec. 2022 

# B. Tech. - Seventh Semester HEATING, VENTILATION AND AIR CONDITIONING 

(BME-DS-721)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Write down use of NE-NW-SE-SW directions in heat load.
b) Describe the function of fire damper in central HVAC System.
c) Define use of RCC Structure in chilling machine platform.
d) Explain the use of boilers in Central HVAC System.
e) Compare two differences between split AC and VRV System.

## PART-A

Q. 2 a) In case of heat load estimation how dehumidified cfm is calculated? Also enumerate the calculation method of Fresh air cfm. (CO5)(L4)10
b) Describe with a suitable sectional diagram of a corridor showing Condenser and Chilled water piping with insulation as per requirement, supply and return duct with insulation specifying thickness, cable tray, clear false ceiling height and clearance spaces between each component above false ceiling. (CO2)(L1)10
Q. 3 a) Write down stepwise how the static head of condenser water pump is calculated along with the safety factor.
(CO6)(L4)10
b) Write down stepwise how the static head of AHU Blower is calculated along with the safety factor to be taken.
(CO6)(L4)10
Q. 4 a) Describe with suitable diagram volume control damper within AHU Room and ducts. Also describe how the damper controls the flow of air in diffusers/grilles and in main duct.
(CO1)(L2)10
b) Describe with suitable diagram showing supply air \& return air ducting from AHU along with AHU room, fire damper, volume control damper, diffusers, grilles etc.
(CO4)(L2)10

## PART-B

Q. 5 a) Illustrate drawing AHU within AHU Room showing its location in mm and justify with reasoning the dimensioning of each side of AHU. (CO2)(L3)10
b) Describe with suitable diagram the HVAC System of operation theatre of a hospital.
(CO3)(L3)10
Q. 6 Describe with suitable diagram a central heating system showing two nos. of boilers, two nos. of chilling machine, two nos. of necessary pumps and valve arrangement with all the necessary pipe lines along with a three floor building consisting of AHUs and FCUs. Also describe interlocking of valves arrangements in boilers and chilling machine during summer \& winter.
(CO4)(L2)20
Q. 7 a) Draw a vertical shaft layout showing chilled water and condenser water pipes with insulation where necessary, supply and return air duct with required
insulation, fire fighting pipes etc in a vertical shaft. Also explain why vertical shafts are used in a multi floor building.
b) Write short notes on:
i) Cooling Tower.
ii) Necessity of insulation requirement in ducting and piping.

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester HEATING, VENTILATING AND AIR CONDITIONING (BME-DS-721)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Define 'CHW and CDW'.
[CO-2] [L-1]
b) Explain the working of cooling Tower in HVAC system.
[CO-2] [L-2]
c) Explain the methods of heating system used in HAVC systems.
[CO-6] [L-3]
d) Write down the name of four different valve arrangements used in HVAC systems.
[CO-2] [L-2]
e) Explain different pipe sizing and friction losses with respect to size of pipe.
[CO-5] [L-2]
f) What is sensible heat its parameters for a room?
[CO-4] [L-1]
g) What do you understand by wet bulb temperature and dew point temperature?
[CO-4] [L-2]
h) What do you understand by AHU?
[CO-3] [L-3]
i) What are the different methods used for duct sizing?
[CO-2] [L-2]
j) What are different duct shapes used in HVAC system?
[CO-2] [L-2] 2x10

## PART-A

Q. 2 Explain the Chiller and its types used in HVAC.
Q. 3 What are the basic concepts of AHU and FCU in HVAC system? Describe both in detail.
[CO-4] [L-6] 20
Q. 4 Explain the HVAC system with different plant layouts.
[CO-4] [L-6] 20
PART-B
Q. 5 Explain E20 sheet and the parameters used in the E20 sheet for calculation of heat load for a room or a building.
[CO-5] [L-4] 20
Q. 6 What are the various types of Air Conditioning Systems? Explain with diagram.
[CO-6] [L-3] 20
Q. 7 Explain the duct components with diagram and explain different types of supply duct system.
[CO-2] [L-3] 20

# End Semester Examination, Dec.-2022 

# B. Tech. - Seventh Semester OPERATION RESEARCH (BME-DS-701) 

Time: 3 hrs.

Max Marks: 100 No. of pages:

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Distinguish between Finite and Infinite Population in Queue Model. CO-3 (L-
3)
b) Point out the various advantages of simulation method.

CO-3 (L1)
c) Differentiate between slack and surplus variables in Linear Programming Problems.
(CO-2 (L-2)
d) List the types of Floats in Network
e) Interpret the jockeying behavior of the customer while developing the queue model.
f) Point out the various advantages of operation research.

CO-1 (L-1)
g) With neat sketch explain the optimistic time in competition of an event in PERT.

CO-5 (L-1)
h) List the methods used for identify the initial basic feasible solution in Transportation Modeling. 2)
i) Name the models used in Operation Research .
j) Demonstrate the Gauss-Jordan reduction process in Simplex Method.CO-6 (L2)

## PART-A

Q. 2 Dr. Kumar has Rs 10000/- to invest in one of three option namely: A, B \& C. The return on his investment depends on whether economy experience inflation, recession or no change at all. The possible returns under each economic condition are given below:

| Strategy | State of Nature |  |  |
| :---: | :--- | :--- | :--- |
|  | Inflation | Recession | No Change |
| A | 2000 | 1200 | 1500 |
| B | 3000 | 800 | 1000 |
| C | 2500 | 1000 | 1800 |

What should he decide using
a) Pessimistic Criterion,
b) Optimistic Criterion,
c) Laplace Criterion and
d) Savage (Regret) Criterion

CO-1,6 (L-4) 20
Q. 3 Use the Big M method to solve the following problem:

Maximize $z=-2 x_{1}-3 x_{2}$
Subject to the constraints:

$$
\begin{align*}
& x_{1}+x_{2} \geq 2 \\
& 2 x_{1}+x_{2} \leq 10 \\
& x_{1}+x_{2} \geq 8 \\
& x_{1} \geq 0 ; x_{2} \geq 0 \tag{L-4}
\end{align*}
$$

Q. 4 Production department in M/s Pankaj Plastics have 5 employees with five jobs to be performed. The time (in hours) that each man takes to perform each given job is given in effectiveness matrix.

Employees

|  |  |  |  |  |  | $I$ |
| :---: | :--- | :--- | :--- | :--- | :--- | :--- |
| JOBS | $I I$ | $I I I$ | $I V$ | $V$ |  |  |
|  | A | 10 | 5 | 13 | 15 | 16 |
|  | 3 | 9 | 18 | 13 | 6 |  |
|  | C | 10 | 7 | 2 | 2 | 2 |
|  | D | 7 | 11 | 9 | 7 | 12 |
|  | E | 7 | 9 | 10 | 4 | 12 |
|  |  |  |  |  |  |  |

How should the jobs be allocated, one per employee, so as to minimize the totalhours?

CO-4,5 (L-3) 20

## PART B

Q. 5 a) Determine the queue discipline. Also explain in detail various queue disciplines consider under queue model.

CO-3,5 (L-2) 7
b) In a service station, the customers at one window drive according to Poisson distribution with a mean of 15 minutes. Service time per customer is exponential with a mean of 8 minutes.
Determine:
i) Probably that arriving customer doesn't have to wait.
ii) Expected Length of System.
iii)Average waiting time in system.
[CO-3,6] [L-4] 13
Q. 6 Based on data given in table below: Find out the critical path. Also find out the variation in the critical path.

| Activity <br> $(\boldsymbol{i}-\boldsymbol{j})$ | Estimated Duration (weeks) |  |  |
| :---: | :--- | :--- | :--- |
|  | Optimistic <br> $\boldsymbol{t}_{\boldsymbol{o}}$ | Most Likely <br> $\boldsymbol{t}_{\boldsymbol{m}}$ | Pessimistic <br> $\boldsymbol{t}_{\boldsymbol{p}}$ |
| $1-2$ | 6 | 8 | 10 |
| $1-3$ | 10 | 14 | 18 |
| $1-4$ | 16 | 24 | 32 |
| $2-5$ | 16 | 18 | 20 |
| $2-6$ | 15 | 20 | 25 |
| $3-6$ | 6 | 9 | 12 |
| $4-7$ | 6 | 9 | 12 |
| $5-7$ | 7 | 8 | 9 |
| $6-7$ | 3 | 4 | 5 |
|  |  |  |  |

Q. 7 The director of Finance for a farm cooperative is concerned about the yield per acre. He can expect from this year Corn Crop. The probability distribution of the yields for the current weather condition is given below:

Yield in per acre Probability
120018
$140 \quad 0.26$
$160 \quad 0.44$
$180 \quad 0.12$
Simulate the yield per acre for 10 years considering random number 20, 72, 34, 54, 30, 22, 48, 74, 76 and 02.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Sixth Semester <br> RENEWABLE ENERGY RESOURCES AND UTILIZATION (BME-DS- 

625) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Define the following:
a) Non-renewable energy sources.
b) Beam and diffuse radiation.
c) Calorific value of biomass samples.
d) Wave energy conversion devices.
e) Thermionic generators.

## PART-A

Q. 2 What are solar collectors? Discuss the design considerations of a Flat Plate Collector in water heating application.
[CO-1] [L-2] 20
Q. 3 What do you understand by Wind Power? Discuss the Horizontal Axis Wind Machines in respect of its design with suitable applications.
[CO-3] [L-3] 20
Q. 4 Illustrate with a neat diagram the components of wind mill and their constructional details.
[CO-4] [L-4] 20

## PART-B

Q. 5 a) Define 'fuel cell'. Also explain its components and working in brief. [CO-4] [L-2] $\mathbf{1 0}$
b) Elucidate the effects and materials used for thermoelectric effects.
[CO-4] [L-4] 10
Q. 6 a) How can we maintain the quality of biogas being produced for long duration?
[CO-5] [L-3] 10
b) Elaborate the points to be considered for digester in initial stage. [CO-5] [L-3] $\mathbf{1 0}$
Q. 7 a) Explain the principles of tidal energy.
[CO-6] [L-3] 10
b) Elaborate in detail the pros and cons of geothermal energy resources.
[CO-6] [L-4] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Sixth Semester <br> PROCESS PLANNING AND COST ESTIMATION (BME-DS-624)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Differentiate between 'product control' and 'process control'.
b) Enlist various 'manufacturing processes'.
c) Explain 'cost estimation'.
d) Discuss significance of process planning.
e) Differentiate between 'a jig and fixture'.
f) Describe the significance of inventory management.
g) Explain 'Depreciation'.
h) Differentiate between 'cost estimation and cost accounting'.
i) Enlist various steps of 'Casting Process'.
j) Enlist various dimensions of quality of a product.
[CO-1, 6] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 Discuss in detail various steps and decisions included in scope of process planning with help of an example.
[CO-1, 3, 6] [L-4] 20
Q. 3 A company sold 500000 litres of paints with a variable cost of Rs. 28 per litre per year.
Each litre contributes $30 \%$ of its revenue to fixed costs and profits. The company is contemplating a price reduction of $5 \%$ this year.
Calculate how may litres will the company be required to sell at $5 \%$ price reduction. In order to earn the same profit.
[CO-1, 2, 4] [L-4]
Q. 4 Demonstrate various elements of cost in detail with help of examples and also draw the cost structure block diagram.
[CO-4, 6] [L-3]

## PART-B

Q. 5 a) Discuss the objectives of cost estimation and how it is affected by process planning.
[CO-3, 4, 6] [L-4] 10
b) Discuss the various components of cost estimation in a casting process.
[CO-4, 6] [L-5] 10
Q. 6 Classify welding processes and its various process parameter. In addition, discuss in detail various components of cost in a arc welding process.
[CO-3, 5, 6] [L-4]
Q. 7 a) Differentiate between machining time calculation for lathe, milling and shaping process.
[CO-1, 6] [L-4] 10
b) Discuss the significance of machining time in manufacturing processes with relevance to today's manufacturing scenario.
[CO-1, 6] [L-4] 10

# End Semester Examination, Dec. 2022 

B. Tech. - Sixth Semester

CAD/CAM (BME-DS-622)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) List out the CAD software's for modeling and analysis.
[CO-1] [L-2]
b) Why feasibility study of the product is important? [CO-1] [L-1]
c) What are the important properties of spline designing? [CO-2] [L-1]
d) Differentiate between parallel projection and perspective projection. [CO-2] [L-2]
e) List out the industrial applications of solid model. [CO-3] [L-3]
f) State the importance of wire-frame modeling in CAD.
g) Write down the five examples of semi-automated systems.
h) What is the concept of composite part?
i) What do you understand by part programming?
j) State benefits of group technology.

## PART-A

Q. 2 a) Explain in details of each process of product life cycle.
[CO-1] [L-5] 10
b) A line having end points $(31,3,76)$ and $(5,11,80)$ is rotated about $x$-axis, keeping point $(31,3,76)$ as fixed, by an angle of 30 degrees in clockwise direction. Find the new co-ordinates of the line.
[CO-1] [L-6] 10
Q. 3 a) Why curves are highly useful and convenient for surface design? What are the design techniques using Bezier curves?
[CO-2] [L-3] 10
b) A cubic Bezier curve is described by the four control points: $(0,0),(2,1)$, $(5,2),(6,1)$. Find the tangent to the curve at $t=0.5$.
[CO-2] [L-6] 10
Q. 4 a) Is there any relationship between homogenous co-ordinates and Matrix representation? If yes, then explain?
[CO-3] [L-5] 10
b) Make a comparative analysis of the B-rep and composite solid geometry.
[CO-3] [L-4] 10

## PART-B

Q. 5 a) Write short notes on the following:
[CO-4] [L-5] 10
i) Absolute coordinate system.
ii) Incremental coordinate system.
b) Explain the function adaptive control in NC machine tools.
[CO-4] [L-2] 10
Q. 6 a) From a shaft 25 mm diameter, make a stepped shaft with dimensions as shown in figure below. Take speed $=3000 \mathrm{rpm}$ and feed $=30 \mathrm{~mm} / \mathrm{min}[C O-5][L-6]$

b) Explain the concept of: i) Drive Surface.
ii) Part Surface.
[CO-5] [L-4] 5×2
Q. 7 Write short notes on:
a) Part classification and coding.
b) Master production scheduling.
c) Bill of material.
d) MRP-II.
[CO-5] [L-1] 5×4

# End Semester Examination, Dec. 2022 

## B. Tech. - Fourth Semester HEAT TRANSFER (BME-DS-602)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Discuss the mechanism of heat transfer through conduction.
b) What do you understand by direct contact heat exchanger?
c) Write the expression of Biot Number.
d) Define 'thermal resistance'.
e) Which law governs the rate of heat transfer through convection? Write its expression.
f) Define 'thermal diffusivity'.
g) State briefly the significance of critical thickness of insulation.
h) What do you understand by stanton number?
i) State the characteristics of black body.
j) What do you understand by shape factor?

## PART-A

Q. 2 Derive an expression for heat transfer rate through a hollow sphere (Radial heat transfer without heat generation). Also state the assumptions under which the expression is derived.
Q. 3 Derive an expression for the heat transfer rate through a fin insulated at the tip. Also state the assumptions made in the derivation.
[CO-3] [L-2] 20
Q. 4 What do you understand by lumped system? Derive the expression. [CO-2] [L-4] 20

$$
\frac{T i-T \infty}{T-T \infty}=e^{\frac{h A}{\rho V C p^{2}}}
$$

## PART-B

Q. 5 Derive an expression for logarithmic mean temperature difference (LMTD) for counter flow heat exchanger.
[CO-3] [L-4] 20
Q. 6 Explain the following in detail -
[CO-1] [L-2] 20
a) Stefan Boltzman law.
b) Absorptivity, reflectivity and transmissivity.
c) Gray body and black body.
Q. 7 A 100 mm diameter steam pipe looses heat through convection. It is placed horizontally in ambient at $35^{\circ} \mathrm{C}$. If Nusselt number is 25 and thermal conductivity of air is $0.02 \mathrm{~W} / \mathrm{mK}$ then find the convection heat transfer coefficient. [CO-4] [L-3]

## End Semester Examination, Dec. 2022

## B. Tech. - Sixth Semester

DESIGN OF MECHANICAL SYSTEMS (BME-DS-601)
Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question. Use of Design Data Book is permitted.
Q. 1 a) What is self-energizing condition of brakes?
b) Define Lewis equation?
c) What do you understand by torsional rigidity?
d) Define factor of safety.
e) Explain the term spring index?
f) What is the Wahl factor?
g) Define 'dynamic load carrying capacity of ball bearing'.
h) State applications of gear drives.
i) Differentiate normal and transverse pitch?
j) Define 'ergonomics'.

## PART-A

Q. 2 a) Explain basic procedure of machine design in detail.
[CO-1] [L-2] 10
b) Distinguish between sequential design and concurrent engineering. [CO-1] [L-2] 10
Q. 3 a) A bracket for supporting the travelling crane is fixed to the steel column by means
of four identical bolts, two at $A$ and two at $B$ as shown in the figure. The maximum
load acting vertically downward is at a distance of 250 mm from the face of the
column. Bolts are made of steel 40 C 8 (Syt $=380 \mathrm{~N} / \mathrm{mm} 2$ ) and the factor of safety
5. Calculate the major diameter of the bolts on the basis of maximum principal
stress theory.

[CO-3] [L-4] 10
b) A plate 75 mm wide and 12.5 thick is to be welded to another plate by means of
figure.
maximum tensile and shear stresses are 70 MPa and 56 MPa respectively. Find the
length of each parallel fillet weld, if the joint is subjected to both static and fatigue loading.

[CO-3] [L-3] 10
Q. 4 a) Derive an expression for the length of an open belt drive.
[CO-4] [L-1] 10
b) A propeller shaft is required to transmit 50 kW power at 600 rpm . It is a hollow
shaft having an inside diameter 0.8 times of the outside diameter. It is made of
steel $\left(\mathrm{S}_{\mathrm{yt}}=380 \mathrm{~N} / \mathrm{mm} 2\right)$ and the FOS is 4.Calculate the inside and outside diameter
of the shaft assume ( $\mathrm{S}_{\mathrm{sy}}=0.5 \mathrm{~S}_{\mathrm{yt}}$ ).

## PART-B

Q. 5 a) A centrifugal clutch, transmitting 20 kW at 750 rpm consists of four shoes. The
clutch is to be engaged at 500 rpm , the inner radius of the drum is 165 mm . The
radius of the centre of gravity of the shoes is 140 mm . when the clutch is engaged.

The coefficient of friction is 0.3 , while the permissible pressure on friction lining
$0.1 \mathrm{~N} / \mathrm{mm} 2$. Calculate:
i) The mass of each shoe
ii) The dimensions of friction lining.
[CO-4] [L-3] 14
b) Explain function of brake? State different types of brakes and give at least one
practical example of each.
[CO-1] [L-1] 6
Q. 6 a) A helical spring is made from a wire of 6 mm diameter and has outside diameter of 75 mm . If the permissible shear stress is 350 MPa and modulus of rigidity $84 \mathrm{kN} / \mathrm{mm}^{2}$, find the axial load which the spring can carry and the deflection per active turn.
[CO-1] [L-4] 10
b) A ball bearing is operating on a work cycle consisting of three parts-a radial
load

300 N at 1440 rpm for one quarter cycle, a radial load of 500 N at 720 rpm for half cycles, and radial load of 2500 N at 1440 rpm for the remaining cycle. The
Q. 7 A pair of spur gears consists of a 24 teeth pinion, rotating at 1000 rpm and transmitting power to a 48 teeth gear. The module is 6 mm , while the face width is 60 mm . Both gears are made of steel with an ultimate tensile strength of 450 $\mathrm{N} / \mathrm{mm}^{2}$. They are heat treated to a surface hardness of 250 BHN . Assume that velocity factor accounts for the dynamic load.
Calculate:
a) Beam strength;
b) Wear strength; and
c) The rated power that the gears can transmit, if service factor and the factor of
safety are 1.5and 2, respectively.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Fifth Semester <br> PRODUCTION ENGINEERING (BME-DS-526) 

Time: 3 hrs.
Max Marks: 100

No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Explain significance of tolerance stacking.
[CO-1] [L-2]
b) What is the function of process engineering?
[CO-1] [L-1]
c) What is meant by $V$ location?
d) Sketch a lever type clamp and swinging strap clamp.
[CO-2] [L-2]
e) Enlist the material properties for guideway.
[CO-2] [L-3]
f) What are the selection parameters of machine tools?
g) What is the function of flutes in tapping tool?
h) Draw the sketch of thread nomenclature.
[CO-4] [L-1]
i) Differentiate between 'gear casting' and 'gear forming'.
j) Identify the principal elements of cost estimation.

## PART-A

Q. 2 a) How does a process planner determine the most economical process for the manufacture of a product?
[CO-1] [L-3] 10
b) A batch of 800 components of mild steel is to be produced from a blank of $\phi$ $85 \times 70 \mathrm{~mm}$.
Generate the process sheet for the components as shown in figure below:

[CO-1][L-
6] 10
Q. 3 a) Explain the degrees of freedom of a free body with special reference to jigs and fixture.
[CO-2] [L-2] 10
b) Draw a neat diagram of a jig and fixture. Explain the various parts and its functions.
[CO-2] [L-3] 10
Q. 4 a) Write about the following tests for slideways:
i) Straightness ii) Flatness ii) Parallelism.
[CO-3] [L-5] 10
b) Describe the factors on which the machining accuracy of machine tool depends.

## PART-B

Q. 5 a) Classify the various types of die-hardening heads and their functions with neat sketch for thread manufacturing.
[CO-4] [L-4] 10
b) Write the advantages of producing threads by grinding. Compare the 'Traverse thread grinding' and 'Plunge cut grinding'.
[CO- 4] [L-3] 10
Q. 6 a) Elaborate the methods of cutting gear by Milling. Write down the advantages and disadvantages of gear milling.
[CO-5] [L-2] 10
b) Explain the principle of gear hobbing. Generalize the features of a gear hobbing over gear shaping.
[CO-5] [L-6] 10
Q. 7 a) Write down the procedure for assigning cutting variables in machining.
[CO-6] [L-1] 10
b) A slot 25 mm deep is to be cut through a work piece 200 mm long with the help of H.S.S. side and face cutter whose diameter is 150 mm and that has 10 teeth. The Cutting speed is $50 \mathrm{~m} / \mathrm{min}$. and feed is 0.25 mm per tooth. Determine:
i) Table feed in $\mathrm{mm} / \mathrm{min}$
ii) Total cutter travel
iii) Time required to machine the slot.

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester <br> TOOL DESIGN (BME-DS-524)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 2
Note: Attempt FIVE questions in all. Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) What are mixed and oxide ceramics?
[CO1 [L2]
b) State the differences between CBN and PCD cutting tools.
[CO2 [L2]
c) State the design factors considered for designing a single point tool.
[CO3 [L2]
d) Write down the principle mechanism of chip breakers.
[CO2 [L2]
e) List the salient features of a twist drill.
[CO1 [L2]
f) Sketch and state the significance of "helix Angle" of a drill.
[CO3 [L3]
g) Define 'Broaching allowances'.
[CO2 [L2]
h) Name the component machined using broaches.
[CO2 [L2]
i) Difference between face and peripheral milling.
[CO3 [L2]
j) Name the various tool wears and tool wear mechanism.

## PART-A

Q. 2 a) Classify the self breaking and forced breaking of chips with the help of neat sketches during metal machining of low alloy steel.
[CO2; L-3] 7
b) State the types of Ceramic tools, Carbide tools used in the industry. Summarize, its each types with their compositions, advantages and disadvantages.
[CO2; L-3] 13
Q. 3 a) Discuss the problems encountered when carbide is brazed to steel.[CO2 L4] 4
b) Design a single point cutting tool based on: i) Checking the strength ii) Checking for rigidity using round, rectangle and square cross-section of the shank.
[CO5; L6] 16
Q. 4 Discuss the following design features of a drill:
a) Helix angle.
b) Web Thickness.
c) Chisel Angle.
d) Flute Constructions.
[CO5; L5] 5×4

## PART-B

Q. 5 Design a broach for broaching sixteen splines in the clutch hub component as shown in the figure.

Q. 6 Write short notes on the following:
a) Abrasion, Adhesion and Tribo-Chemical Wear mechanisms in cutting tools.
b) Tool Wear, Causes and Remedies.
[CO4; L4] 10×2
Q. 7 Discuss the design features of a milling cutter:
a) Size of cutter.
b) Helix Angles.
c) Relief angles.
d) Number of teeth.
e) Lead Angles.
[CO5 L5] $\mathbf{4 \times 5}$

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester

MECHATRONIC SYSTEMS AND CONTROL (BME-DS-522)
Time: 3 hrs.
Max Marks:
100
No. of pages:
1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) Explain Mechatronics with diagram using.
[CO1][L1]
b) Define digital logic system examples. [CO1][L1]
c) Differentiate between sensor and transducer. [CO2][L4]
d) Explain the purpose of using sensors in manufacturing. [CO3][L2]
e) Describe Microprocessor with various applications. [CO4][L1]
f) Explain the functions of ALU. [CO4][L1]
g) Explain the need of building blocks in mathematical modeling. [CO5][L2]
h) Differentiate between DA and AD converters.
i) Explain data presentation system with example. [CO6][L2]
j) Explain the importance of calibration in industries.

## PART-A

Q. 2 a) Describe various logic gates with truth table.
[CO1][L-2]
10
b) Explain in detail about the emerging areas of Mechatronics.
[CO1][L-2]
10
Q. 3 Explain construction and working of the following:
a) Tactile sensor.
[CO2]

## 10

b) Hydraulic actuator.
[CO2][L-2]

## 10

Q. 4 a) Explain the working of three types of buses in microprocessor with diagram.
[CO3][L-2]

## 10

b) Discuss the application of 8085 microprocessor in washing machine.
[CO3][L-2]

## 10

## PART-B

Q. 5 a) Describe mathematical models. Explain the mechanical system building blocks.
[CO4][L-2]
10
b) Design and develop a rotational-translation system.
[CO4][L-6]
Q. 6 a) Differentiate between analog and digital converters. Explain applications of ADC.
b) Define an Operational amplifier. Explain the working of Inverting amplifier.
[CO5][L-2]
10
Q. 7 a) Design a mechatronics system for radiator water level indicator. [CO6,L-6] 10
b) Discuss applications of mechatronics in bionics and avionics. [CO6,L-2] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester

INTERNAL COMBUSTION ENGINES (BME-DS-521)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) Draw PV and TS diagram of ideal diesel cycle.
[CO-1 L-2]
b) Explain the following:
i) Rich mixture.
ii) Stoichiomtiric mixture.
iii) Lean mixture.
[CO-2 L-2]
c) Classify solid injection system.
[CO-2 L-1]
d) State four differences between SI and CI engines.
[CO-3 L-1]
e) What is 'specific fuel consumption'?
[CO-5 L-1]
f) What are the various components to be lubricated in an IC engine? [CO-4 L-2]
g) Define mean effective pressure for an IC engine.
[CO-5 L-1]
h) What do you understand by the term 'viscosity' of an oil?
[CO-4 L-2]
i) Explain Octane rating of fuel.
[CO-6 L-2]
j) Define 'combustion'. What are the general conditions necessary for combustion?
[CO-3 L-1]
$2 \times 10$

## PART-A

Q. 2 For an engine working on the ideal Dual cycle, the compression ratio is 10 and maximum pressure is limited to 70 bars. If the heat supplied is $1680 \mathrm{~kJ} / \mathrm{kg}$. Find the pressure and temperature at the various salient points of the cycle and the cycle efficiency. The pressure and temperature of air at the commencement of compression are 1 bar and $100^{\circ} \mathrm{C}$ respectively.
Assume: $-\mathrm{Cp}=1.004 \mathrm{~kJ} / \mathrm{kg} \mathrm{K}$ and $\mathrm{Cv}=0.717 \mathrm{~kJ} / \mathrm{kg} \mathrm{K}$ of air.
[CO-1 L-4] 20
Q. 3 With the help of neat sketch explain the Battery ignition system.

$$
\text { [CO-2 L-3] } 20
$$

Q. 4 Describe the stages of combustion in SI engine. On what factors does flame speed depend.

## PART-B

Q. 5 Explain the splash lubrication system with a neat sketch.
[CO-4 L-4] 20
Q. 6 A six cylinder, gasoline engine operates on the four stroke cycle. The bore of each cylinder is 80 mm and the stroke is 100 mm . The clearance volume in each cylinder is 70 cc . At a speed of 4000 rpm and the fuel consumption is $20 \mathrm{~kg} / \mathrm{h}$. The torque developed is $150 \mathrm{~N}-\mathrm{m}$.
Calculate:
a) The brake power.
b) The brake means effective pressure.
c) Brake thermal efficiency if the calorific value of the fuel is $43000 \mathrm{~kJ} / \mathrm{kg}$.
d) The relative efficiency on a brake power basis.

Assume the engine works on the constant volume cycle. $Y=1.4$ for air.
[CO-5 L-5] 20
Q. 7 Explain the reason for searching for alternate fuel for IC engine. Give a brief account of biodiesel being used as an alternate fuel in IC engine.
[CO-6 L-3] 20

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester

INDUSTRIAL ENGINEERING (BME-DS-502)
Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Differentiate between 'product control' and 'process control'.
b) Discuss work sampling.
c) Explain EOQ.
d) Enlist measures of productivity.
e) What is sampling inspection?
f) Enlist types of attribute control charts.
g) Differentiate between type-1 and type-2 error.
h) Describe the significance of inventory control.
i) Discuss 'routing'.
j) Differentiate between time study and work measurement.
[CO-1,6] [L-2] 2x10

## PART-A

Q. 2 Discuss the purpose and procedure of Work measurement in detail with help of a case study.
[CO-1,3,6] [L-2] 20
Q. 3 a) Derive Economic Order Quantity graphically and analytically. [CO-3,5,6] [L-4] 10
b) Discuss various elements of cost in detail and buildup the cost structure.
[CO-1,2] [L-4] 10
Q. 4 a) A company produces 4800 parts per day and sells then at approximately half of the rate. The setup cost is Rs. 1000 and carrying cost is Rs. 5 per unit. The annual demand is $4,80,000$ units. Find (i) optimal lot size (ii) number of production run that should be scheduled per year.
[CO-4,5 ] [L-5 ] 10
b) Discuss EOQ and Various models of inventory.

CO-4,6] [L-5] 10
PART-B
Q. 5 Discuss various functions of PPC in detail with help of conceptual diagrams and examples.
[CO1,3,6 ] [L-2] 20
Q. 6 a) Discuss factors affecting productivity with help of examples. [CO-1,4,6] L4 $\mathbf{1 0}$
b) Discuss limitations of Job Evaluation and merit rating with help of a case study.
[CO-1,6]
Q. 7 Plot the $X$ bar and $R$ chart for data given below and discuss whether process is statistically out of control:

| Sub | 8:00 | 8:30 | 9:00 | 9:30 | 10:00 | 10:30 | 11:00 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| group | AM | AM | AM | AM | AM | AM | AM |
| no |  |  |  |  |  |  |  |
| 1 | 10.1 | 7.0 | 5.0 | 9.0 | 2.0 | 2.0 | 5.0 |
| 2 | 1.0 | 4.0 | 2.0 | 3.0 | 4.0 | 4.0 | 6.0 |
| 3 | 4.0 | 10.0 | 6.0 | 7.0 | 2.0 | 8.0 | 4.0 |
| 4 | 9.0 | 2.0 | 2.0 | 3.0 | 6.0 | 8.0 | 10.0 |
| 5 | 8.0 | 8.0 | 3.0 | 1.0 | 1.0 | 6.0 | 3.0 |


| Subgroup Size (n) | A2 | D3 | D4 |
| :---: | :---: | :---: | :---: |
| 2 | 1.880 | 0.000 | 3.267 |
| 3 | 1.023 | 0.000 | 2.574 |
| 4 | 0.729 | 0.000 | 2.282 |
| 5 | 0.577 | 0.000 | 2.114 |

# End Semester Examination, Dec. 2022 <br> B. Tech. - Fifth Semester <br> THEORY OF MACHINES (BME-DS-501) 

Time: 3 hrs.
Max Marks: 100

No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Define the following:
a) Inversion.
b) Reverted gear train.
c) Grubler's Criterion.
d) Law of Gearing.
e) Length of Path of Contact.
f) Hammer Blow.
g) Chebychev spacing.
h) Gyroscopic couple.
i) Sensitivity of governor.
j) Types of followers in cam and follower.

## 2x10

## PART-A

Q. 2 a) Explain with the help of figure of inversions of double slider crank chain.
[L-1, CO1] 10
b) Discuss the types of synthesis.
Q. 3 Two shafts A and B are co-axial. A gear C (50 teeth) is rigidly mounted on shaft A. A compound gear D-E gears with C and an internal gear G. D has 20 teeth and gearswith $C$ and $E$ has 35 teeth and gears with an internal gear $G$. The gear $G$ is fixed and is concentric with the shaft axis. The compound gear $D-E$ is mounted on a pin which projects from an arm keyed to the shaft B. Sketch the arrangement and find the number of teeth on internal gear $G$ assuming that all gears have the same module. If the shaft A rotates at 110 r.p.m., find the speed of shaft B.
Q. 4 A cam is to give the following motion to a knife-edged follower:

1. Outstroke during $90^{\circ}$ of cam rotation; 2. Dwell for the next $30^{\circ}$ of cam rotation;
2. Return stroke during next $60^{\circ}$ of cam rotation, and 4. Dwell for the remaining $180^{\circ}$ of cam rotation.
The stroke of the follower is 50 mm and the minimum radius of the cam is 40 mm . The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when (a) the axis of the follower passes through the axis of the cam shaft, and b) the axis of the follower is offset by 20 mm from the axis of the cam shaft.
Q. 5 A shaft carries four masses A, B, C and D of magnitude $200 \mathrm{~kg}, 300 \mathrm{~kg}, 400 \mathrm{~kg}$ and 200 kg respectively and revolving at radii $80 \mathrm{~mm}, 70 \mathrm{~mm}, 60 \mathrm{~mm}$ and 80 mm in planes measured from A at $300 \mathrm{~mm}, 400 \mathrm{~mm}$ and 700 mm . The angles between the cranks measured anticlockwise are A to B45 , B to C $70^{\circ}$ and C to $D 120^{\circ}$. The balancing masses are to be placed in planes $X$ and $Y$. The distance between the planes $A$ and $X$ is 100 mm , between X and Y is 400 mm and between $Y$ and $D$ is 200 mm . If the balancing masses revolve at a radius of 100 mm , find their magnitudes and angular positions
[L-4,CO4] 20
Q. 6 a) A Proell governor has equal arms of length 300 mm . The upper and lower ends of the arms are pivoted on the axis of the governor. The extension arms of the lower links are each 80 mm long and parallel to the axis when the radii of rotation of the balls are 150 mm and 200 mm . The mass of each ball is 10 kg and the mass of the central load is 100 kg . Determine the range of speed of the governor.

## [L-1,2 CO2,3] 10

b) Each arm of a Porter governor is 200 mm long and is hinged at a distance of 40 mm from the axis of rotation. The mass of each ball is 1.5 kg and of the sleeve is 25 kg . When the links are at 300 to the vertical, the sleeve begins to rise at 260 rpm . Assuming that the friction force is constant, find the maximum and the minimum speeds of rotation when the inclination of the arms to the vertical is 450 .
[L-1,2
CO5,6] 10
Q. 7 a) Determine the stability of 4wheeler while taking a turn.
b) Derive expression for gyroscopic couple.

# End Semester Examination, Dec. 2022 

## B. Tech. - Fourth Semester MATERIAL SCIENCE (BME-DS-404)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Distinguish between Edge and Screw dislocations.
b) Mention the two types of solid solutions.
c) Draw and explain the S-N curve.
d) Differentiate between the elasticity and plasticity.
e) What is tensile testing?
f) State and explain the lever rule.
g) Explain the difference between pearlite and cementite?
h) What do you mean by TTT diagram?
i) What are the features that make cast iron an important material?
j) What are cupronickels?

## PART-A

Q. 2 a) Draw a neat sketch of FCC crystal structure and calculate its packing factor, coordination number.
[CO-1] [L-6] 8
b) Molybdenum has BCC structure and a density of $10.2 \times 103 \mathrm{~kg} / \mathrm{m} 3$. Calculate its atomic radius. The atomic weight of molybdenum is $95.94 \mathrm{~g} / \mathrm{mol}$ and Avogadro's number is $6.023 \times 1023$ atoms $/ \mathrm{mol}$.
[CO-2] [L-5] 12
Q. 3 a) Shear modulus ' $\mathrm{G}^{\prime}(\mathrm{GPa})$ obeys the proportionality with Elastic modulus ' E ' (GPa).
$\mathrm{E}=117$ for a metal and Poisson's ratio $(\mu)=0.31$, find the value of G for the metal.
[CO-3] [L-3] 10
b) What is creep? Explain the different stages of creep with the help of diagram.
[CO-1] [L-1] 10
Q. 4 Write the short notes on the following:
a) Hardness testing.
b) Magnetic particle testing.
[CO-6] [L-2] $\mathbf{1 0 \times 2}$

## PART-B

Q. 5 a) Explain Gibb's phase rule. Enumerate the degree of freedom of a three component
system with various numbers of possible phases.
[CO-4] [L-4] 5
b) What do you mean by a phase diagram? Draw the Fe-C equilibrium diagram, showing all the reactions, temperatures, compositions, phases and microstructure occurs during the solidification processes.
Q. 6 Explain the following processes with neat sketches:
a) Case hardening.
b) Carburizing.
c) Nitriding.
d) Cyaniding.
e) Carbo-nitriding.
Q. 7 a) Explain the composition, properties and uses of four types of cast iron. [CO6][L2] 10
b) Explain the composition, properties and uses of copper and copper alloys. [CO1] [L1] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Fourth Semester MANUFACTURING TECHNOLOGY (BME-DS-403) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) What are the various elements of numerical control machine tools?
[CO-1] [L-1]
b) What are the advantages of NC machine tools?
c) Define tool signature.
[CO-1] [L-1]
d) List the main requirement of cutting tool material. [CO-1] [L-1]
e) State the reason of tool failure.
f) How are ceramic tool made?
g) What is meant by machinability?
h) Differentiate between surface and cylindrical grinding operation.
i) What are the essential properties of a cutting fluid?
j) Name the basic features of machine tool.

## PART-A

Q. 2 a) Construct a Merchant's circle diagram and show the forces and their relations.
[CO-4] [L-3] 12
b) In orthogonal cutting of a mild steel component if the rake angle of tool is 10 degree and the shear angle is 30 degree. Calculate the chip thickness ratio.
[CO-1] [L-6] 8
Q. 3 A cylindrical stainless steel rod with length as 150 mm , diameter being 12 mm is reduced to a diameter of 11 mm by turning on lathe. The spindle rotates at 400 rpm and the tool traveling at an axial speed of $200 \mathrm{~mm} / \mathrm{min}$. Calculate:
a) Cutting Speed (maximum and minimum).
b) The material removal rate.
c) The cutting time.
d) The power required if the unit power is estimated to $4 \mathrm{w}-\mathrm{s} / \mathrm{mm}^{3}$. [CO-5] [L-5] 5×4
Q. 4 a) Discuss the main application of cutting fluids.
b) Write short notes on 'carbides and ceramic tools'. [CO-2] [L-2] 5
c) Give a comparative evaluation of the various cutting tool materials
[CO-2] [L-2] 10

## PART-B

Q. 5 a) Differentiate between cutting tool and grinding wheel.
[CO-4] [L-4] 5
b) State the parameters used for designing a grinding wheel. Decode the grinding wheel specification: 51-A - $36-\mathrm{L}-5-\mathrm{V}-23 \quad[\mathrm{CO}-5][\mathrm{L}-4] 15$
Q. 6 a) Explain the term machine tool and how is it different from machine. [CO-3] [L-3] 5
b) Compare generating and forming with reference to machine tool. [CO-3] [L-3] $\mathbf{5}$
c) Explain how the machine tools are classified based on the machining of flat surfaces and cylindrical surfaces
[CO-4] [L-4] 10
Q. 7 a) Describe five main features of CNC machinrs, which distinguish them from conventional machine tools.
b) Explain the advantages and limitations of numerical control of machine tools?

# End Semester Examination, Dec. 2022 

# B. Tech. - Fourth Semester <br> STRENGTH OF MATERIALS (BME-DS-402) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Differentiate between true stress and engineering stress.
b) Why thin cylinder is pre-stressed by winding with a wire under tension?
c) Why I section is preferred over other section in case of structure?
d) Differentiate proof resilience and modulus of resilience.
e) State Hooke's law.
f) Differentiate proof stress and working stress.
g) What is Principal plane?
h) Differentiate thick cylinders and thin cylinder pressure vessel?
i) What is the significance of section modulus?
j) What is torsional rigidity?

## PART-A

Q. 2 a) A 50 mm diameter steel bar 200 mm long was subjected to a tensile force. The length was found to increase by 0.08 mm and decrease in diameter was 0.006 . Determine the poisson's ratio.
b) Derive the relationship between elastic constants E, G and K.
[CO-1] [L-5] 14
Q. 3 A rectangular block of material is subjected to a tensile stress of 80 MPa on a plane and a tensile stress of 50 MPa on the plane at right angles to the former, together with a shear stress of 60 MPa on the same plane. Find: i) the direction of principal planes, ii) magnitude of principal stresses and iii) magnitude of the greatest shear.
Q. 4 a) A rectangular section, $250 \mathrm{~mm} \times 450 \mathrm{~mm}$, spans a distance of 2 m . Find what uniformly distributed load can the beam section carry on this span. Permissible stresses are $10 \mathrm{~N} / \mathrm{mm}^{2}$ in tension and $20 \mathrm{~N} / \mathrm{mm}^{2}$ in compression.[CO-3] [L-4] 1
b) Derive the simple bending equation of beam and list the assumption made therein.
[CO-3] [L-5] 10

## PART-B

Q. 5 a) A simply supported beam carries a uniformly distributed load ( $\mathrm{w} \mathrm{kN} / \mathrm{m}$ ) over the whole span ( L meter). Find the slopes at the supports and the maximum deflection. Sketch the elastic curves.
b) State and prove maxwell's reciprocal theorems.
Q. 6 a) A helical spring, in which the mean diameter of the coils is 8 times the wire diameter, is to be designed to absorb energy $200 \mathrm{~N}-\mathrm{m}$ of energy with an extension of 10 cm . The maximum shear stress is not to exceed 125 MPa . Determine the mean diameter of the helix, diameter of the wire and the diameter of turns. Also find the load with which an extension of 4 cm could be produced in the spring. G = 84 GPa .
b) State the assumptions made in driving the torsion equation. Explain the significance of each assumption.
[CO-4] [L-5] 10
Q. 7 a) A cylindrical pressure vessel, of diameter 1 m and length 2 m , is subjected to an internal pressure of 2 MPa . If the hoop stress is limited to 42 MPa and the longitudinal stress to 28 MPa , find the minimum thickness required. What will be the change in volume of the cylinder under this pressure? $\mathrm{E}=200 \mathrm{GPa}$ and poisson's ratio $=0.3$
[CO-6] [L-6] 10
b) Explain lame's theory for thick pressure vessel and derive its equation. [CO6][L5] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Fourth Semester <br> APPLIED THERMODYNAMICS (BME-DS-401) 

Time: 3 hrs.

Max Marks: 100
No. of pages: 2

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) What are the characteristics of Ideal fuel? List examples of various types of fuel.
b) Define Calorific value of a fuel. What is the difference between Higher Calorific

Value(HCV) and Lower Calorific Value (LCV).
c) Draw the P-V and T-S diagram of a dual cycle. Also mention the processes.
d) Draw the $\mathrm{P}-\mathrm{V}$ and $\mathrm{T}-\mathrm{S}$ diagram of a rankine cycle. Also mention the processes.
e) Discuss the advantages and disadvantages of reheating in rankine cycle.
f) Explain the chocked flow. What is the significance of this in Nozzle?
g) Describe the desirable properties of the refrigerants.
h) Draw the P-H and T-S diagram of a VCRS Cycle. Also mention the processes.
i) Explain the Degree of Reaction briefly.
j) What do you understand by Compounding? Why Compounding is necessary in

Steam turbine.

## PART-A

Q. 2 a) What is Orsat Apparatus? Where is it used? Explain its construction and working
with a neat labeled diagram.
[CO-2,3] [L-2] 10
b) A sample of coal supplied to a boiler has the following composition by mass:
$\mathrm{C}=88 \% ; \mathrm{H}_{2}=5 \% ; \mathrm{O}_{2}=3 \% ; \mathrm{N}_{2}=1 \% ; \mathrm{S}=0.5 \%$ and rest is incombustible matter.

Calculate:
i) Mass of air required for complete combustion of 1 kg of coal,
ii) Dry analysis both by mass and volume of the products of combustion when
excess air is supplied.
Q. 3 a) Derive an expression for the air standard efficiency of diesel cycle with $\mathrm{p}-\mathrm{V}$ and
b) A gas engine operating on the ideal Otto cycle has a compression ratio of 8:1. The
pressure and temperature at the commencement of compression are 1 bar and

300C. Heat added during the constant volume combustion process is 2000 kJ/kg.

Determine the following:
i) peak pressure and temperature,
ii) work output per kg of air and
iii) air standard efficiency.

Assuming $\mathrm{Cp}=1.005 \mathrm{~kJ} / \mathrm{Kg}$ and $\mathrm{Cv}=0.717 \mathrm{~kJ} / \mathrm{Kg}$ for air.
Q. 4 In a Rankine cycle, the steam at inlet to turbine is saturated at a pressure of 30 bar and exhaust pressure is 0.1 bar. Determine:
a) The pump work.
b) The Turbine work.
c) Rankine efficiency.
d) The Condenser heat flow.
e) The dryness at the end of expansion. [CO-4,5][L-4,5] $\mathbf{4 \times 5}$

## PART-B

Q. 5 a) What do you understand by stagnation state.
[CO-2] [L-2] 5
b) Define critical pressure ratio for the nozzle of a steam turbine. Obtain analytically
value in terms of the index of expansion.
Q. 6 The following data refers to a particular stage of a Parson's reaction turbine:

Speed of the turbine $=1500 \mathrm{rpm}$
Mean diameter of the rotor $=1 \mathrm{~m}$
Stage efficiency $=80 \%$
Blade Outlet angle $=20^{\circ}$
Speed ratio $=0.7$
Determine the available isentropic heat drop in the stage.
[CO-5,6] [L-4,5] 20
Q. 7 In a standard vapor compression refrigeration cycle, operating between an evaporator temperature of $-10^{\circ} \mathrm{C}$ and condenser temperature of $40^{\circ} \mathrm{C}$, enthalpy of the refrigerant Freon-12 at the end of the compression is $220 \mathrm{~kJ} / \mathrm{kg}$. Show the cycle on the T-s diagram. Calculate:
i) The COP of the cycle
ii) The refrigerating capacity and the power consumed by the compressor assuming
refrigerant flow rate of $1 \mathrm{~kg} / \mathrm{min}$.

| Temperature $\left({ }^{\circ} \mathrm{C}\right)$ | Pressure $(\mathrm{MPa})$ | $\mathrm{hf}(\mathrm{KJ} / \mathrm{kg})$ | $\mathrm{hg}(\mathrm{KJ} / \mathrm{kg})$ |
| :---: | :---: | :---: | :---: |
| -10 | 0.2191 | 26.85 | 183.1 |
| 40 | 0.9607 | 74.53 | 203.1 |

# End Semester Examination, Dec. 2022 

## B. Tech. - Third Semester <br> BASICS OF AUTOMOBILE ENGINEERING (BME-DS-311)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) Name main four car body styles.
b) Name four ways of classification of two wheel vehicle.
c) Give reason for changing lubricating oil at specific periods.
d) What do you mean by VVT technology?
e) Calculate air resistance at 30 Kmph if the air resistance at 10 kmph is W .
f) What is the importance of carcass in a tyre?
g) What are leading and trailing shoe in drum drakes?
h) Name four types of steering gears.
i) Why skidding take place in a vehicle? How it can be prevented?
j) Why clutch should have less size and weight?

## PART-A

Q. 2 a) Name the different parameters used for specifying a vehicle and explain the importance of each with suitable example.
[CO-2] [L-2] 10
b) With the help of neat and labeled sketch explain how the power from the engine is transmitted to the wheels.
[CO-2] [L-2] 10
Q. 3 a) Justify the necessity of VVT system for engine with the help of neat sketch.
[CO-5] [L-5] 10
b) With the help of neat sketch explain working of $L$ and $D$ MPFI systems. [CO2] [L2] 10
Q. 4 a) Justify the necessity of a transmission in a vehicle. Explain with the help of total resistance - tractive effort curve.
[CO-5] [L-5] 10
b) Explain the principle of working of diaphragm spring clutch with the help of neat sketch.
[CO-2] [L-2] 10

## PART-B

Q. 5 Explain with sketches the following terms and their effects:
[CO-2] [L-2] 5×4
a) Castor
b) Camber
c) Toe in
e) Toe out
Q. 6 A four wheeler having a weight of 1200 kg . As an automotive design engineer select parts and design a braking system for the vehicle.
[CO-4] [L-4] 20
Q. 7 a) As a automotive expert how will you identify the cause of tyre wear and provide suggestion to the customer by inspecting the tyre.
[CO-2] [L-2] 10
b) A tyre is designated as $195 / 65 \mathrm{R} 1591 \mathrm{~T}$. Determine the significance of different symbols used for specification.

# End Semester Examination, Dec. 2022 

# B. Tech. - Third Semester <br> MANUFACTURING PROCESSES (BME-DS-304) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) What is the function of a core?
b) State the applications of centrifugal casting.
c) Differentiate between 'hot working' and 'cold working'.
d) What are the defects possible in an extruded product?
e) What is function of flux in welding?
f) What is thickness of sheet in sheet metal operations?
g) List the manufacturing processes.
h) What is Addiline manufacturing?
i) Explain sintering process of powdered metals.
j) How is the arc formed in the electric arc welding process?
[CO-1, CO-2, CO-3, CO-4] [L-2] 2x10

## PART-A

Q. 2 a) Discuss the casting process and its various steps in detail alongwith neat sketches of component.
[CO-1,2] [L-3] 10
b) Discuss the various elements of Gating system in a casting alongwith sketches.
Q. 3 a) Explain the process of extrusion and differentiate between direct, indirect and impact extrusion with a neat diagram
[CO-1] [L-2] 10
b) Explain forging and the various operations possible in forging with neat diagrams.
[CO-1] [L-2] 10
Q. 4 a) Discuss the principle of sheet metal cutting and differentiate between punching and blanking with help of neat sketches.
[CO-4] [L-3] 12
b) Explain the various bending processes on sheet metal with a neat diagram.

Also explain the concept of spring back in bending.
[CO-4] [L- 1] 8

## PART-B

Q. 5 a) Discuss the term rapid prototyping and its applications in detail. $[C O-4,1][L-3] \mathbf{1 0}$
b) Discuss the relevance of rapid prototyping in today's manufacturing scenario. Also, classify the rapid manufacturing techniques.
Q. 6 a) Discuss the advantages limitations and applications of powder metallurgy processes.
b) Explain the sequence of processes in powder metallurgy with neat diagrams
Q. 7 a) Explain the working of Tungsten inert gas welding and its advantages over other electric arc welding methods
[CO-4] [L-5] 10
b) Classify welding processes with respect to the power sources and discuss electrical resistance welding in detail.
[CO-4] [L-3] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Third Semester <br> FLUID MECHANICS AND MACHINES (BME-DS-303) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) Explain Newton's law of viscosity. Also, state the types of fluid according to the stress-strain relation.
b) What do you understand by equipotential lines and stream lines? Also prove that both the lines are perpendicular to each other.
c) Explain the concepts of steady flow and incompressible flow.
d) Write the expression of bernoulli's theorem and state the different types of energy heads available to a fluid.
e) Differentiate between impulse and reaction turbine.
f) In the velocity triangles of turbines, mark the guide blade angle and vane width angles at inlet and outlet.
[CO4L2]
g) State the concept of working of centrifugal pump in brief.
[CO3L1]
h) Explain the phenomenon of surface tension and capillarity.
i) What is the significance of dimensional analysis?
[CO3L1]
j) Briefly explain the concept of hydrodynamic boundary layer.
[CO3L2] 2x10

## PART-A

Q. 2 a) A plate 0.035 mm distant from a fixed plate, moves at $50 \mathrm{~cm} / \mathrm{s}$ and requires a force of 2 N per unit area $\left(2 \mathrm{~N} / \mathrm{m}^{2}\right)$ to maintain this speed. Determine the fluid viscosity between the plates
[CO-1] [L-3] 10
b) Derive the expression for hydrostatic force and height of center of pressure from free liquid surface for a vertical plate submerged under liquid. [CO-1] [L-2] 10
Q. 3 Explain the following types of flows:
a) Uniform and Non Uniform flow.
b) Steady and Unsteady flow.
c) Compressible and incompressible flow.
b) 2D and 3D flow.
[CO-2] [L-1] 5x4
Q. 4 A $45^{\circ}$ reducing bend is connected to a pipe line, the diameters at the inlet and outlet of the bend being 600 mm and 300 mm respectively. Find the force exerted by the water on the bend if the intensity of pressure at the inlet to the bend is $8.829 \mathrm{~N} / \mathrm{cm}^{2}$ and the rate if flow of water is 600 liters/s. Refer the figure shown below.
[CO-4] [L-5] 20


## PART-B

Q. 5 A 137 mm diameter jet of water issuing from a nozzle impinges from the buckets of a pelton wheel and the jet is deflected through an angle of $165^{\circ}$ by the buckets. The head available at the nozzle is 400 m . Assuming the coefficient of velocity as 0.97 , speed ratio as 0.46 , and reduction in relative velocity while passing through the buckets as $15 \%$, find the force exerted by the jet on buckets in tangential direction and the power developed.
[CO-3] [L-5] 20
Q. 6 Explain the working of centrifugal pump with a neat diagram indicating all the components and their functionality.
[CO-3] [L-1] 20
Q. 7 Explain the need and utility of dimensional analysis in detail. Also, give an example of dimensional analysis through Buckingham $-\pi$-Theorem. $[C O-4][L-2]$

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester <br> THERMODYNAMICS (BME-DS-302) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following questions:
a) State the Zeroth law of thermodynamics.
b) Write the expression of work done for polytropic process.
c) What is free expansion?
d) Explain throttling process.
e) What is the difference between ideal and real gas.
f) Explain critical point.
g) What are the limitations of first law of thermodynamics?
h) What do you mean by entropy?
i) What is enthalpy?
j) What is available energy and unavailable energy?

## PART-A

Q. 2 a) Write short notes on the following:
i) Thermodynamic system.
ii) Thermodynamic Equilibrium.
[CO-1,2][L-1,2] 10
b) A fluid at a pressure of 1 bar, and with specific volume of $0.18 \mathrm{~m}^{3} / \mathrm{kg}$, contained in a cylinder behind a piston expands reversibly to a pressure of 0.6 bar according to the equation $\mathrm{pV}^{2}=\mathrm{C}$ where C is a constant. Calculate the work done by the fluid on the piston.
[CO-3,5][L-5] 10
Q. 3 a) Write and derive the corollaries of First law of Thermodynamics and explain perpetual motion machine of first kind.
[CO-1,3][L-3] 10
b) Air enters a compressor at $10^{5} \mathrm{~Pa}$ and $25^{\circ} \mathrm{C}$ having volume of $1.8 \mathrm{~m}^{3} / \mathrm{kg}$ and is compressed to $5 \times 10^{5} \mathrm{~Pa}$ isothermally. Determine:
i) Work done:
ii) Change in internal energy.
iii) Heat transferred
[CO-4,5][L-4,5] 10
Q. 4 a) State the Kelvin-Planck and Clausius statements of the second law of thermodynamic and establish the equivalence between them. [CO-1,4][L-1,4] 10
b) A cyclic heat engine operation between a source temperature of $1000^{\circ} \mathrm{C}$ and a sink temperature of $40^{\circ} \mathrm{C}$. Find out the least rate of heat rejection per kW net output of the engine. Make a figure showing source, sink and work output.
[CO-5][L-5] 10

## PART-B

Q. 5 a) An insulated duct air is flowing steadily. The Pressure and Temperature measurement at two stations $A$ and $B$ are given as

Station Pressure(kPa) Temperature $\left({ }^{0}\right.$

|  |  | C) |
| :--- | :--- | :--- |
| A | 130 | 60 |
| B | 100 | 15 |

Establish the direction of flow of the air in the duct.
[CO-5][L-5] 10
b) Define the available energy and unavailable energy. When does the system become dead? Also show that there is a decrease in energy output whenever heat is transferred through a finite temperature difference. $\quad[C O-3,4][L-1,3,4] \mathbf{1 0}$
Q. 6 a) Write short notes on:
i) Vander Waal's equation.
ii) Compressibility chart.
[CO-1,4][L-1,4] 5×2
b) Describe with a neat sketch a throttling calorimeter for measuring the dryness fraction of steam.
[CO-2][L-2] 10
Q. 7 a) Draw the $\mathrm{p}-\mathrm{v}$ and T-s diagram of rankine cycle. Also explain the cycle with the help of a neat block diagram.
[CO-1,2][L-1,2] 10
b) In a standard vapor compression refrigeration cycle, operating between an evaporator temperature of $-10^{\circ} \mathrm{C}$ and condenser temperature of $40^{\circ} \mathrm{C}$, enthalpy of the refrigerant Freon-12 at the end of the compression is $220 \mathrm{~kJ} / \mathrm{kg}$. Show the cycle on the T-s diagram. Calculate:
i) The COP of the cycle.
ii) The refrigerating capacity and the power consumed by the compressor assuming a refrigerant flow rate of $1 \mathrm{~kg} / \mathrm{min}$.

| Temperature $\left({ }^{\circ} \mathrm{C}\right)$ | Pressure $(\mathrm{MPa})$ | $\mathrm{h}_{\mathrm{f}}(\mathrm{KJ} / \mathrm{kg})$ | $\mathrm{h}_{\mathrm{g}}(\mathrm{KJ} / \mathrm{kg})$ |
| :---: | :---: | :---: | :---: |
| -10 | 0.2191 | 26.85 | 183.1 |
| 40 | 0.9607 | 74.53 | 203.1 |
|  |  |  | $[\mathrm{CO}-4,5][\mathrm{L}-4,5] \mathbf{1 0}$ |

# End Semester Examination，Dec． 2022 

B．Tech．－Third Semester
ENGINEERING MECHANICS（BME－DS－301A）
Time： 3 hrs．
Max Marks： 100
No．of pages： 3
Note：Attempt FIVE questions in all；Q． 1 is compulsory．Attempt any TWO questions from PART－A and TWO questions from PART－B．Marks are indicated against each question．

Q． 1 Answer the following in briefly：
a）Define Theorems of Pappus and Guldinus．
b）Write down all static equilibrium equation．
c）State Parallel axes theorems with formula．
d）What do you means by static determinacy and static indeterminacy？
e）What is rigid body and particle？
f）Define property＂principle of transmissibility of a force．＂
g）Discuss about Principle of work and energy．
h）Define general plane motion with diagram．
i）Define＂law of moment．＂
j）Write the difference between moment of a force and couple．
$2 \times 10$
PART－A
Q． 2 a）Determine the resultant moment produced by the forces about point 0.

［CO－1］［L－3］ 10
b）Determine the magnitude of the resultant force acting on the plate and its direction，measured counterclockwise from the positive $x$ axis．

Q. 3 a) Two smooth pipes, each having a mass of 300 kg , are supported by the forked tines of the tractor in Fig. Draw the free-body diagrams for each pipe and both pipes together

2] $[L-3] 10$

[CO-
b) The uniform $10-\mathrm{kg}$ ladder in Fig. rests against the smooth wall at B , and the end A rests on the rough horizontal plane for which the coefficient of static friction is $\mu \mathrm{s}=0.3$. Determine the angle of inclination $\theta$ of the ladder and the normal reaction at B if the ladder is on the verge of slipping.

Q. 4 a) Determine the moment of Inertia (MOI) of the given sectionas shown in figure about its both centroidalaxes.

[CO-3] [L-4] 10
b) Determine the location $y$ bar of the centroidal axis $x$ bar-x bar of the beam's cross-sectional area. Neglect the size of the corner welds at A and B for the calculation.

Q. 5 Determine the force in each member of the truss. State if the members are in tension or compl

[CO-3] [L-4,L-5] 20
Q. 6 a) A tower is 90 m in height. A particle is dropped from the top of the tower and at the same time another particle is projected upward from the foot of the tower. Both the particle meet at a height of 30 m . Find the velocity, with which the second particle is projected upward.
[CO-4] [L-4] 10
b) A car moving on a straight level road skidded for a total distance of 60 meters after the brakes were applied. Determine the speed of the car, just before the brakes were applied, if thecoefficient of friction between car tyres and the road is 0.4 . Take $\mathrm{g}=9.80 \mathrm{~m} / \mathrm{s}^{2}$.
[CO-4] [L-5] 10
Q. 7 a) A wheel is rotating at 200 r.p.m and after 10 second it is rotating at 160 r.p.m. If the retardation is uniform, determine number of revolution made by the wheel and the time taken by the wheel before it comes to rest from the speed of 200 r.p.m.
[CO-4] [L-3] 10
b) The radius of gyration of a flywheel, which weight 6 kN , is 50 cm . if the wheel starts from rest and attain a speed of 200 r.p.m in 2 minutes, determine the average torque exerted on the flywheel.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester <br> ENGINEERING MECHANICS (BME-DS-301) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 3
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) Define 'Principle of work and energy'.
b) Discuss about general plane motion with diagram
c) Differentiate statically determinate truss and statically indeterminate truss.
d) Why I section is more preferred in structure?
e) What is moment of a force about an axis and how to express it in scalar triple product form?
f) Define property "principle of transmissibility of a force."
g) What is zero force members in trusses and discuss its purpose.
h) Discuss about moment of a force and couple with examples.
i) What is perpendicular axis theorem and discuss its use?
j) Define coordinate direction angles with diagram.

## PART-A

Q. 2 a) Determine the x and y components of each force acting on the gusset plate of a bridge truss. Show that the resultant force is zero.


Figure (a)
(CO1 L-3) 10
b) Determine the magnitude of the resultant force at A .


Figure (b)
(CO1 L-3) 10
Q. 3 a) Determine the minimum force $P$ to prevent the $30-\mathrm{kg}$ rod $A B$ from sliding. The contact surface at B is smooth, whereas the coefficient of static friction between the rod and the wall at A is $\mu_{\mathrm{s}}=0.2$.


Figure (c)
(CO2,4) (L-3,5) 10
b) The uniform stone in Fig. has a mass of 500 kg and is held in the horizontal position using a wedge at B. If the coefficient of static friction is $\mu_{\mathrm{s}}=0.3$ at the surfaces of contact, determine the minimum force P needed to remove the wedge. Assume that the stone does not slip at A.


Figure (d)
Q. 4 a) Determine the normal force, shear force, and moment at point C. Assume $A$ is pinned and $B$ is a roller. Also draw the shear and bending-moment diagrams for the beam.


Figure (e)
$(\mathrm{CO}, 6)(\mathrm{L}-4) 10$
b) Determine the location ( $x$ bar, $y$ bar) of the centroid $C$ of the area.

(CO4,6)(L-4) $\mathbf{1 0}$
Figure (f)

## PART-B

Q. 5 Determine the force in each member of the roof truss as shown in figure. Indicate whether the member is in tension or compression. (Use Method of Section only)


Figure (g)
(CO4,6) (L-3, L-5) 20
Q. 6 a) Determine the velocity of point $A$ on the rim of the gear at the instant shown.


Figure (h)
b) Define instantaneous center of zero velocity and instantaneous axis of zero velocity. How to locate the instantaneous center (IC), explain the various case of it.
Q. 7 At the instant shown both rods of negligible mass swing with a counter clockwise angular velocity of $\dot{\omega}=5 \mathrm{rad} / \mathrm{s}$, while the $50-\mathrm{kg}$ bar is subjected to the 100 N horizontal force. Determine the tension developed in the rods and the angular acceleration of the rods at this instant.


Figure (i)
(L-3, L-5) (CO5,3) 20

## End Semester Examination, Dec. 2022

## B. Sc. - Third Semester

## PLANT PATHOLOGY AND DISEASE MANAGEMENT (BMB-DS-321)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) Define 'Plant Disease'.
[CO-1] [L-1]
b) Differentiate between Plant disease and injury.
[CO-1] [L-3]
c) What is the difference between local and systemic resistance?
[CO-1] [L-1]
d) Summarize vertical and horizontal resistance.
[CO-1] [L- 2]
e) Differentiate between susceptible and resistant plants.
[CO-4] [L-3]
f) What are avr genes?
[CO-1] [L-1]
g) Name the pathogen associated with Irish Potato Famine.
[CO- 2] [L- 1]
h) What do you mean by collateral hosts?
[CO- 2] [L-1]
i) What are ratoon crops?
[CO- 2] [L-1]
j) What do you mean by Dual culture technique?
[CO-3] [L-1] 2x10

## PART-A

Q. 2 a) Compare the concept of 'Disease Triangle' and 'Disease Pyramid'. [CO-3] [L-2] 7
b) Describe the important events in history of Plant Pathology. [CO-1] [L-2] 13
Q. 3 a) Explain the phenomenon of infection - pre-penetration, penetration and post penetration.
[CO-4] [L-1] 10
b) Discuss the role of toxins in plant defense. [CO-3] [L-2] $\mathbf{1 0}$
Q. 4 a) What are the different types of chemicals used for plant disease control? Explain their classification according to mode of action and the type of pathogen.
[CO-1] [L-2] 10
b) Give a comprehensive account of host pathogen interaction.
[CO-4] [L-1] 10

## PART-B

Q. 5 a) Explain the term biological control. Write a detailed account of the mechanism of biocontrol.
b) Write a short note on 'integrated pest management'.
Q. 6 a) What are the sources of survival of infectious plant pathogens? [CO-1] [L-1] $\mathbf{1 0}$
b) Crop rotation is one of the most effective methods of root disease control. Comment and Justify.
[CO-3] [L-5] 10
Q. 7 a) How is mulching different from trenching?
[CO-3] [L-3] 5
b) Give the causal organism, host and symptoms of late blight of potato and citrus stubborn disease causing substantial losses to crops.

## End Semester Examination, Dec. 2022

## B. Sc. (Microbiology) - Third Semester

ENVIRONMENTAL MICROBIOLOGY (BMB-DS-303)
Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) What are extremophiles and types of their habitats?
b) Define Microbial Guilds in a population.
c) Explain microbial population in a lake.
d) Differentiate nitrification and denitification reactions.
e) Summarize vertical zones of a lake.
f) What are biosurfactants? Name few of them.
g) Define 'Chemical Oxygen Demand'.
h) Compare Mutualism and Commensalism.
i) What are the human pathogens? Name few with examples present in air?
j) Define biofilms and its composition.

## PART-A

Q. 2 Analyze different types of soil and discuss microbial diversity present in soil.
[CO-1] [L-4] 20
Q. 3 Discuss isolation techniques and molecular characterization of microbes. [CO3] [L-2] 20
Q. 4 a) How microorganism adapt themselves in high salt concentration and extreme temperatures?
[CO-2] [L-4] 10
b) Identify culture independent sampling of microbial population. [CO-4] [L-3] $\mathbf{1 0}$

## PART-B

Q. 5 Classify strategies to achieve bioremediation and discuss in detail bioremediation of hydrocarbons.
[CO-4] [L-4] 20
Q. 6 Discuss the drinking water microbiology and describe process used for water purification at municipal water supply.
[CO-2] [L-3] 20
Q. 7 a) Outline different types of metal produced due to anthropogenic activities and how these are hazardous to living forms?
[CO-4] [L-1] 10
b) Explain secondary treatment of wastewater in detail.
[CO-2] [L-3] 10

# End Semester Examination, Dec. 2022 

## B. Sc. (Microbiology) - Third Semester MYCOLOGY AND PHYCOLOGY (BMB-DS-302)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) List four silent features of Algae.
[CO-1] [L-1]
b) Names the various modes of nutrition in fungi. [CO-3] [L-1]
c) What are plastids?
d) What are mycotoxins?
e) Draw the labeled diagram of spirulina.
f) List four silent features of Fungi.
g) Names the various modes of nutrition in fungi.
h) Draw the diagram of basidiocarp.
i) Write any two symptoms of rust disease.
[CO-3] [L-1]
j) Draw the labeled diagram of Chlamydomonas.

PART-A
Q. 2 Describe general features, structure, nutrition and reproduction in Deuteromycetes.
Q. 3 Describe the lifecycle of rust fungi.
Q. 4 Explain the diversity of habitat in algae in detail.
[CO-4] [L-4] 20

## PART-B

Q. 5 Explain the application of algae in biofuel production in detail.
[CO-1] [L-2] 20
Q. 6 Describe the various modes of asexual reproduction in fungi.
[CO-4] [L-2] 20
Q. 7 Explain the smut diseases of plants in detail.
[CO-3] [L-2] 20

# End Semester Examination, Dec. 2022 

B. Sc. (Microbiology) - Third Semester

VIROLOGY (BMB-DS-301)
Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) What are prions? Name one disease caused by them.
b) What is prophylaxis? Is it same as prognosis?
c) Expand HBV and how is it related to oncogenesis?
d) Give two examples of tumor suppressor genes.
e) What is the difference between protooncogenes and oncogenes?
f) How bacteriophages are different from other viruses?
g) Mention the strategies for antiviral targets.
h) How HIV is transmitted?
i) Expand PAM.
j) Differentiate between inhibition and inactivation of viruses. [CO1-4, L2] $\mathbf{2 x 1 0}$

## PART-A

Q. 2 a) How do we classify viruses? Who classified them and on what basis? [CO-1] [L-1] 10
b) What is the significance of viral culture? How do we achieve that? [CO-1] [L-2] $\mathbf{1 0}$
Q. 3 Give a detailed analysis of lytic and lysogenic life cycles.
[CO-2] [L-2] 20
Q. 4 mRNA is the central point for all viral classes. Explain and illustrate with diagram.
[CO-2] [L-2] 20

## PART-B

Q. 5 What is horizontal and vertical Transmission? What is achieved by these processes?
[CO-3] [L-3] 20
Q. 6 What are vaccines? Explain their types, modes of selection and design. What are the types of immunoglobulins that get raised by vaccines? Show them on graph.
[CO-3] [L-5] 20
Q. 7 a) Explain the pathogenesis of Influenza Virus. Explain its types, mode of transmission and control measures.
[CO-4] [L-3] 10
b) Explain Genome editing and what tools can be used for the same.
[CO-4] [L-3] 10

# End Semester Examination, Dec. 2022 

## B.Sc. (Hons.) Microbiology - Second Semester <br> BIOINFORMATICS (BMB-DS-221)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1

## Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.

Q. 1 a) Explain the approaches used to align multiple sequences?
[CO-1] [L-1]
b) Interpret the applications of databases. [CO-1] [L-2]
c) Outline the applications of sequence analysis program. [CO-3] [L-2]
d) Show how local alignment is different from global alignment?
[CO-2] [L-2]
e) Recall any four applications of nucleic acid database in bioinformatics.
[CO-1] [L-1]
f) Compare two different alignment methods used in sequence alignment. [CO-3] [L-2]
g) How Smith waterman algorithm is different from Needleman and Wunch algorithm.
h) Enlist the applications of protein dynamics.
i) Elaborate protein secondary structure component.
j) Explain protein folding.

## PART-A

Q. 2 Explain in detail the steps used in molecular biology data generation. Examine the challenges faced during this process.
[CO-1] [L-3] 20
Q. 3 Show sequence alignment for given sequences using Smith Waterman algorithm. Where Sequences are CTGCT and CAGAT, match score is +2 , mismatch score is 1 and gap is 0 .
[CO-2] [L-4] 20
Q. 4 Distinguish between FASTA format from Genbank format.
[CO-2] [L-5] 20

## PART-B

Q. 5 Analyze different steps applied in phylogenetic analysis.
[CO-3] [L-4] 20
Q. 6 Explain rational drug design.
[CO-4] [L-5] 20
Q. 7 Describe homology modeling used in secondary structure prediction method.
[CO-4] [L-6] 20

# End Semester Examination, Dec. 2022 

## B. Sc. (Microbiology) - Second Semester

 FOOD AND DAIRY MICROBIOLOGY (BMB-DS-203)Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Differentiate between prebiotics and probiotics.
b) Are GMOs and nutraceuticals same? Why do you think so?
c) Expand Aw and mention its importance.
d) Name the medicinal component in ginger. What's its property?
e) Define 'Preservation'.
f) Name two microbes responsible for spoilage of potato.
g) Mention the nutraceuticals which are good for reproductive health.
h) What relation does shigella has with food?
i) How the byproducts of milk can be utilized?
j) Differentiate between inhibition and inactivation.
[CO-1-6] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Enlist the different factors of food spoilage. Explain the principles along with examples of preservation.
[CO-1] [L-1] 10
b) What is the significance of microbiological food testing? How do we achieve that?
[CO-1] [L-2] 10
Q. 3 a) Give a detailed analysis of various fungi associated with vegetable spoilage. Illustrate with proper examples.
[CO-2] [L-2] 10
b) What are intrinsic and extrinsic barriers that help in avoiding spoilage?
[CO-2] [L-2] 10
Q. 4 Give a detailed overview of the factors that affect culture activity.
[CO-3] [L-2] 20

## PART-B

Q. 5 Explain different types of modeling utilized in predictive microbiology. Explain with examples.
[CO-4] [L-3] 20
Q. 6 What are the two major methods for rapid detection of food borne pathogens? Explain their differences and utility areas.
[CO-5] [L-5] 20
Q. 7 a) What are the factors that stress upon the need for nutraceuticals? How do they
find utilization?
b) Give an overview of HACCP Guidelines.

## End Semester Examination, Dec. 2022

# B. Sc. Microbiology - Second Semester MICROBIAL TECHNIQUES AND INSTRUMENTS (BMB-DS-202) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer briefly.
a) How does sensitivity instrument affect the measurement?
b) Define 'Accuracy' in measurement.
c) Calculate total magnification of a microscope with 10X ocular and 20X objective.
d) What is the function of condenser in a microscope?
e) Define Stoke's Law.
f) Identify the stationary phase in affinity chromatography.
g) Explain the working of sample injector in HPLC.
h) Mention the advantages of reducing PAGE.
i) Examine the use of various types of gels in electrophoresis.
j) Identify the role of monochromator in spectroscopy.
[CO-1] [L-1] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Differentiate between random and systemic errors giving example. [CO-2] [L-2] 10
b) Explain the methods of calibration of an analytical instrument.
Q. 3 a) Illustrate the ray diagram of a light microscope.
[CO-2] [L-2] 10
b) Identify the role of phase ring in a phase contrast microscope.
[CO-2] [L-3] 10
Q. 4 a) Derive the expression for Svedberg equation and deduce conclusions for a particle under centrifugation.
[CO-3] [L-6] 10
b) Evaluate the features and applications of various centrifuge rotors. [CO-3] [L-5] 10

## PART-B

Q. 5 a) Analyze the suitability of ion exchange chromatography for separation of amino acids.
[CO-3] [L-4] 10
b) Construct a chromatographic method for separation of plant pigments.
[CO-3] [L-6] 10
$\begin{array}{lll}\text { Q. } 6 \text { a) Demonstrate the process of discontinuous gel electrophoresis. } & {[C O-4][\mathrm{L}-2] \mathbf{1 0}} \\ & \text { b) Analyze the }\end{array}$
b) Analyze the importance of dyes in gel electrophoresis.
[CO-4] [L-4] 10
Q. 7 a) Apply Beer-Lambert's law for characterization of biomolecules. [CO-4] [L-3] 10
b) Determine the quantity of an unknown sample using a calibration curve.
[CO-4] [L-5] 10

## End Semester Examination, Dec. 2022

# B. Tech. (Biotechnology) - First Semester <br> HEREDITY AND EVOLUTION (BMB-DS-121) 

Time: 3 hrs.

Max Marks: 100
No. of pages: 2

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) What is brachydactyly?
[CO-1] [L-2]
b) What are gain of function mutations?
[CO-1] [L-2]
c) What are loss of function mutations?
[CO-1] [L-2]
d) Differentiate between heterozygosity and homozygosity.
[CO-1] [L-2]
e) Differentiate between haploid and triploid.
[CO-1] [L-2]
f) Differentiate between telocentric and metacentric chromosomes.
g) How is sex determination in Drosophila different from that in man?
[CO-1] [L-2]
h) What is dosage compensation?
[CO-1] [L-2]
i) What is non-disjunction?
[CO-1] [L-2]
j) What is the chromosomal abnormality associated with down syndrome?
[CO-1] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 In jimsonweed, purple flower $(P)$ is dominant to white ( p ), and spiny pods ( S ) are dominant to smooth (s). A true-breeding plant with white flowers and spiny pods is crossed to a true-breeding plant with purple flowers and smooth pods. Determine the phenotype of
a) the F1 generation;
b) the F2 generation;
c) the progeny of a cross of the F1 plants back to thewhite, spiny parent; and
d) the progeny of a cross of the F1 back to the purple,smooth parent. [CO-2] [L-4] 20
Q. 3 Genes a, b, and c assort independently and are recessive to their respective alleles A, B, and C. Two triply heterozygous (Aa Bb Cc ) individuals are crossed.
a) What is the probability that a given offspring will be phenotypically A B Cthat
is,
will exhibit all three dominant traits?
[CO-3] [L-5] 10
b) What is the probability that a given offspring will be homozygous for all three dominant alleles?
Q. 4 In garden peas, tall stem ( T ) is dominant over short stem ( t ), green pods (G) are dominant over yellow pods (g), and smooth seeds (S) are dominant over wrinkled seeds (s). Suppose a homozygous short, green, wrinkled pea plant is crossed with a homozygous tall, yellow, smooth one.
a) What will be the appearance of the F1 generation?
b) If the F1 plants are interbred, what will be the appearance of the F2 generation?
c) What will be the appearance of the offspring of a crossof the F1 back to the short,
green, wrinkled parent?
d) What will be the appearance of the offspring of across of the F1 back to the tall,
yellow, smooth parent?

## PART-B

Q. 5 a) For the pedigrees $A$ and $B$, indicate whether the trait involved in each case could be recessive or dominant, and explain your answers

Pedigree A


Pedigree B

[CO-4] [L-6] 10
b) How many different gametes could result from the following genotypes? In each
case, what are they?
i) Aa
ii) $A A B B$
iii) Aa Bb
iv) DD EeHh
v) II JJ KK LI
Q. 6 a) In Pisumsativum(peas), the pods may be inflated (I as the dominant allele) or constricted (i as the recessive allele). What proportion of the offspring in the following crosses would be expected to be inflated?
i) II X ii
ii) Ii X ii
iii) II X II
iv) Ii X Ii
[CO-5] [L-5] 10
b) In humans, the genotypes DD and Dd are Rh positive ( $\mathrm{Rh}+$ ), and dd is Rh negative
(Rh - ).
i) If an Rh+ man and an Rh- woman gave birth to an Rh- child, what would be the genotype of the man?
ii) If an Rh+ man and an Rh- woman had six children, all of whom were Rh+, would be the genotype of the man? what
Q. 7 a) In humans, the gene for hemophilia (a disease in which the blood does not clot
normally) is recessive and carried on the X chromosome.
i) What phenotypes, and in what proportions would be expected from a mating of a normal man and a woman who has hemophilia?
ii) What phenotypes, and in what proportions would be expected from a mating
a heterozygous woman and a man who has hemophilia?
b) A particular kind of color blindness in humans is due to a recessive gene located
on the X chromosome.
a) Can a normal son have a color-blind mother?
b) Can a normal son have a color-blind father?
[CO-5] [L-5]
c) Can a colorblind son have a normal mother?
d) Can a color-blind son have a normal father?

## End Semester Examination, Dec. 2022

## B. Sc. (Microbiology) - First Semester

## CELL BIOLOGY (BMB-DS-103)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Compare active and passive transport across the cell membrane.
[CO-1][L5]
b) What are microtubules and microfilaments?
[CO-3][L1]
c) Define 'apoptosis'.
[CO-4][L1]
d) Illustrate the Integrin receptor structure and function.
[CO-1][L2]
e) Explain the functions of mitochondria.
[CO-1][L2]
f) Write a short note on the 'lysosomes'.
[CO-2][L1]
g) List the cytoskeleton components.
[CO-1][L1]
h) Compare cilia and flagella of the cell.
[CO-1][L5]
i) Explain the neurotransmitters.
[CO-4][L2]
j) Define 'extracellular matrix'.
[CO-3][L1] $2 \times 10$

## PART-A

Q. 2 Explain the structure and functions of the cell organelles involve in protein synthesis, sorting and trafficking?
[CO2][L5] 20
Q. 3 Describe the various mechanisms of transport across the cell membrane. [CO2][L2] 20
Q. 4 a) Distinguish between prokaryotic and eukaryotic cell.
[CO1][L4] 10
b) Compare animal and plant cell.
[CO1][L5] 10

## PART-B

Q. 5 Explain various adhere junctions for cell- cell and cell to matrix interactions [CO1][L5] 20
Q. 6 Describe the cytoskeleton organization in detail.
[CO1][L5] 20
Q. 7 a) Illustrate the structure and function of neurons.
[CO1][L5] 10
b) Discuss the structure and function of the muscle cells
[CO1][L5] 10

## End Semester Examination, Dec. 2022

## B.Sc. (Microbiology) - First Semester

 BACTERIOLOGY AND SYSTEMATICS (BMB-DS-102)Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Briefly explain chemotaxis.
b) Differentiate between sphaeroplasts and protoplasts.
c) Name the physical methods of microbial control.
d) Explain gram and acid-fast staining mechanisms.
e) Give the effect of antibiotics and enzymes on the cell wall.
f) What are endospores?
g) Mention the differences between eubacteria and archaebacteria.
h) What are the aim and principles of classification?
i) Draw the phylogenetic overview of archaebacteria.
j) Compare taxa and strain in systematics.
$\mathbf{2 \times 1 0}$

## PART-A

Q. 2 Explain the composition and detailed structure of gram-positive and gramnegative cell walls with diagrams.
[CO-1] [L-2] 20
Q. 3 Elaborate the chemical methods of microbial control in detail with their types and mode of action.
[CO- 2] [L-2] 20
Q. 4 Explain the following in detail:
a) Inclusion bodies.
b) Nucleoid.
[CO- 1] [L-3] $\mathbf{1 0 \times 2}$

## PART-B

Q. 5 Explain the conventional, molecular and recent approaches to polyphasic bacterial taxonomy.
[CO-3] [L-3] 20
Q. 6 a) Describe thermophiles and halophiles in detail.
b) Give a brief study of typical eubacteria.
[CO-4] [L-3] 10×2
Q. 7 Elaborate the following in detail:
a) Escherichia and Salmonella.
b) Mycoplasma and Chlamydia.
[CO-4] [L-4] $\mathbf{1 0 \times 2}$

# End Semester Examination, Dec. 2022 

## B. Sc. - First Semester

MICROBIAL WORLD AND PRINCIPLES OF MICROBIOLOGY
(BMB-DS-101)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) What is the advantage of using agar over gelatin?
b) Define classification and identification.
c) What do you mean by pure culture?
d) Point out the methods to characterize microorganisms.
e) Explain physical conditions affecting microbial growth.
f) What are zooplanktons?
g) What are the characteristics of protozoa?
h) Discuss how prokaryotes differ from eukaryotes.
i) How sterilization is carried out using chemicals?
j) What are different types of streaking methods?

## PART-A

Q. 2 Robert Koch is known as "Father of Microbiology". Explain his contribution to the germ theory.
[CO-1] [L-2] 20
Q. 3 Explain how Baltimore classifies viruses on basis of their genetic material.
[CO-2] [L-5] 20
Q. 4 a) Determine the discovery of Antonie van Leeuwenhoek in the filed of Microbiology.
[CO- 1] [L-4] 10
b) Spheroplasts are wall less forms. Define their structure, characteristics and economic importance.
[CO- 3] [L-3] 10

## PART-B

Q. 5 Classify general characteristics of actinomycetes and how these are important for industry and medicinal point of view?
Q. 6 Apply the role of different types of media in detection of microbes. [CO-2] [L-3] 20
Q. 7 a) What are the methods for preservation of pure cultures?
[CO- 2] [L-1] 10
b) Microorganisms are present in almost every habitat. Analyze how they are harmful to us?
[CO-4] [L-5] 10

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester <br> MATHEMATICS-III (BMA-308) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 5
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Find the Z- transform of $\left\{a^{|k|}\right\}$. (CO-1,2: L-2) 2
b) Find the Laplace transform of $t^{2} \sin a t$.
(CO-1: L-3) 2
c) Write the normal equations for the least square parabola. (CO-3: L-1) 2
d) Find the Inverse Laplace transform of $s \log \frac{(s+1)}{s^{2}+4}$.
(CO-1: L-3) 3
e) Find the Z- transform of $\left\{\left(\frac{1}{3}\right)^{k}\right\}$.
(CO-1,2: L-3) 3
f) Find the Z- transform of unit impulse function: $\delta(k)=\left\{\begin{array}{l}1, k=0 \\ 0, k \neq 0\end{array}\right\} . \quad(\mathrm{CO}-1,2: \mathrm{L}-3) \mathbf{1}$
g) For normal curve, prove that the maximum value of the ordinate is $\frac{1}{\sigma \sqrt{2 \pi}}$.
(CO-5: L-2) 2
h) Evaluate: $\int_{0}^{\infty} t^{3} e^{-t} \sin t d t$
(CO-1: L-1) 2
i) A manufacturer knows that the electrical gadget he makes contains an average $0.5 \%$ of defectives. He packs them in packets of 5 . What is the probability that a packet picked at random will contain 3 or more faulty electrical gadget?
(CO3: L-3) 3

## PART-A

Q. 2 a) Solve the following equation by using Laplace transform:

$$
\begin{equation*}
x^{\prime \prime}(t)+9 x(t)=\cos 2 t \text { with } x(0)=1, x\left(\frac{\pi}{2}\right)=-1 \tag{CO-1:L-4}
\end{equation*}
$$

b) Using convolution theorem to evaluate: $L^{-1}\left\{\frac{s^{2}}{\left(s^{2}+a^{2}\right)\left(s^{2}+b^{2}\right)}\right\}$
(CO-1: L-4) 10
Q. 3 Solve the difference equation:
$y_{k+2}+4 y_{k+1}+3 y_{k}=3^{k}$ with $y_{o}=0$ and $y_{1}=1$
Q. 4 a) Solve the integral equation $\int_{0}^{\infty} f(x) \operatorname{Cos} \alpha x d x=e^{-\alpha}$
b) If $F(z)=\frac{z^{2}}{z^{2}+4}$, find $Z^{-1}$

## PART-B

Q. 5 a) A sample of 100 dry battery cells tested to find the length of life produced the following results:
$\bar{x}=12$ hours, $\sigma=3$ hours
Assuming that the data is normally distributed, what percentage of the battery cells are expected to have life i) more than 15 hours ii) between 10 and 14 hours?
(CO-3: L-3) 10
b) Fit a second degree parabola to the following data:

| x | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
| :---: | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $\mathrm{y}(\mathrm{x})$ | 1.1 | 1.3 | 1.6 | 2.0 | 2.7 | 3.4 | 4.1 |

Q. 6 a) The table gives the number of aircraft accidents that occurs during various days of the week:

| Days | Sunda <br> y | Monda <br> y | Tuesda <br> y | Wednesda <br> y | Thursda <br> y | Frida <br> y | Saturda <br> y |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| No. of <br> Accident <br> s | 14 | 16 | 8 | 12 | 11 | 9 | 14 |

Find whether the accidents are uniformly distributed over the week. (CO-4: L-5) $\mathbf{1 0}$
b) Two independent samples of 8 and 7 items respectively had the following values of the variables (weight in kgs):
Sample 1: $9,11,13,11,15,9,12,14$ and Sample 2: $10,12,10,14,9,8,10$.
Is the difference between the means of the samples significant?
(CO-4: L-5) 10
Q. 7 a) Using Method of Least Squares, fit a straight line to the following data:

| x | -4 | 1 | 2 | 3 |
| :---: | :---: | :---: | :---: | :---: |
| y | 4 | 6 | 10 | 8 |

(CO-3: L-4) 10
b) Intelligence test of two groups of boys and girls gives the following results:

|  | Mean | Standard <br> Deviation | Sample <br> Size |
| :---: | :---: | :---: | :---: |
| Girls | 84 | 10 | 121 |
| Boys | 81 | 12 | 81 |

i) Is the difference in mean scores significant?
ii) Is the difference between the standard deviations significant?
(CO-4: L-4) 10

Tables are attached:

Table 1: NORMAL TABLE AREAS UNDER THE STANDARD NORMAL

$$
\text { CURVE }=\frac{1}{\sqrt{2 \pi}} \int_{0}^{z} e^{-\frac{x^{z}}{2}} d z
$$



| $=$ | . 00 | . 0.1 | .183 | 02 | . 04 | . 05 | ,06 | 07 | .08 | 09 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 0.0 | 0000 | 0040 | .0080 | . 0120 | .0160 | 0199 | 0239 | 0279 | 0319 | 0369 |
| 0.1 | 0398 | 0438 | . 0478 | . 0517 | 0557 | 0595 | 0636 | 0675 | 0714 | 0754 |
| 0.2 | 0793 | . 0832 | 0.0871 | 0010 | 0948 | . 0987 | 1026 | 1064 | 1103 | 1141 |
| 0.3 | 1179 | 1217 | , 1255 | 1293 | . 1331 | . 1368 | . 1406 | . 1443 | 1480 | 1517 |
| 0.4 | 1854 | . 1591 | 1628 | .1684 | 1700 | . 1736 | . 1772 | 1808 | 1834 | 1879 |
| 0.5 | 1915 | 1950 | 1985 | 2019 | 2054 | 2088 | 2123 | 2157 | 2190 | 2224 |
| 06 | 2257 | 2291 | 2324 | 2357 | 2389 | 2422 | 2454 | 2485 | 2517 | 2549 |
| 0.7 | 2580 | 2611 | 2842 | 2673 | 2704 | -2784 | 2764 | 2794 | 2823 | 2852 |
| 0.8 | 2881 | 2 m 10 | 2939 | 2097 | 2996 | 3029 | 3051 | 3078 | 3106 | 3133 |
| 0.9 | 31ts | 3186 | 3212 | 3238 | 3284 | 3289 | 3315 | 3340 | . 3365 | 3389 |
| 1.6 | 3418 | 3438 | 3461 | 3485 | 3508 | 3531 | 3554 | 3577 | \$509 | 3621 |
| 11 | 3643 | 3065 | 3886 | 3708 | 8729 | 3749 | 3770 | 3750 | . 3810 | 3830 |
| 12 | 3849 | 3869 | . 3888 | . 3007 | 3925 | 3944 | 3062 | 3980 | \$3997 | 4015 |
| 18 | 4032 | 4049 | 4068 | 4082 | 4092 | 4115 | 4131 | -4147 | 4162 | 4177 |
| 1.4 | 4192 | 4207 | 4222 | +4296 | 4251 | 4255 | 4279 | 4292 | 4306 | 4319 |
| 15 | 4332 | 4345 | 4357 | 4370 | 4382 | 4994 | 4406 | 4418 | 4429 | 4441 |
| 1.6 | 4452 | 4463 | 474 | 4484 | 4495 | 4505 | 4515 | 4525 | 4035 | 4545 |
| 1.7 | 4554 | 4564 | 4573 | 45.82 | 4891 | 4099 | 4008 | 4616 | +4086 | 4633 |
| 1.8 | 4641 | 4649 | 4656 | 1564 | 1671 | 4625 | 4685 | 4698 | 4699 | 4706 |
| 1.18 | 4713 | 4719 | 4726 | 4732 | 4238 | 4744 | 4750 | 4755 | 4761 | 4767 |
| 2.0 | 4772 | 4778 | 4783 | 4788 | 4793 | 4798 | $44^{4} 03$ | 4808 | 4812 | 4817 |
| 21 | 4821 | 4824 | 4830 | 4834 | 4841 | 4842 | 4840 | 4850 | -4854 |  |
| 2.1 | 4861 | 4864 | 4868 | 4871 | 4825 | 4878 | 4881 | . 4884 | -4887 | 4890 |
| 2.8 | 4893 | 4891 | 4808 | 4901 | 4904 | 4006 | 4909 | 4911 | 4913 | 4916 |
| 24 | 4918 | 1929 | 4922 | 4925 | 492\% | 4929 | 4931 | 4932 | 4934 | $\begin{array}{r}4936 \\ 4952 \\ \hline\end{array}$ |
| 2.5 | 4938 | 4940 | 4891 | 4983 | 4045 | 49:46 | 4948 | 4949 | 4951 |  |
|  | 4063 | . 985 |  |  |  | 41830 | 4087 | 4902 | 4963 | . 4964 |
| 2.7 | 4965 | 19945 | 4967 | 4968 | 4869 | 4070 | 4971 | 4972 4979 | 4973 4980 | 4974 4981 |
| 28 | 4974 | 1925 | 4976 | $497 \%$ | 4977 | 4978 | 4979 | 4979 | 4989 | . 4986 |
| 210 | 4881 | . 4982 | ,4982 | 1983 | 4884 | 4984 | 4985 | 4985 |  | 4980 |
| 30 | $498 \%$ | 4987 | $498 \%$ | .t0s8 | 4088 | 4089 4992 | $\begin{aligned} & 6999 \\ & 4092 \end{aligned}$ | $\begin{array}{r} 6989 \\ 4998 \end{array}$ | 4993 | 4990 |
| 8.1 | 4.900 | 4iP1 | 4901 | 4901 | 4992. | 4992 |  |  |  |  |

Table 2 : SIGNIFICANT VALUES $t_{v}(\alpha)$ OF $t$-DISTRIBUTION (TWO TAIL AREAS) $\left||t|>t_{v}(\alpha)\right]=\alpha$

| d.f. | Probability (Level of Significance) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| (v) | 0.50 | 0.10 | 0.05 | 0.02 | 0.01 | 0.001 |
| 1 | 1.00 | 6.31 | 12.71 | 31.82 | 63.66 | 636.68 |
| 2 | 0.82 | 0.92 | 4.30 | 6.97 | 6.93 | 31.60 |
| 3 | 0.77 | 2.32 | 3.18 | 4.54 | 5.84 | 12.94 |
| 4 | 0.74 | 2.13 | 2.78 | 3.75 | 460 | 8.61 |
| 5 | 0.73 | 2.02 | 2.57 | 3.37 | 4.03 | 6.86 |
| 6 | 0.72 | 1.94 | 2.45 | 3.14 | 3.71 | 5.96 |
| 7 | 0.71 | 1.90 | 2.37 | 3.00 | 3.50 | 5.41 |
| 8 | 0.71 | 1.80 | 231 | 2.90 | 3.36 | 5.04 |
| 8 | 0.70 | 1.83 | 2.26 | 288 | 3.25 | 4.78 |
| 10 | 0.70 | 181 | 223 | 2.76 | 3.17 | 4.59 |
| 11 | 0.70 | 1.80 | 2.20 | 2.72 | 3.11 | 4.44 |
| 12 | 0.70 | 1.78 | 2.18 | 268 | $3.06$ | 4.32 |
| 13 | 0.69 | 177 | 216 | 2.05 | 3.01 | 4.22 |
| 14 | 0.69 | 176 | 2.15 | 2.62 | 2.98 | 414 |
| 15 | 0.69 | 1.75 | 2.13 | 2.60 | 2.95 | 4.07 |
| 16 | 0.69 | 175 | 2.12 | 2.58 | 2.92 | 4.02 |
| 17 | 0.69 | 174 | 2.11 | 2.57 | 2.90 | 3.97 |
| 18 | 0.69 | 1.73 | 2.10 | 2.55 | 2.88 | 3.92 |
| 19 | 0.89 | 1.73 | $209$ | 2.54 | 2.86 | 3.88 |
| 20 | 0.69 | 1.73 | 209 | 2.53 | 2.85 | 3.85 |
| 21 | 0.69 | 172 | 2.08 | 2.52 | 2.83 | 3.83 |
| $22$ | 0.69 | 172 | $2.07$ | 2.51 | 2.42 | 3.79 |
| 23 | 0.69 | 171 | 2.07 | 2.50 | 2.81 | 3.77 |
| $24$ | $0.69$ | $17$ | 2.06 | 2.49 | 2.80 | 3.75 |
| 25 | 0.68 | 1.72 | 2.06 | 2.49 | 2.79 | 3.73 |
|  | $0.68$ | 1.71 | $2.06$ | 2.48 | 2.78 | 3.71 |
| $27$ | 0.68 | 1.70 | 2.05 | 2.47 | 2.77 | $3.69$ |
| 28 | 0.68 | 1.70 | 2.05 | 2.47 | 2.76 | 3.67 |
| $29$ | 0.68 | 1.70 | $2.05$ | 2.45 | $276$ | $366$ |
| 30 | 0.68 | 1.70 | 20.4 | 2.46 | 2.75 | 3.65 |
| - | 0.07 | 1.65 | 196 | 2.38 | 2.58 | 3.29 |


|  | Signific |  | 3: CH <br> (a) of $\chi$ <br> Given <br> $=P_{\Sigma}\left(\chi^{2}\right.$ <br> Degrees |  | Righ d.f.) | 1 Areas |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Degree of freedom (v) | Probrability (Level of Significance) |  |  |  |  |  |  |
|  | $0=.99$ | 0.95 | 0.50 | 0.10 | 0.05 | 0.02 | 0.01 |
|  |  | 00398 | 455 | 2.706 | 3.841 | 5.214 | 6.695 |
| 2 | . 0201 | 103 | 1.386 | 4.605 | 5.991 | 7.824 | 9.210 |
| 3 | . 115 | 352 | 2.366 | 6.251 | 7815 | 9.837 | 11.341 |
| 4 | 297 | 711 | 3.357 | 7.779 | 9.488 | 11.668 | 13.277 |
| 5 | 554 | 1.145 | 4.351 | 9.236 | 11.070 | 13,388 | 15.086 |
| 6 | 872 | 2.635 | 5.348 | 10.645 | 12.592 | 15.038 | 16.812 |
| 7 | 1239 | 2167 | 6.346 | 12.017 | 14.067 | 16.622 | 18.475 |
| 8 | 1.646 | 2.733 | 7.344 | 13.362 | 15.507 | 18.168 | 20.090 |
| 9 | 2.088 | 3.325 | 8.343 | 14.684 | 16.919 | 19.679 | 21.669 |
| 10 | 2.558 | 3.940 | 9340 | 15.987 | 18.307 | 21.161 | 23.209 |
| 11 | 3.058 | 4.575 | 10.341 | 17.275 | 19.675 | 22.618 | 24.725 |
| 12 | 3.871 | 5.226 | 11.340 | 18.549 | 21.026 | 24.054 | 26.217 |
| 13 | 4108 | 5.892 | 12.340 | 19.812 | 22,362 | 25.472 | 27.688 |
| 14 | 4.660 | 6.571 | 13.339 | 21.064 | 23.685 | 26.873 | 29.141 |
| 15 | 4.229 | 7.261 | 14.339 | 22.307 | 24.906 | 28.259 | 30.578 |
| 18 | 5.812 | 7.962 | 15.338 | 23.542 | 26.296 | 29.633 | 32.000 |
| 17 | 6.408 | 8.672 | 15.338 | 24.769 | 27.587 | 30.985 | 33,409 |
| 18 | 7.015 | 9390 | 17.238 | 25.989 | 28869 | 32.3.46 | 34.805 |
| 19 | 7.838 | 10.117 | 18.338 | 27.203 | 30.144 | 33.687 | 36.191 |
| 20 | 8.260 | 10.851 | 19.337 | 28.412 | 31.410 | 38.020 | 37.566 |
| 21 | 8897 | 11.591 | 20.337 | 29.615 | 32.671 | 36.343 | 38.932 |
| 22 | 9512 | 12,338 | 21.337 | 30.813 | 33.924 | 37.659 | 40.289 |
| 23 | 10196 | 13.091 | 32:397 | 32.007 | 35.172 | 38.8688 | 41.638 |
| 24 | 10.850 | 138.88 | 23.397 | 32.196 | 36.415 | 40.270 | 42.980 |
| 25 | 11:524 | 14.611 | 24.337 | 34.382 | 37.65 | 41.566 | 44.314 |
| 26 | 12.198 | 15.379 | 25.336 | 36.363 | 38.885 | 41858 | 45.642 |
| 27 | 12.879 | 16.151 | 26.836 | 30.711 | 40.118 | 41.140 | 46.963 |
| 24 | 18.005 | 16.928 | 27398 | 37.916 | 41.397 | 45.419 | 48.278 |
| 29 | 17.256 | 17.208 | 2833 | 99.087 | 42357 | 46.683 | 49.688 |
| 30 | 14.983 | 18.493 | 29.330 | 40.256 | 43.778 | 47.983 | 50.892 |

## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester <br> MATHEMATICS - III (BMA-307)

Time: 3 hrs.

Max Marks: 100
No. of pages: 6

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question. The statistical tables for hypothesis test are attached.
Q. 1 a) In a box, there are 8 Red, 7 Blue and 6 Green balls. One ball is picked up randomly.

What is the probability that it is neither Red nor Green?
b) Find the number of words, with or without meaning that can be formed with the
letters of the word 'SWIMMING?
c) Relation between moment about mean and moment about a number.
d) Determine the value of median from the following series

| Marks | $0-10$ | $10-15$ | $15-20$ | $20-25$ | $25-30$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| No. of students | 8 | 6 | 9 | 39 | 43 |

e) Can two uncorrelated variable be independent.
f) If the regression coefficients are 0.7 and 0.3 , find correlation coefficients.
g) When does type-1 error occurs?
h) If the Critical region is evenly distributed then the test is referred as?
[CO-5] [L-2]
i) A table with all possible value of a random variable and its corresponding probabilities is called $\qquad$ .
[CO-6] [L-2]
j) A variable that can assume any value between two given points is called $\qquad$ .
[CO-6] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 Four cards are drawn from a pack of 52 cards. Find the probability that
a) All are diamonds.
b) There is one card of each suit.
c) There are two spades and two hearts.
Q. 3 In normal distribution, $31 \%$ of the items are under 45 and $* \%$ are over 64. Find the mean and standard deviation of the distribution.
[CO- 2] [L-3] 20
Q. 4 a) Find the Spearman's rank correlation coefficient from the following data:

| x | 10 | 12 | 15 | 14 | 19 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| y | 40 | 41 | 48 | 60 | 50 |

b) Find the line of regression of y on x for the following data:

| $x$ | 1 | 2 | 3 | 4 | 5 |
| :--- | :--- | :--- | :--- | :--- | :--- |


| $y$ | 2 | 5 | 3 | 8 | 7 |
| :--- | :--- | :--- | :--- | :--- | :--- |

## PART-B

Q. 5 a) Calculate coefficient of skewness using Karl Pearson's formula and draw you conclusion.

| class | $4-5$ | $5-10$ | $10-15$ | $15-20$ | $20-25$ | $25-30$ | $30-35$ | $35-45$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Frequency | 5 | 20 | 10 | 0 | 5 | 20 | 8 | 7 |

b) Determine the binomial distribution whose mean is 9 and S.D. is $3 / 2$. [CO-4] [L-3] 5
Q. 6 a) In a hospital 475 female and 525 male babies were born in a week. Do these figures confirm the hypothesis that males and females are born in equal number? [CO-6] [L-3] 20
Q. 7 Fit a Poisson distribution to the following data and best the goodness of fit:

| $x$ | 0 | 1 | 2 | 3 | 4 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $f$ | 109 | 65 | 22 | 3 | 1 |

(Hint: the tabulated value of $\chi^{2}$ at $5 \%$ for 4 d.f. is 9.90 )

Z test table

| Lovol of significance |  |  |  |
| :--- | :---: | :---: | :---: |
|  | $1 \%(0.01)$ | $5 \%(0.05)$ | $10 \%(0.1)$ |
| Two tailed test | $\left\|z_{\alpha}\right\|=2.58$ | $\|z\|=1.966$ | $\|z\|=0.645$ |
| Right tailed | $z_{\alpha}=2.33$ | $z_{\alpha}=1.645$ | $z_{\alpha}=1.28$ |
| Left tailed | $z_{\alpha}=-2.33$ | $z_{\alpha}=-1.645$ | $z_{\alpha}=-1.28$ |

Numbers in each row of the table are values on a $t$-distribution with (df) degrees of freedom for selected right-tail (greater-than) probabilities (p).


| $\mathbf{d t} / \mathrm{p}$ | $\mathbf{0 . 4 0}$ | $\mathbf{0 . 2 5}$ | $\mathbf{0 . 1 0}$ | $\mathbf{0 . 0 5}$ | $\mathbf{0 . 0 2 5}$ | $\mathbf{0 . 0 1}$ | $\mathbf{0 . 0 0 5}$ | $\mathbf{0 . 0 0 0 5}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | 0.324920 | 1.000000 | 3.077684 | 6.313752 | 12.70620 | 31.82052 | 63.65674 | 636.6192 |
| $\mathbf{2}$ | 0.288675 | 0.816497 | 1.885618 | 2.919986 | 4.30265 | 6.96456 | 9.92484 | 31.5991 |
| $\mathbf{3}$ | 0.276671 | 0.764892 | 1.637744 | 2.353363 | 3.18245 | 4.54070 | 5.84091 | 12.9240 |
| $\mathbf{4}$ | 0.270722 | 0.740697 | 1.533206 | 2.131847 | 2.77645 | 3.74695 | 4.60409 | 8.6103 |
| $\mathbf{5}$ | 0.267181 | 0.726687 | 1.475884 | 2.015048 | 2.57058 | 3.36493 | 4.03214 | 6.8688 |
| $\mathbf{6}$ | 0.264835 | 0.717558 | 1.439756 | 1.943180 | 2.44691 | 3.14267 | 3.70743 | 5.9588 |
| $\mathbf{7}$ | 0.263167 | 0.711142 | 1.414924 | 1.894579 | 2.36462 | 2.99795 | 3.49948 | 5.4079 |
| $\mathbf{8}$ | 0.261921 | 0.706387 | 1.396815 | 1.859548 | 2.30600 | 2.89646 | 3.35539 | 5.0413 |
| $\mathbf{9}$ | 0.260955 | 0.702722 | 1.383029 | 1.833113 | 2.26216 | 2.82144 | 3.24984 | 4.7809 |
| $\mathbf{1 0}$ | 0.260185 | 0.699812 | 1.372184 | 1.812461 | 2.22814 | 2.76377 | 3.16927 | 4.5869 |
| $\mathbf{1 1}$ | 0.259556 | 0.697445 | 1.363430 | 1.795885 | 2.20099 | 2.71808 | 3.10581 | 4.4370 |
| $\mathbf{1 2}$ | 0.259033 | 0.695483 | 1.356217 | 1.782288 | 2.17881 | 2.68100 | 3.05454 | 43178 |
| $\mathbf{1 3}$ | 0.258591 | 0.693829 | 1.350171 | 1.770933 | 2.16037 | 2.65031 | 3.01228 | 4.2208 |
| $\mathbf{1 4}$ | 0.258213 | 0.692417 | 1.345030 | 1.761310 | 2.14479 | 2.62449 | 2.97684 | 4.1405 |
| $\mathbf{1 5}$ | 0.257885 | 0.691197 | 1.340606 | 1.753050 | 2.13145 | 2.60248 | 2.94671 | 4.0728 |
| $\mathbf{1 6}$ | 0.257599 | 0.690132 | 1.336757 | 1.745884 | 2.11991 | 2.58349 | 2.92078 | 4.0150 |
| $\mathbf{1 7}$ | 0.257347 | 0.689195 | 1.333379 | 1.739607 | 2.10982 | 2.56693 | 2.89823 | 3.9651 |
| $\mathbf{1 8}$ | 0.257123 | 0.688364 | 1.330391 | 1.734064 | 2.10092 | 2.55238 | 2.87844 | 3.9216 |
| $\mathbf{1 9}$ | 0.256923 | 0.687621 | 1.327728 | 1.729133 | 2.09302 | 2.53948 | 2.86093 | 3.8834 |
| $\mathbf{2 0}$ | 0.256743 | 0.686954 | 1.325341 | 1.724718 | 2.08596 | 2.52798 | 2.84534 | 3.8495 |
| $\mathbf{2 1}$ | 0.256580 | 0.686352 | 1.323188 | 1.720743 | 2.07961 | 2.51765 | 2.83136 | 3.8193 |
| $\mathbf{2 2}$ | 0.256432 | 0.685805 | 1.321237 | 1.717144 | 2.07387 | 2.50832 | 2.81876 | 3.7921 |
| $\mathbf{2 3}$ | 0.256297 | 0.685306 | 1.319460 | 1.713872 | 2.06866 | 2.49987 | 2.80734 | 3.7676 |
| $\mathbf{2 4}$ | 0.256173 | 0.684850 | 1.317836 | 1.710882 | 2.06390 | 2.49216 | 2.79694 | 3.7454 |
| $\mathbf{2 5}$ | 0.256060 | 0.684430 | 1.316345 | 1.708141 | 2.05954 | 2.48511 | 2.78744 | 3.7251 |
| $\mathbf{2 6}$ | 0.255955 | 0.684043 | 1.314972 | 1.705618 | 2.05553 | 2.47863 | 2.77871 | 3.7066 |
| $\mathbf{2 7}$ | 0.255858 | 0.683685 | 1.313703 | 1.703288 | 2.05183 | 2.47266 | 2.77068 | 3.6896 |
| $\mathbf{2 8}$ | 0.255768 | 0.683353 | 1.312527 | 1.701131 | 2.04841 | 2.46714 | 2.76326 | 3.6739 |
| $\mathbf{2 9}$ | 0.255684 | 0.683044 | 1.311434 | 1.699127 | 2.04523 | 2.46202 | 2.75639 | 3.6594 |
| $\mathbf{3 0}$ | 0.255605 | 0.682756 | 1.310415 | 1.697261 | 2.04227 | 2.45726 | 2.75000 | 3.6460 |
| $\boldsymbol{z}$ | 0.253347 | 0.674490 | 1.281552 | 1.644854 | 1.95996 | 2.32635 | 2.57583 | 3.2905 |
| $\mathbf{\text { cI}}$ | - | - | - | $80 \%$ | $90 \%$ | $95 \%$ | $98 \%$ | $99 \%$ |
| $99.9 \%$ |  |  |  |  |  |  |  |  |

ORDINATES ( $\eta$ OF THE STANDARD NORMAL CURVE AT $\boldsymbol{z}$


|  | 0 |  | 2 | 3 |  | 5 | 6 | 7 | 8 | 9 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 0 | 1 | 2 | 88 | 0.3986 | 0.3984 | 0.3982 | 0.3980 | 0.3977 | 0.3973 |
| 0.0 | 0.3989 | 0.3989 | 0.3989 | 0.3988 | 0.3986 | 0.3984 | 0.3939 | 0.3932 | 0.3925 | 0.3018 |
| 0.4 | 0.3970 | 0.3965 | 0.3961 | 0.3956 | 0.3951 | 0.38867 | 0.3857 | 0.3847 | 0.3836 | 0.3825 |
| 0.2 | 0.3910 | 0.3902 | 0.3984 | 0.3885 | 0.3876 | 0.3867 0.3752 | 0.3739 | 0.3725 | 0.3712 | 0.3697 |
| 0.3 | 0.3814 | 03802 | 0.3790 | 0.3778 | 0.3765 | 0.3752 0.3605 | 0.3589 | 0.3572 | 0.3555 | 0.3538 |
| 0.4 | 0.3683 | 0.3668 | 0.3653 | 0.3637 | 0.3621 | 0.3605 0.3429 | 0.3410 | 0.3391 | 0.3372 | 0.3152 |
| 0.5 | 0.3521 | 0.3503 | 0.3485 | 0.3467 | 0.3448 | 0.3429 0.3230 | 0.3209 | 0.3187 | 0.3166 | 0.3144 |
| 0 | 0.3332 | 0.3312 | 0.3292 | 0.3271 0.3056 | 0.3251 | 0.3230 0.3011 | 0.2989 | 0.2966 | 0.2943 | 0,2920 |
| 0.7 | 0.3123 | 0.3101 | 0.3079 0.2850 | 0.3056 0.2827 | 0.3034 0.2803 | 0.3011 0.2780 | 0.2756 | 0.2732 | 0.2709 | 0.2685 |
| 0.8 | 0.2897 | 0.2874 | 0.2850 | 0.2827 0.2589 | 0.2803 0.2565 | 0.2780 0.2541 | 0.2516 | 0.2492 | 0.2468 | 0.2685 |
| 0. | 0.2661 | 0.2637 | 0.2613 | 0.2589 0.2347 | 0.2565 0.2323 | 0.2541 0.2299 | 0.2275 | 0.2251 | 0.2227 | 0. 2444 |
| 1.0 | 0.2420 | 0.2396 | 0.2371 | 0.2347 | 0.2323 | 0.2299 | 0.2275 | 0.2251 | 0.2227 | 0.2444 |
| 1.1 | 0.2179 | 0.2155 | 0.2131 | 0.2107 | 0.2083 | 0.2059 | 0.2036 | 0.2012 | 0.1989 | 0.2207 |
| 1.2 | 0.1942 | 0.1919 | 0.1895 | 0.1872 | 0.1849 | 0.1826 | 0.1804 | 0.1781 | 0.1758 | 0.1965 |
| 1.3 | 0.1714 | 0.1691 | 0.1669 | 0.1647 | 0.1626 | 0.1604 | 0.1582 | 0.1561 | 0.1539 | 0.1736 |
| 1.4 | 0.1497 | 0.1476 | 0.1450 | 0.1435 | 0.1415 | 0.1394 | 0.1374 | 0.1354 | 0.1334 | 0.1518 |
| 1.5 | 0.1295 | 0.1276 | 0.1257 | 0.1238 | 0.1219 | 0.1200 | 0.1182 | 0.1163 | 0.1145 | 0.1315 |
| 1.6 | 0.1109 | 0.1092 | 0.1074 | 0.1057 | 0.1040 | 0.1023 | 0.1006 | 0.0989 | 0.0923 | 0.1127 |
| 1.7 | 0.0940 | 0.0925 | 0.0909 | 0.0893 | 0.0878 | 0.0863 | 0.0848 | 0.0833 | 0.0818 | 0.0957 |
| 1.8 | 0.0790 | 0.0775 | 0.0761 | 0.0748 | 0.0734 | 0.0721 | 0.0707 | 0.0694 | 0.0681 | 0.0804 |
| 1.9 | 0.0656 | 0.0644 | 0.0632 | 0.0620 | 0.0608 | 0.0596 | 0.0584 | 0.0573 | 0.0562 | 0.0669 |
| 2.0 | 0.0540 | 0.0529 | 0.0519 | 0.0508 | 0.0498 | 0.0488 | 0.0478 | 0.0468 | 0.0459 | 0.0551 |
| 2.1 | 0.0440 | 0.0431 | 0.0422 | 0.0413 | 0.0404 | 0.0396 | 0.0387 | 0.0379 | 0.0371 | 0.0449 |
| 2.2 | 0.0355 | 0.0347 | 0.0839 | 0.0332 | 0.0325 | 0.0317 | 0.0310 | 0.0303 | 0.0297 | 0.0363 |
| 2.3 | 0.0283 | 0.0277 | 0.0270 | 0.0264 | 0.0258 | 0.0252 | 0.0246 | 0.0241 | 0.0235 | 90 |
| 2.4 | 0.0224 | 0.0219 | 0.0213 | 0.0208 | 0.0203 | 0.0198 | 0.0194 | 0.0189 | 0.0184 |  |
| 25 | 0.0175 | 0.0171 | 0.0167 | 0.0163 | 0.0158 | 0.0154 | 0.0151 | 0.0147 | 0.0143 |  |
| 2.6 | 0.0136 | 0.0132 | 0.0129 | 0.0126 | 0.0122 | 0.0119 | 0.0116 | 0.0113 |  |  |
| 2.7 | 0.0104 | 0.0101 | 0.0099 | 0.0096 | 0.0093 | 0.0091 | 0.0088 | 0.0086 | 0.0110 | 0.0139 |
| 2.8 | 0.0079 | 0.0977 | 0.0075 | 0.0073 | 0.0071 |  | 0.0088 | 0.0086 | 0.0084 | 0.0107 |
| 2.9 | 0.0060 | 0.0058 | 0.0056 | 0.0055 | 0.0051 |  | 0.0067 | 0.0065 | 0.0063 | 0.0081 |
| 3.0 | 0.0044 | 0.0043 | 0.0042 | 0.0040 |  | 0.0051 | 0.0050 | 0.0048 | 0.0047 | 0.0061 |
| 3.1 | 0.0033 | 0.0032 | 0.0031 | 0.0030 |  | 0.0038 | 0.0037 | 0.0036 | 0.0035 | 0.0046 |
| 3.2 | 0.0024 | 0.0023 | 0.0022 | 0.0022 | .0029 | 0.0028 | 0.0027 | 0.0026 | 0.0025 | 0.0034 |
| 33 | 0.0017 | 0.00017 | 0.0016 | 0.0022 0.0016 | 0.0021 | 0.0020 | 0.0020 | 0.0019 | 0.0018 | 0.0025 |
| 3.4 | 0.0012 | 0.0012 | 0.0016 | 016 | 0.0015 | 0.0015 | 0.0014 | 0.0014 | 0.0013 | 0.0018 |
| 3.5 | Otbog | 0.0008 | 0.0012 | 0.0011 | 0.0011 | 0.0010 | 0.0010 | 0.0010 | 0.0009 | 0.0013 |
| 3.6 | 0.gos | 0.000s |  | 0.0008 | 0.0008 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0009 |
| 3.7 | 0.0003 | 20004 |  | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0007 |
| 3.8 | 0.0008 | bacim | 0.0004 | 0.0004 | 0.0004 | 0.0004 | 0.0003 | 0.0003 | 0.0003 | 0.0003 |
| 3.9 | 0.0002 | Uncon | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0002 | 0.0002 | 0.0002 | 0.0002 |
|  |  |  |  | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0001 | 0.0001 |

## TABLES

## AREA UNDER STANDARD NORMAL CURVE



| $z$ | . 00 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.69 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 0.0 | . 0000 | . 0040 | . 0080 | . 0120 | . 0160 | . 0199 | . 0239 | . 0279 | . 0319 | 0359 |
| 0.1 | . 0398 | . 0438 | . 0478 | . 0517 | . 0557 | 0596 | .0636 | . 0675 | . 0714 | . 0753 |
| 0.2 | . 0793 | . 0832 | . 0871 | . 0910 | 0048 | . 0988 | . 1026 | . 1064 | . 1103 | .1141 |
| 0.3 | . 1179 | . 1217 | . 1255 | . 1293 | .1331 | . 1368 | . 1406 | . 1443 | . 1480 | . 1517 |
| 0.4 | . 1554 | .1519 | . 1628 | . 1664 | . 1700 | . 1736 | . 1772 | .1808 | .1844 | 1879 |
| 0.5 | . 1915 | . 1950 | . 1985 | . 2019 | . 2054 | . 2088 | 2123 | . 2157 | . 2190 | . 2224 |
| 0.6 | . 2257 | . 2291 | 2324 | . 2357 | 2389 | . 2422 | 2454 | . 2486 | . 2517 | . 2549 |
| 0.7 | . 2580 | , 2611 | . 2642 | 2673 | 2704 | . 2734 | 2764 | . 2794 | . 2823 | 2852 |
| 0.8 | 2881 | . 2910 | . 2939 | . 2967 | . 2995 | . 3023 | 3051 | . 3078 | 3106 | 3133 |
| 0.9 | . 3159 | . 3186 | . 3212 | . 3238 | . 3264 | . 3289 | 3315 | . 3340 | 3365 | . 3389 |
| 1.0 | . 3413 | . 3438 | 3461 | . 3485 | . 3508 | . 3531 | 3554 | . 3577 | 3599 | . 3621 |
| 1.1 | . 3643 | . 3665 | 3686 | . 3708 | . 3729 | . 3749 | 3770 | . 3790 | 3810 | . 38.30 |
| 1.2 | 3849 | . 3869 | 3888 | . 3907 | . 3925 | . 3944 | 3962 | . 3980 | 3997 | . 4015 |
| 1.3 | 4032 | . 4049 | . 4066 | . 4082 | 4009 | . 4115 | 4131 | . 4147 | 4162 | . 4177 |
| 1.4 | . 4192 | , 4207 | . 4222 | . 4236 | . 4251 | 4265 | . 4279 | . 4292 | 4306 | . 4319 |
|  | 4332 | . 4345 | . 4357 | . 4370 | 4382 | 4394 | . 4406 | . 4418 | 4429 | . 4441 |
|  | 452 | . 4463 | . 4474 | . 4484 | A495 | 4505 | . 4515 | . 4525 | 4535 | . 4545 |
| 17 | .4452 <br> .4554 | 4564 | . 4573 | . 4582 | . 4591 | . 4599 | . 4608 | 4616 | . 4625 | . 4633 |
| 1.7 | . 4554 | . 4649 | 4656 | . 4664 | . 4671 | . 4678 | . 4686 | . 4693 | 4699 | . 4706 |
| 1.8 | . 4641 | . 464719 | . 4726 | . 4732 | . 4738 | . 4744 | 4750 | . 4756 | . 4761 | . 4767 |
| 1.9 | . 4713 |  | . 4783 | .4788 | . 4793 | . 4798 | A803 | . 4808 | . 4812 | A817 |
| 2.0 | . 4772 |  | . 4830 | 4834 | . 4838 | . 4842 | A846 | . 4850 | . 4854 | 4857 |
| 2.1 | 4821 | . 4826 | . 4868 | . 4871 | 4875 | . 4878 | 4881 | . 4884 | . 4887 | 4890 |
| 2.2 | , 4861 |  | . 4898 | . 4901 | A904 | . 4906 | . 4909 | . 4911 | . 4913 | . 4916 |
| 2.3 | . 4893 | . 4922 | . 4922 | . 4925 | 4927 | . 4929 | 4931 | . 4932 | . 4934 | 4936 |
| 2.4 | 4918 |  | . 4941 | . 4943 | 4945 | . 4946 | . 4948 | . 4949 | -4951 | 4952 |
| 2.5 | 4938 |  | , 4956 | . 4957 | A959 | . 4960 | 4\%1 | . 4962 | . 4963 | 4964 |
| 2.6 | 4953 | 4955 | . 4967 | . 4968 | 4969 | . 4970 | . 4971 | 4972 | . 4973 | 4974 |
| 2.7 | 4965 | 4966 | 4976 | 4977 | . 4977 | . 4978 | . 4979 | . 4979 | . 4980 | . 4981 |
| 2.8 | 4974 | 4975 | 4976 4982 | .4983 | . 4988 | . 4984 | . 4985 | 4985 | . 4986 | 4986 |
| 2.9 | A)81 | 4982 | .4987 | . 4988 | 4988 | . 4989 | 4989 | 4989 | 4990 | 4990 |

# End Semester Examination, Dec. 2022 

## B. Tech. - Third/Fourth Semester <br> MATHEMATICS -III (BMA-306)

Time: 3 hrs.

Max Marks: $\mathbf{1 0 0}$
No. of pages: 2

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Find the $Z$ - transform of $\left\{2^{k \mid k}\right\}$.
[CO-1, 2] [L-2]
b) Find the Laplace transform of $t^{2} \sin a t$.
c) Write the normal equations for the least square parabola.
d) Determine the median of the following data:

| Marks | $10-12$ | $13-15$ | $16-18$ | $19-21$ |
| :--- | :---: | :---: | :---: | :---: |
| No. of students | 5 | 11 | 22 | 12 |

e) Find the first three moments about the number ' 3 ' for the following series: 2 , $4,8,9,19$.
[CO-4] [L-3]
f) Find the correlation coefficient, if

$$
\begin{equation*}
\sum_{i=1}^{25} x_{i}=125 ; \sum_{i=1}^{25} y_{i}=100 ; \sum_{i=1}^{25} x_{i}^{2}=650 ; \sum_{i=1}^{25} y_{i}^{2}=460 ; \sum_{i=1}^{25} x_{i} y_{i}=508 \tag{CO-3}
\end{equation*}
$$

g) For normal curve, prove that the maximum value of the ordinate is $\frac{1}{\sigma \sqrt{2 \pi}}$.
[CO-5] [L-2]
h) Evaluate: $\int_{0}^{\infty} t e^{-t} \sin t d t$
i) A small electronic component of a given brand with average weighs 0.3 gm with a standard deviation of 0.01 gm . What is the probability that two lots of 100 components each will differ in weight by more than 2 gm ?
[CO-5] [L-2]
j) The number of cars passing a point on a country lane has a mean 1.6 per minute. Using the Poisson distribution, find the probability that in any one minute how many cars will be there?
[CO-5] [L-3] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Using convolution theorem to evaluate: $L^{-1}\left\{\frac{s^{2}}{\left(s^{2}+16\right)\left(s^{2}+9\right)}\right\}$.
[CO-1] [L-4] 10
b) Find the Laplace transform of the square-wave function of the period a define as:

$$
f(t)=\left\{\begin{array}{ll}
a & 0 \leq t \leq a / 2  \tag{CO-1}\\
-a & a / 2<t<a
\end{array}\right\} .
$$

Q. 3 Solve the following equation by using Laplace transform:
$x^{\prime \prime}(t)+9 x(t)=\cos 3 t$ with $x(0)=1, x\left(\frac{\pi}{2}\right)=-1$.
Q. 4 State and prove convolution theorem of Fourier Transform?

## PART-B

Q. 5 a) Calculate the coefficient of Skewness and Kurtosis of the following frequency distribution:
[CO-4, 5] [L-2] 10

| $x$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $f$ | 2 | 7 | 14 | 26 | 31 | 23 | 10 | 6 | 3 |

b) Calculate rank correlation coefficient from the following data: [CO-4, 5] [L-2] 10

| x | 78 | 89 | 97 | 69 | 59 | 79 | 68 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| y | 124 | 136 | 155 | 111 | 106 | 135 | 123 |

Q. 6 a) Fit a second degree parabola to the following data:
[CO-3, 5] [L-2] 10

| x | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathrm{y}(\mathrm{x})$ | 1.1 | 1.3 | 1.6 | 2.0 | 2.7 | 3.4 | 4.1 |

b) A sample of 5000 members has mean of 3.2 cms . And Standard deviation of 2.5 cms . Is the sample drawn from a large population of mean 3.05 cms .[CO-5, 6] [L-1] 10
Q. 7 a) The table gives the number of aircraft accidents that occurs during various days of the week:

| Days | Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| No. of <br> Accidents | 12 | 14 | 10 | 10 | 9 | 7 | 12 |

Find whether the accidents are uniformly distributed over the week. [CO-5, 6][L-3] $\mathbf{1 0}$
b) Two independent samples of 9 and 10 items respectively had the following values of the variables (weight in kgs ):
Sample 1: 9, 11, 13, 11, 15, 9, 12, 14, 16 and Sample 2: 10, 12, 10, 14, 9, 8 , $10,8,11,13$. Is the difference between the means of the samples significant?

## Tables are attached:

| Table 1: NORMAL TABLE <br> AREAS UNDER THE STANDARD NORMAL $\text { CURVE }=\frac{1}{\sqrt{2 \pi}} \int_{0}^{z} e^{-\frac{x^{x}}{2}} d z$ |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| z | .00 | . 0.1 | 489 | 0.6 | . 04 | . 05 | . 06 | . 07 | .08 | 09 |
| 0.0 | 0000 | 0040 | 0080 | . 0120 | . 0160 | . 0199 | 0239 | 0279 | 0319 | 0369 |
| 0.1 | 0398 | 0488 | . 0478 | 0517 | 0557 | 0595 | 0636 | 0675 | 0714 | 0754 |
| 0.2 | 0793 | 0832 | .0871 | 0010 | . 0948 | , 0987 | 1026 | 1064 | 1103 | 1141 |
| 0.3 | 1179 | 1217 | 1255 | 1293 | . 1331 | . 1368 | . 1406 | 1443 | 1480 | 1517 |
| 0.4 | 1554 | 1591 | . 1628 | .1684 | 1700 | . 1736 | . 1772 | 1808 | 1844 | 1879 |
| 0.5 | 1915 | 1950 | 1985 | 2019 | 2054 | 2088 | 2129 | 2157 | 2190 | 2224 |
| 0 क | 2257 | 2291 | 2324 | 2357 | 2389 | 2422 | 2454 | 2485 | 2517 | 2549 |
| 0.7 | 2580 | 2611 | 2842 | 2673 | 2704 | 2784 | 2764 | 2794 | 2823 | 2852 |
| 08 | 2881 | 2 m 10 | 2939 | 2097 | 2995 | 3029 | 3051 | 3078 | , 3106 | 3133 |
| 0.9 | 3173 | 3186 | 3212 | 3238 | . 3284 | 3289 | 3315 | 3340 | .3365 | 3389 |
| 1.6 | 3418 | 3438 | 3461 | 1385 | 3608 | 3531 | 3554 | $357 \%$ | 3509 | 3621 |
| 11 | 3643 | 3065 | 3886 | 3708 | 8729 | 3749 | 3770 | 3730 | .3810 | 38830 |
| 1.2 | 3849 | 3869 | 3888 | 13007 | 3925 | 3944 | 3062 | . 3980 | \$9997 | $4015$ |
| 13 | 4032 | 4049 | 400t | 4082 | 4098 | . 4115 | 4131 | - 4147 | 4162 | 4177 |
| 1.4 | 4192 | 4207 | 4222 | 4236 | 4251 | 4255 | 4279 | 4292 | 4806 | 4319 |
| 15 | 4332 | 4345 | 4357 | 4370 | 4382 | 4994 | 4406 | 4418 | 4429 | 4441 |
| 1.6 | 4452 | 4463 | 4774 | 4484 | 4495 | 4505 | 4515 | . 4525 | 4035 | 4545 |
| 1.7 | 4554 | 4564 | 4573 | 45.82 | 4591 | 4099 | 4608 | 4616 | 4025 | 4638 |
| 1.8 | 4611 | 4649 | 4656 | 1961 | 4671 | 4628 | 4685 | 4698 | 4899 | 4706 |
| 1.8 | 4713 | 4719 | 4726 | 4732 | 4738 | 4744 | 4750 | 4755 | 4761 | 4767 |
| 2.0 | 4772 | 4778 | 4783 | 4788 | 4793 | 4798 | 4803 | 1808 | 4812 | 4817 |
| 21 | 4821 | 4834 | 4830 | 4834 | 48311 | 4842 | 4446 | 4850 | 4854 | 4857 |
| 2.1 | 4861 | 4861 | 4868 | 4871 | 4875 | 4878 | 4881 | -4884 | -4887 | 4890 |
| 2.3 | 4893 | 4691 | 1856 | 4901 | 4904 | t1906 | 4909 | 4911 | 4918 4934 | 4916 |
| 24 | 4918 | 4929 | 4922 | 4985 | $492 \%$ | 4929 | 4911 | 4932 | 4934 |  |
| 26 | 4938. | 4040 | $49+1$ | 4943 | 4096 | . 49.16 | 4948 | 4949 | 4961 |  |
| 2.6 | 4953 | 4905 | 1956 | 4957 | 4969 | 41830 | t909 | . 4902 | . 4963 | 4964 4974 |
| 2.7 | 4965 | 19606 | 4967 | 4968 | 4869 | 4070 | 4971 | 4972 | 4973 4980 | $49 \% 4$ .4981 |
| 28 | 4974 | 1975 | 4976 | A97t | t97\% | 4978 | 4979 |  | 4986 |  |
| 211 | 4981 | 4982 | 4982 | c983 | 4854 | 4084 |  |  |  |  |
| 36 31 | 4987 4990 | 4987 | 4987 4901 | toss 4971 | $\begin{aligned} & t 088 \\ & 4992 \end{aligned}$ | $\begin{aligned} & 4089 \\ & 4992 \end{aligned}$ | $\begin{aligned} & 4999 \\ & 4092 \end{aligned}$ | $\begin{array}{r} 4989 \\ 4992 \\ \hline \end{array}$ | $\begin{aligned} & 4900 \\ & \hline 9993 \end{aligned}$ | $4991$ |

Table 3: CHI-SQUARE ( $\chi^{\text {² }}$ )
Significant Values $\chi^{2}(\alpha)$ of $\chi^{2}$ Distribution Right Tail Areas for Given Probability $\alpha$,

$$
P=P_{r}\left(\chi^{2}>\chi^{2}(\alpha)\right)=\alpha
$$

And is Degrees of Freedom (d.f.)

| Drgree of freedom (v) | Probability (Level of Significance) |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $0=.99$ | 0.95 | 0.50 | 0.10 | 0.05 | 0.02 | 0.01 |
| 1 |  | . 00898 | 455 | 2.706 | 3841 | 5.214 | 6.685 |
| 2 | . 0201 | 103 | 1.386 | 4.605 | 5.991 | 7.824 | 9.210 |
| 2 | . 8115 | 1352 | 2.366 | 6.251 | 7.815 | 9.837 | 11.341 |
| 3 | . 297 | 711 | 3.357 | 7.779 | 9.488 | 11.668 | 13.277 |
| 4 | 297 | 1.715 | 4.351 | 9.236 | 11.070 | 13,388 | 15.086 |
| 5 | 554 | 1.145 | 4.351 |  | 12.592 | 15.033 | 16.812 |
| 6 | 872 | 2.635 | 5.348 | 10.645 | 12.092 | 16.029 | 18.475 |
| 7 | 1239 | 2167 | 6.346 | 12.017 | 14.067 | 16.622 | 18.475 |
| 8 | 1.646 | 2.733 | 7.344 | 13.362 | 15.507 | 18.168 | 20.090 |
| 9 | 2.888 | 3.325 | 8.343 | 14.684 | 16.919 | 19.679 | 21.669 |
| 10 | 2.558 | 3.940 | 9340 | 15.987 | 18.307 | 21.161 | 28.209 |
| 11 | 8.053 | 4.575 | 10:341 | 17.275 | 19.676 | 22.618 | 24.725 |
| 12 | 3871 | 5.226 | 11.340 | 18.549 | 21.026 | 24.004 | 26.217 |
| 18 | 4.100 | 5.898 | 12.340 | 19.812 | 22,362 | 25.472 | 27.688 |
| 14 | 4.660 | 6.571 | 13.339 | 21.064 | 23.685 | 26.873 | 29.141 |
| 15 | 4.229 | 7.201 | 14.389 | 22.307 | 24.906 | 28.259 | 30.578 |
| 16 | 5.812 | 7862 | 15.338 | 23.542 | 26.296 | 29.633 | 32.000 |
| 17 | 6.40 R | 8.672 | 15.338 | 24.769 | 27.587 | 30.995 | 33.409 |
| 18 | 7.016 | 9.290 | 17.338 | 25.989 | 28.869 | 32.346 | 34.805 |
| 19 | 7.533 | 10.117 | 18.338 | 27.204 | 30.144 | 39.687 | 36.191 |
| 20 | 8.260 | 10.851 | 19.337 | 28.412 | 31.410 | 35.020 | 37.566 |
| 21 | 8897 | 11.591 | 20.337 | 29.615 | 82.671 | 36.348 | 38. 932 |
| 22 | 9.542 | 12,238 | 21.337 | 30818 | 33.924 | 37.659 | 40.289 |
| 23 | 10.196 | 18.091 | 22.337 | 32,007 | 35.172 | 38.968 | 41.638 |
| 24 | 10.856 | 13.8 .48 | 23387 | 32.196 | 36.415 | 40.270 | 42.980 |
| 25 | $11: 584$ | 14.611 | 21.337 | 34382 | 37.65 | 41.566 | 44.314 |
| 26 | 12.188 | 15.379 | 25.338 | 36.368 | 38.885 | 41856 | 45.642 |
| 27 | 12.879 | 16.151 | 96:836 | 85.717 | 40.118 | 41.140 | 46.963 |
| 48 | 13.085 | 16.928 | 27,398 | 37,916 | 41.337 | 45.419 | 48.278 |
| $29$ | 14.206 | 17.708 | 28.356 | 39.087 | 42387 | 46.688 | 49.688 |
| 30 | 14938 | 18.493 | 29.336- | 40285 | 43.773 | 47.9682 | 50, 8982 |

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# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester <br> MATHEMATICS - III (BMA-303) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from Part-A and TWO questions from Part-B. Each question carries equal marks.
Q. 1 a) Solve $\frac{d y}{d x}=e^{x-y}+x^{2} e^{-y}$
b) Solve $\sin p x \cos y=\cos p x \sin y+p$
c) Solve if possible: $d r+(2 r \cot \theta+\sin 2 \theta) d \theta=0$
d) Solve : $\frac{d^{6} y}{d x^{6}}-y=0$.
e) Examine the convergence of the series: $\sum(-1)^{n} \frac{1+2+3+\ldots \ldots . .+n}{n^{3}}$
f) Find the equation of the tangent plane and normal line to the surface: $x^{2}+2 y^{2}+3 z^{2}=12 \quad$ at $(1,2,-2)$
[CO:2 L-1]
g) For a solenoidal vector $\vec{F}$, show that curlcurlcurlcurl $\vec{F}=\nabla^{4} \vec{F}$
h) Find vector normal to the surface $f(x, y, z)=3 x y z+e^{z} x$ at the point $(1,1,0)$
i) Expand $a^{x}$ in powers of $x$.
j) Test the convergence of the series $\sum_{1}^{\infty} x e^{-x^{2}}$

## PART-A

Q. 2 a) Discuss the convergence of the series: $\sum \frac{n^{n^{2}}}{(n+1 / 4)^{n^{2}}}$
b) Discuss the convergence of the series: $\left(\frac{1}{2}\right) x+x^{2}+\left(\frac{9}{8}\right) x^{3}+x^{4}+\left(\frac{25}{32}\right) x^{5}+$ $\qquad$
[CO-1] [L-3] 14
Q. 3 a) If $x y z=8$, find the value of $x, y, z$ for which $u=\frac{5 x y z}{x+2 y+4 z}$ is maximum.
[CO-2] [L-2] 10
b) If $u_{1}=\frac{x_{1}}{x_{n}}, u_{2}=\frac{x_{2}}{x_{n}}, u_{3}=\frac{x_{3}}{x_{n}}, \ldots \ldots \ldots . u_{n-1}=\frac{x_{n-1}}{x_{n}}$ and $x_{1}^{2}+x_{2}^{2}+x_{3}^{2}+\ldots \ldots \ldots .+x_{n}^{2}=1$

Find Jacobian $\frac{\partial\left(u_{1}, u_{2}, u_{3}, u_{4}, \ldots \ldots \ldots . . . . u_{n-1}\right)}{\partial\left(x_{1}, x_{2}, x_{3}, x_{4}, \ldots \ldots \ldots . . . x_{n-1}\right)}$
[CO-2] [L-2] 10
Q. 4 a) Test the convergence of the series: $\sum(-1)^{n} \frac{(x+1)^{n}}{2^{n} n^{2}}$
[CO-1] [L-3] 10
b) Compute the value of $\cos 33^{\circ}$ to four decimal places

## PART-B

Q. 5 a) Solve $\left(\frac{y}{x} \sec y-\tan y\right) d x+(\sec y \log x-x) d y=0$.
[CO-3] [L-3] 10
b) Solve $\left(1+y^{2}\right) d x=\left(\tan ^{-1} y-x\right) d y$
[CO-3] [L-2] 10
Q. 6 a) Solve Cauchy's Equation: $r^{2} \frac{d^{2} u}{d r^{2}}+r \frac{d u}{d r}-u+k r^{3} \log r=0$
b) Solve: $\frac{d^{2} y}{d x^{2}}-4 \frac{d y}{d x}+4 y=8 x^{2} e^{2 x} \sin 2 x$
[CO-4] [L-3] 10
[CO-4] [L-3] 10
Q. 7 a) Using method of variation of parameters, solve $y^{\prime \prime}-2 y^{\prime}+y=e^{x} \log x$
[CO-4] [L-3] 10
b) Solve: $(3 x+2)^{2} \frac{d^{2} y}{d x^{2}}+3(3 x+2) \frac{d y}{d x}-36 y=3 x^{2}+4 x+1$

# End Semester Examination, Dec. 2022 <br> B. Tech. - (Third Semester) <br> MATHEMATICS -III (BMA-303) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Solve $\frac{d y}{d x}=\sin ^{2}(x-y+1)$
b) Solve for ' y ' , $y=2 x p+p^{n}$.
c) Solve if possible: $d r+(2 r \cot \theta+\sin 2 \theta) d \theta=0$
d) Solve the following:

$$
\begin{equation*}
\frac{d^{6} y}{d x^{6}}-y=0 \tag{CO:4L-3}
\end{equation*}
$$

e) Examine the convergence of the series: $\sum(-1)^{n} \frac{1+2+3+\ldots \ldots .+n}{n^{3}}$
[CO:1 L-1]
f) Find the equation of the tangent plane and normal line to the surface: $2 x^{2}+y^{2}+2 z=3$ at $(2,1,-3)$
[CO:2 L-1]
g) Find $\nabla \phi$, if $\phi=3 x^{2} y-y^{3} z^{2}$ at $(1,-2,-1)$
h) Find vector normal to the surface $f(x, y, z)=3 x y z+e^{z} x$ at the point $(1,1,0)$
[CO:1 L-2]
i) Expand $e^{x}$ in powers of $x$.
[CO:2 L-1]
j) Test the convergence of the series $\sum_{1}^{\infty} x e^{-x^{2}}$
[CO:1 L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Discuss the convergence of the series: $\frac{x}{\sqrt{5}}+\frac{x^{3}}{\sqrt{7}}+\frac{x^{5}}{\sqrt{9}}+\frac{x^{7}}{\sqrt{11}}+\ldots$
[CO-1] [L-2] 10
b) Discuss the convergence of the series: $\left(\frac{1}{2}\right) x+x^{2}+\left(\frac{9}{8}\right) x^{3}+x^{4}+\left(\frac{25}{32}\right) x^{5}+$ $\qquad$
[CO:1 L-3] 10
Q. 3
a) If $u_{1}=\frac{x_{1}}{x_{n}}, u_{2}=\frac{x_{2}}{x_{n}}, u_{3}=\frac{x_{3}}{x_{n}}, \ldots \ldots \ldots . . u_{n-1}=\frac{x_{n-1}}{x_{n}}$ and $x_{1}^{2}+x_{2}^{2}+x_{3}^{2}+\ldots \ldots \ldots+x_{n}^{2}=1$

Find Jacobian $\frac{\partial\left(u_{1}, u_{2}, u_{3}, u_{4}, \ldots \ldots \ldots . . . . u_{n-1}\right)}{\partial\left(x_{1}, x_{2}, x_{3}, x_{4}, \ldots \ldots . . . . . x_{n-1}\right)}$
[CO:2 L-2] 10
b) Examine the function $f(x, y)=y^{2}+4 x y+3 x^{2}+x^{3}$ for extreme values.
[CO:2 L-2] 10
Q. 4 a) Test the convergence of the series: $\sum(-1)^{n} \frac{(x+1)^{n}}{2^{n} n^{2}}$
b) Compute the value of $\cos 33^{\circ}$ to four decimal places.
[CO:1 L-2] 10

## PART-B

Q. 5 a) Solve $\left(x y^{2} \sin x y+y \cos x y\right) d x+\left(y x^{2} \sin x y-x \cos x y\right) d y=0$
[CO:3.L-3] $\mathbf{1 0}$
b) Solve Bernoulli's differential equation $\frac{d y}{d x}+x \sin 2 y=x^{3} \cos ^{2} y$
[CO:3.L-2] 10
Q. 6 a) Solve Cauchy's equation: $x^{2} \frac{d^{2} y}{d x^{2}}+x \frac{d y}{d x}+y=\log x \sin (\log x)$
[CO:4.L-3] $\mathbf{1 0}$
b) Solve: $\frac{d^{2} y}{d x^{2}}-2 \frac{d y}{d x}+y=x e^{x} \sin x$
[CO:4.L-3] $\mathbf{1 0}$
Q. 7 a) Using method of variation of parameters, solve $\frac{d^{2} y}{d x^{2}}-y=\frac{2}{1+e^{x}}$ [CO:4.L-3]10
b) Solve: $(3 x+2)^{2} \frac{d^{2} y}{d x^{2}}+3(3 x+2) \frac{d y}{d x}-36 y=3 x^{2}+4 x+1$
[CO:3.L-3]10

## End Semester Examination, Dec. 2022

## B. Tech. (BT only) - Second Semester

MATHEMATICS - II (BMA-203/MA-203)
Time: 3 hrs.

Max Marks: 100
No. of pages: 2

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Solve: $\frac{d y}{d x}+2 x y=x^{2}$
b) Solve: $\left(x^{2}+y^{2}+2 x\right) d x+2 y d y=0$
c) Find C. F. for the differential equation $y^{\prime \prime}+a^{2} y=0$.
d) Find P.I. for the differential equation $\left(D^{2}-4 D+3\right) y=\operatorname{Cos} 4 x$.
e) Form the partial differential Equation $z=f\left(x^{2}-y^{2}\right)$
f) Solve $x p+y q=z$
g) Evaluate $\int_{0}^{\infty} t^{2} e^{-2 t} \sin t d t$
h) Find the inverse laplace transform $\frac{e^{-\pi s}}{s^{2}+1}$
i) In the fourier series expansion of $f(x)=x^{2}$ in $(-\pi, \pi)$, what is the value of $b_{n}$
?
j) Three unbiased coins are tossed. What is the probability of getting at most two heads?
$2 \times 10$

## PART-A

Q. 2 a) Solve the following differential equations:
[CO-1] [L-2] 10 $\left(x y^{2} \operatorname{Sin} x y+y \cos x y\right) d x+\left(x^{2} y \operatorname{Sin} x y-x \cos x y\right) d y=0$
b) $\frac{d y}{d x}+x y=\cos x^{2}$
[CO-1] [L-2] 10
Q. 3 a) Solve $\frac{d^{2} y}{d x^{2}}+4 y=e^{x}+\sin 2 x$.
[CO-2] [L-3] 10
b) Solve $\frac{d^{2} y}{d x^{2}}-\frac{d y}{d t}=2 x+2 t, \frac{d x}{d t}+4 \frac{d y}{d t} x-3 y=0$
Q. 4 a) Solve the following differential equation: $\tan x p+\tan y q=\tan z$
[CO-3] [L-3] 10
b) Solve completely the equation $\frac{\partial^{2} y}{\partial t^{2}}=c^{2} \frac{\partial^{2} y}{\partial x^{2}}$, representing the vibration of a string of length $l$, fixed at the both ends, given that $y(0, t)=0, y(l, t)=$ $0 ; y(x, 0)=f(x)$ and $\frac{\partial}{\partial x} y(x, 0)=0,0<x<l$.
[CO-3] [L-3] 10

## PART-B

Q. 5 a) State and prove convolution theorem for laplace transform.
[CO-4] [L-2] 10
b) Solve the following differential equation by laplace transform.

$$
\begin{equation*}
\frac{d^{2} y}{d x^{2}}+4 y=\cos 2 x ; \text { given that } y(0)=0=\frac{d y}{d x}(0) . \tag{CO-4}
\end{equation*}
$$

Q. 6 a) Find the fourier series to represent the function $f(x)=x \sin x,-\pi<x<\pi$.
[CO-5] [L-3] 15
b) Find the fourier series expansion for $f(x)=2 \pi x, \quad 0 \leq x \leq 1$.
Q. 7 a) Three factories produce light bulbs to supply the market. Factory A produces $20 \%, 50 \%$ of the tools are produced in factories B and $30 \%$ in factory C. $2 \%$ of the bulbs produced in factory $A, 1 \%$ of the bulbs produced in factory $B$ and $3 \%$ of the bulbs produced in factory C are defective. A bulb is selected at random in the market and found to be defective. What is the probability that this bulb was produced by factory B?
b) From a pack of 52 cards, two cards are drawn together at random. What is the probability of both the cards being kings?
[CO-6] [L-3] 5

# End Semester Examination, Dec. 2022 

# B. Tech. - Second Semester <br> MATHEMATICS-II (BMA-202/BSC-MA-202) 

Time: 3 hrs.
Max
Marks: 100
No. of
pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Find the work done by the vector $\vec{V}=(x) i+(4 x) j+(6 x) k$ from $x=0$ to $x=2$
b) Find the zeros of $f(z)=\frac{z-5}{2}$
c) Find the complimentary function of the equation $\frac{d^{2} y}{d x^{2}}-y=7$
d) Find the particular integral of the equation $\left(D^{2}+4 D+3\right) y=25 e^{x}$
e) What is the necessary condition for a differential equation to be exact?
f) Express $x^{2}+2$ in terms of legendre polynomial.
g) Find the poles of $f(z)=\frac{e^{z}}{z^{2}+4}$
h) State Cauchy-Riemann equation for an analytic function in polar form
i) State residue theorem.
j) Find the solution of the differential equation: $y d x+x d y=0$
[CO-1,3] 2×10

## PART-A

Q. 2 a) Using double integration, find the area between the parabolas $y^{2}=4 a x$ and $x^{2}=4 a y$
[CO-1,2] 10
b) Evaluate $\iint_{S} \vec{F} \cdot \hat{n} d S$, where $\vec{F}=4 x \hat{i}-2 y^{2} \hat{j}+z^{2} \hat{k} \quad$ and $S$ is the surface bounding the region $x^{2}+y^{2}=4, z=0, z=4$
[CO-1,2] 10
Q. 3 Solve the following differential equations:
a) $\left(2 x y^{2}+y\right) d x+\left(x+2 x^{2} y-x^{4} y^{3}\right) d y=0$
[CO-1,3] 10
b) $p^{3}+2 x p^{2}-y^{2} p^{2}-2 x y^{2} p=0$
Q. 4 Solve the following differential equations:
a) $\frac{d^{2} y}{d x^{2}}+3 \frac{d y}{d x}+2 y=\sin ^{2} x$.
[CO-1,3] 10
b) $x^{2} \frac{d^{2} y}{d x^{2}}-3 x \frac{d y}{d x}+5 y=x^{3} \cos (\log x)$

## PART B

Q. 5 a) Determine analytic function $f(z)=u+i v$ whose real part is $e^{2 x}(x \sin 2 y-y \cos 2 y)$
[CO-1,4] 10
b) If $f(z)$ is a regular function of $z$, prove that

$$
\begin{equation*}
\left\{\frac{\partial}{\partial x}|f(z)|\right\}^{2}+\left\{\frac{\partial}{\partial y}|f(z)|\right\}^{2}=\left|f^{\prime}(z)\right|^{2} \tag{CO-1,4}
\end{equation*}
$$

Q. 6 a) State and prove cauchy's integral formula and hence evaluate $\int_{c} \frac{3 z+1}{z^{2}-7 z+2} d z$,

Where, c is the ellipse $4 x^{2}+9 y^{2}=1$
[CO-1,5] 10
b) By using residue theorem, evaluate $\iint_{c} \frac{1-\operatorname{Cos} 2(z-3)}{(z-2)^{3}} d z$, where c : $|z-2|=1$
Q. 7 a) Show that the function $f(z)=\left\{\begin{array}{cc}\frac{\left(x^{3}-y^{3}\right)+i\left(x^{3}+y^{3}\right)}{x^{2}+y^{2}}, & z \neq 0 \\ 0, & z=0\end{array}\right\}$ satisfies C-R equations at the origin but does not have a derivative at origin.
[CO-1,4] 10
b) Expand the function in laurent's series $f(z)=\frac{1}{(z+1)(z+2)}$ for $1<|z|<2$
[CO-1,5] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Second Semester MATHEMATICS-II (BMA-201/BSC-MA-201) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) A die is thrown twice and the sum of the numbers appearing is observed to be 6 . What is the conditional probability that the number 4 has appeared at least once?
[CO-1, 3] [L-2] 2
b) In a lottery, there are 25 prizes and 35 blanks. A lottery is drawn at random. What is the probability of getting a prize?
[CO-1, 3] [L-2] 2
c) A batch of 100 manufactured components is checked by an inspector who examines 11 components selected at random. If none of the 11 components is defective, the inspector accepts the whole batch. Otherwise, the batch is subjected to further inspection. What is the probability that a batch containing 11 defective components will be accepted? [CO-1,3] [L-2] 2
d) Four cards are drawn from a pack of 52 cards. Find the probability that
i) All are diamonds
ii) There is one card of each suit, and
iii) There are two spades and two hearts.
[CO-1, 4] [L-3] 3
e) Find $Q_{2}, D_{7}$ and $P_{10}$ for the data $40,42,44,46,48,50,52,54$.
$[\mathrm{CO}-1,3][\mathrm{L}-2] 3$
f) Find the area under the normal curve in each of the cases.
[CO-1, 5] [L-2] 2
i) $\mathrm{z}=-0.39$ and $\mathrm{z}=4.21$
ii) To the left of $z=-1.28$
g) A speaks truth in $75 \%$ cases and B in $80 \%$ cases. In what percentage of cases are they likely to contradict each other in stating the same fact?[CO-1, 4] [L-2] 2
h) The coin was tossed 375 times and head turned up 116 times. Test the hypothesis that the coin is unbiased.
[CO-1, 4] [L-2] 2
i) Find the value of c such that $f(x)=c e^{x}, 0<x<\infty$ represents probability density function.
[CO-1, 2] [L-2] 2

## PART-A

Q. 2 a) A bag contains 4 white, 5 red and 6 blue balls. 3 balls are drawn at random from the bag. Find the probability that all balls are red. [CO-1, 3] [L-2] 10
b) A random variable $x$ has the following probability distribution: $\quad[\mathrm{CO}-1,3][\mathrm{L}-3] \mathbf{1 0}$

| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathrm{P}(\mathrm{x})$ | a | 3 a | 5 a | 7 a | 9 a | 11 a | 13 a | 15 a | 17 a |

i) Determine the value of $a$
ii) Find $P(X<3), P(X \geq 3), P(2 \leq X<5)$
iii) What is the smallest value of $x$ for which $P(X<x)>0.5$
Q. 3 a) A car-hire firm has two cars, which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson distribution with
mean 1.5. Calculate the proportion of days on which neither car is used and the proportion of days on which some demand is refused. [CO-1, 4] [L-3]

10
b) In a Normal distribution 17\% of the items are under 30 and $17 \%$ are over 60. Find the mean and standard deviation of the distribution.
[CO-1, 4] [L-2] 10
Q. 4 a) Messages arrive in a Poisson manner at an average rate of six per hour. Find the probability for each of the following events:
[CO-1, 2] [L-3] 10
i) Exactly two messages arrive within one hour.
ii) No message arrives within one hour.
iii) At least three messages arrive within one hour.
b) A random variable $X$ has the following probability distribution

| $x$ | -3 | 6 | 9 |
| :---: | :---: | :---: | :---: |
| $P(x)$ | $1 / 6$ | $1 / 2$ | $1 / 3$ |

Find $\mathrm{E}(\mathrm{X}) \operatorname{AND} \mathrm{E}\left(X^{2}\right)$. Hence evaluate $\mathrm{E}\left((2 X+1)^{2}\right.$.
[CO-1, 2] [L-3] 10

## PART-B

Q. 5 a) The following table shows the distances between the worker's residence and their offices situated at Hyderabad.

| Distances | $0-20$ | $20-40$ | $40-60$ | $60-80$ | $80-100$ | $100-120$ | $120-140$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| No. Of | 5 | 9 | 10 | 15 | 10 | 4 | 3 |
| workers |  |  |  |  |  |  |  |

Calculate Kelly's Coefficient of Skewness.
[CO-1, 4] [L-2] 10
b) Calculate Rank correlation coefficient from the following data: [CO-1, 4] [L-3] $\mathbf{1 0}$

| x | 78 | 89 | 97 | 69 | 78 | 79 | 68 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| y | 72 | 73 | 93 | 88 | 83 | 94 | 72 |

Q. 6 a) In a survey of buying habits, 400 women shoppers are chosen at random in super market ' $A$ ' located in a certain section of the city. Their average weekly food expenditure is Rs. 250 with a standard deviation of Rs. 40. For 400 women shoppers chosen at random in super market ' $B$ ' in another section of the city, the average weekly food expenditure is Rs. 220 with a standard deviation of Rs. 55. Test a $1 \%$ level of significance whether the average weekly food expenditure of the two populations of shoppers are equal.[CO-1, 5] [L-3] 10
b) Fit a second degree parabola to the following data:
[CO-1, 5] [L-2] 10

| $x$ | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $y(x)$ | 1.1 | 1.3 | 1.6 | 2.0 | 2.7 | 3.4 | 4.1 |

Q. 7 a) The manufacturer of a certain make of electric bulbs claims that his bulbs have a mean life of 25 months with a standard deviation of 5 months. Random samples of 6 such bulbs have the following values: Life of bulbs in months: 24, 20, 30, 20, 20, and 18. Can you regard the producer's claim to valid at $1 \%$ level of significance? (Given $\mathrm{t}_{\mathrm{tab}}=4.032$ corresponding to $\alpha=5$ ). [CO-1, 6] [L-4]
b) The life time of electric bulbs for a random sample of 10 from a large consignment gave the following data: 4.2, 4.6, 3.9, 4.1, 5.2, 3.8, 3.9, 4.3, 4.4, 5.6 (in ' 000 hours). Can we accept the hypothesis that the average life time of bulbs is 4,000 hours?

Tables are attached:

Table 1: NORMAL TABLE AREAS UNDER THE STANDARD NORMAL

CURVE $=\frac{1}{\sqrt{2 \pi}} \int_{0}^{z} e^{-\frac{z^{z}}{2}} d z$

| \% | .00 | . 0.9 | . 98 | 0.4 | . 04 | . 05 | ,06 | . 07 | .08 | 09 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 0.0 | 0000 | 0040 | 0080 | . 0120 | . 0169 | 0199 | 0239 | 0279 | 0319 | 0369 |
| 0.1 | . 0398 | 0.438 | . 0478 | . 0517 | 0557 | 0595 | 0636 | 0675 | 0714 | 0754 |
| 0.2 | 0793 | . 18332 | . 0871 | 0010 | 0948 | .0987 | 1026 | 1084 | 1103 | 1141 |
| 0.3 | 1179 | 1217 | +1255 | 1293 | . 1331 | 1368 | .1406 | . 1443 | . 1480 | 1517 |
| 0.4 | .1554 | .1591 | 1628 | .1684 | I700 | . 1736 | . 1772 | 1808 | $1844$ | 1879 |
| 0.5 | 1915 | 1950 | 5985 | 2019 | 2054 | 2088 | 2129 | 2157 | 2190 | 2224 |
| 0 盛 | 2257 | 2291 | 2324 | 2957 | 2389 | 2422 | 2454 | 2485 | . 2517 | 2549 |
| 0.7 | 2580 | 2811 | 2842 | 2673 | $2704$ | 973,4 | 2764 | 2794 | 2823 | $2852$ |
| 0.8 | 2881 | 24510 | 2939 | $2907$ | 2995 | 3029 | 3051 | 3078 | . 3106 | $3133$ |
| 09 | 3179 | 3186 | 3212 | 3238 | 32854 | 3289 | 3315 | 8340 | -3365 | $3389$ |
| 1.0 | 3413 | 3438 | 3461 | 3485 | 3508 | 3531 | 3554 | $357 \%$ | 3509 | 8621 |
| 1.1 | 3643 | 3665 | 3886 | 3708 | 8727 | 3749 | 3770 | 3730 | . 3810 | $3830$ |
| 1.2 | . 3848 | 3869 | . 3888 | $8007$ | $3925$ | $3944$ | $3 \log 2$ | 3980 | \$3997 | $4016$ |
| 13 | 4032 | 4049 | 406i | . 4082 | +4092 | 4115 | 4131 | -4147 | $4162$ | $4177$ |
| 1.4 | 4192 | 4207 | 4222 . | 4296 | 4251 | 4255 | 4279 | . 4292 | $45006$ | 4319 |
| 15 | 4332 | 4345 | 4957 | 4370 | 4382 | 4994 | 4406 | 4418 | 4429 | 4441 |
| 1.6 | 4452 | 4468 | .1474 | 4484 | 4495 | . 4505 | 4515 | . 4525 | $4535$ | $4545$ |
| 1.7 | 4564 | 4564 | 4573 | 46.82 | . 4591 | $4009$ | 4008 | 4616 | $4086$ | $4633$ |
| 1.18 | 4611 | 4641 | 4656 | 4564 | 4671 | t628 | 4685 | $4698$ | $4699$ | $4706$ |
| 1.9 | 4713 | 4719 | 4736 | 1732 | 4738 | 4744 | 4750 | $4755$ | $4761$ | $4767$ |
| 20 | 4772 | 4778 | 4783 | 4788 | 4793 | $4798$ | 4403 |  |  |  |
| 2.1 | 4821 | 4820 | 4830 | 4884 | 48311 | 4842 | 4840 |  |  |  |
| 2.1 | 4861 | 4 ¢ 51 | 4868 | $4871$ | $4875$ | 4878 | $4881$ | $4884$ | 4887 <br> 4913 | 4890 |
| 2,3 | 4893 | $4891$ | $4808$ | $1901$ | $4904$ | t106 | $4909$ | $4912$ | $4913$ | $\begin{aligned} & 4916 \\ & 4936 \end{aligned}$ |
| 24 | 4918 | $4920$ | $4922$ | $4925$ | $4927$ | $4929$ | $49: 1$ | $4932$ | $\begin{aligned} & 4934 \\ & 4951 \end{aligned}$ | $\begin{aligned} & 4936 \\ & 4952 \end{aligned}$ |
| 25 | 4938 | 4240 | $49+1$ | $4843$ | 4045 | .49.6 | 4948 |  |  |  |
| 2.6 | 4953 | . 1965 | 1956 | 495\% | 1969 | 41830 | 1081 | . 4902 | 4963 | . 4964 |
| 2.7 | 4915 | 49616 | 4967 | 4968 | 4869 | 41070 | 4971 | 4972 | 4973 4980 | $48 \% 4$ 4081 |
| 2.8 | 4974 | 4975 | 4976 | A97\% | 1977 | 4978 | 4979 | 4979 4985 | 4980 4986 | . 4988 |
| 2.11 | 4881 | A982 | 1982 | 4983 | 4854 | 4084 | 4985 | 4985 |  |  |
| $36$ | $4987$ | $4987$ | $4087$ | TVEs | $4088$ | $4089$ | $8999$ $4992$ | $\begin{array}{r} 6989 \\ 4998 \end{array}$ | 4993 | $4990$ |
| 31 | $4090$ | $4191$ | $4991$ | $4901$ | $4992$ | $4992$ |  |  |  |  |

Table 2 : SIGNIFICANT VALUES $t_{v}(\alpha)$ OF t-DISTRIBUTION
(TWO TAIL AREAS) $\left||t|>t_{v}(\alpha)\right]=\alpha$

| d.f. <br> (v) | Probability (Level of Significance) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 0.50 | 0.10 | 0.05 | 0.02 | 0.01 | 0.001 |
| 1 | 1.00 | 6.31 | 12.71 | 31.82 | 63.66 | 636.62 |
| 2 | 0.82 | $0.92$ | 4.30 | 6.97 | 6.98 | 31.60 |
| 3 | 0.77 | 2.32 | 3,18 | 4.54 | 5.84 | 12.94 |
| 4 | 0.74 | 2.13 | 2.78 | 3.75 | 4.60 | 8.61 |
| 5 | 0.73 | 2.02 | 2.57 | 3.37 | 4.03 | 6.86 |
| 6 | 0.72 | 1.94 | 2.45 | 3.14 | 3.71 | 5.98 |
| 7 | 0.71 | 1.90 | 2.37 | 3.00 | 3.50 | 5.41 |
| 8 | 0.71 | 1.80 | 231 | 2.90 | 3.36 | 5.04 |
| 9 | 0.70 | 1.83 | 226 | 282 | 3.25 | 4.78 |
| 10 | 0.70 | 1.81 | 223 | 2.76 | 3.17 | 4.59 |
| 11 | 0.70 | 1.80 | 2.20 | 2.72 | 3.11 | 4.44 |
| 12 | 0.70 | 1.78 | 2.18 | 2.68 | 3.06 | 4.32 |
| 13 | 0.69 | 1.77 | 2.16 | 2.05 | 3.01 | 4.22 |
| 14 | 0.69 | 1.76 | 2.15 | 2.62 | 2.98 | 4.14 |
| 15 | 0.69 | 1.75 | 2.13 | 2.60 | 2.95 | 4.07 |
| 16 | 0.69 | 1.75 | 2.12 | 2.58 | 2.92 | 4.02 |
| 17 | 0.69 | 174 | 2.11 | 2.57 | 2.90 | $3.97$ |
| 18 | 0.69 | 1.73 | 2.10 | 2.55 | 2.88 | 3.92 |
| 19 | 0.69 | 1.73 | 2.09 | 2.54 | 2.86 | 3.88 |
| 20 | 0.69 | 178 | 209 | 2.53 | 2.85 | 3.85 |
| 21 | 0.69 | 1.72 | 2.08 | 2.52 | 2.83 | 3.88 |
| 22. | 0.69 | 172 | 2.07 | 2.51 | 2.42 | 3.79 |
| 23 | 0.69 | 171 | 2.07 | 2.50 | 2.81 | 3.77 |
| 24 | 0.68 | 171 | 2.06 | 2.49 | 2.80 | 3.75 |
| 25 | 0.68 | 1.71 | 2.06 | 2.49 | 2.79 | 3.73 |
| 26 | $0.68$ | 1.71 | 2.06 | 2.48 | 3.78 | 3.71 |
| 27 | $0.68$ | 1.70 | 2.05 | 2.47 | 2.77 | 3.69 |
| 28 | 0.68 | $1.70$ | 2.05 | 2.47 | 2.76 | 3.67 |
| 29 | 0.88 | 1.70 | 2.05 | 2.45 | 276 | 3.65 |
| 30 | 0.68 | 1.70 | 20.4 | 2.46 | 275 | 3.65 |
| $\cdots$ | 0.67 | 1.65 | 1.96 | 2.83 | 2.58 | 3.29 |

Table 3: CHI-SQUARE ( $\chi^{2}$ )
Significant Values $\chi^{2}(\alpha)$ of $\chi^{2}$ Distribution Right Tail Areas for Given Probability $\alpha$,

$$
\mathrm{P}=\mathrm{P}_{\mathrm{r}}\left(\chi^{2}>\chi^{2}(\alpha)\right)=\alpha
$$

And is Degrees of Freedom (d.f.)

| Degree of freedom (v) | Probisbility (Level of Significance) |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $0=.99$ | 0.95 | 0.50 | 0.10 | 0.05 | 0.02 | 0.01 |
| 1 | .000157 | 00398 | 455 | 2.706 | 3841 | 5.214 | 6.635 |
| 2 | . 0201 | 108 | 1.386 | 4.605 | 5.991 | 7.824 | 9.210 |
| 3 | . 115 | 352 | 2.366 | 6.251 | 7815 | 9.837 | 11.341 |
| 4 | 297 | 711 | 3.357 | 7.779 | 9.488 | 11.668 | 13.277 |
| 5 | 554 | 1.145 | 4.351 | 9.236 | 11.070 | 13,388 | 15.086 |
| 6 | 872 | 2.635 | 5.348 | 10.645 | 12.592 | 15.038 | 16.812 |
| 7 | 1.239 | 2167 | 6.3 .46 | 12.017 | 14.067 | 16.622 | 18.475 |
| 8 | 1.646 | 2.733 | 7.344 | 13.362 | 15.507 | 18.168 | 20.090 |
| 9 | 2.088 | 3.325 | 8.343 | 14.684 | 16.919 | 19.679 | 21.669 |
| 10 | 2.558 | 3.940 | 9340 | 15.987 | 18.307 | 21.161 | 23.209 |
| 11 | 3.053 | 4.575 | 10.341 | 17.275 | 19.675 | 22.618 | 24.725 |
| 12 | 3.571 | 5.226 | 11.340 | 18.549 | 21.026 | 24.084 | 26.217 |
| 13 | 4.108 | 5.898 | 12.340 | 19.812 | 22.362 | 25.472 | 27.688 |
| 14 | 4.660 | 6.571 | 13.339 | 21.064 | 23.685 | 26.873 | 29.141 |
| 15 | 4.229 | 7.261 | 14.339 | 22.307 | 24.906 | 28.259 | 30.578 |
| 16 | 5.812 | 7.962 | 15.338 | 23.542 | 26.296 | 29.633 | 32.000 |
| 17 | 6.408 | 8.672 | 15.338 | 24.769 | 27.587 | 30.985 | 33,409 |
| 18 | 7.015 | 9390 | 17.338 | 25.989 | 28869 | 32.3.46 | 34.805 |
| 19 | 7.838 | 10.117 | 18.338 | 27.203 | 30.144 | 33.687 | 36.191 |
| 20 | 8.260 | 10.851 | 19.337 | 28.412 | 31.410 | 38.020 | 37.566 |
| 21 | 8897 | 11.591 | 20.337 | 29.615 | 32.671 | 36.343 | 38.932 |
| 22 | 9.512 | 12,338 | 21.337 | 30813 | 33.924 | 37.659 | 40.289 |
| 23 | 10.196 | 13.091 | 32:397 | 32.007 | 35.172 | 38.968 | 41.638 |
| 24 | 10.850 | 13.8 .48 | 23.397 | 32.196 | 36.415 | 40.270 | 42.980 |
| 25 | 11:584 | 14.611 | 22.337 | 34.382 | 37.65 | 41.566 | 44.314 |
| 26 | 12.188 | 15.379 | 25.336 | 35.363 | 38.885 | 41878 | 45.642 |
| 27 | 12:879 | 16.151 | 25.836 | 35.711 | 40.113 | 41.140 | 46.963 |
| 28 | 18.055 | 16.928 | 27.398 | 37.916 | 41.337 | 45.419 | 48.278 |
| $29$ | $19.206$ | 17.708 | 28385 | 39.087 | 42.537 | 46.683 | 49.688 |
| 30 | 14983 | 18,493 | 29.330 | 40.256 | 43.773 | 47.968 | 50.892 |

Note. For descrum of treedom ( $v$ ) ervater than 30 , the quantity $\sqrt{2 x^{2}}-\sqrt{2 v-1}$ miey be used as a narma variate With asit Yurianus

# End Semester Examination, Dec. 2022 

## B. Tech. - First Semester <br> MATHEMATICS FOR BIO-TECHNOLOGY - I (BMA-103)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Find the determinant of the matrix $A==\left[\begin{array}{ccc}14 & 28 & 6 \\ 0 & 60 & 1 \\ 7 & 0 & 80\end{array}\right]$
b) If $A=\left[\begin{array}{lll}1 & 2 & 3 \\ 0 & 2 & 5 \\ 0 & 0 & 3\end{array}\right]$. What are the eigen values of $A^{2}$ ?
c) Express the complex number $\frac{(-5+\sqrt{3} \mathrm{i})}{1-\sqrt{3 \mathrm{i}}}$ in the form of $\mathrm{a}+\mathrm{ib}$.
d) Check the convergence of the series: $\sum_{x=1}^{\infty} \frac{1}{x^{-3}}$
e) Draw Graph of $y=2 \cos x$
f) Find the derivative of $y=x \log x$
g) If $x^{y}+y^{x}=a^{b}$, Show that $\frac{d y}{d x}=\frac{y x^{y-1}+y^{x} \log y}{x^{y} \log x+x y^{x-1}}$
h) If $y=\frac{1}{2 x+3}$, find $y_{10}$
i) Evaluate $\int \sin x \cos x d x$
j) Find area of unit circle using double integrals.

## PART-A

Q. 2 a) Investigate the value of $\lambda$ and $\mu$ so that the equations:
[CO-1] [L-2] 10

$$
2 x+3 y+5 z=9 ; 7 x+3 y-2 z=8 ; 2 x+3 y+\lambda z=\mu
$$

has i) No solution, ii) unique solution and iii) an infinite number of solutions.
b) Find the inverse of a matrix $A=\left[\begin{array}{ccc}1 & -4 & 3 \\ 1 & 1 & 1 \\ 3 & 0 & 2\end{array}\right]$
[CO-1] [L-3] 10
Q. 3 a) Prove that $\tan 3 x \tan 2 x \tan x=\tan 3 x-\tan 2 x-\tan x$
[CO-2] [L-3] 10
b) Prove that : $\tan \left(142 \frac{1}{2}\right)^{o}=2+\sqrt{2}-\sqrt{3}-\sqrt{6}$
[CO-2] [L-2] 10
Q. 4 a) Test for the convergence of the series: $\sum_{n=1}^{\infty} \frac{1}{n^{3}+1} x^{2 n}$
[CO-3] [L-2] 10
b) Test for absolutely and conditional convergence: $\sum(-1)^{n} \sqrt{(n+1)^{3}}$
[CO-5] [L-2] 10

## PART-B

Q. 5 a) Calculate the approximate value of $\sqrt{17}$ to four decimal places by the application of Taylor's series.
b) Expand: $\cos \left(m \sin ^{-1} x\right)$ by Maclaurin's theorem as far as $\mathrm{x}^{5}$
[CO-4] [L-2] 10
Q. 6 a) If $u=\log _{e}\left(\frac{x^{4}+y^{4}}{x+y}\right)$, show that $x \frac{\partial u}{\partial x}+y \frac{\partial u}{\partial y}=3$
[CO-5] [L-3] 10
b) Find the extreme value of the function: $f(x)=2 x^{3}-6 x^{2}+6 x+5$
[CO-5] [L-3] 10
Q. 7 a) Change the order of integration in the integral:

$$
\begin{equation*}
\int_{0}^{1} \int_{2 y}^{2} e^{-x^{2}} d y d x \tag{CO-6}
\end{equation*}
$$

b) Using triple integral, find the volume of the sphere $x^{2}+y^{2}+z^{2}=a^{2}$
[CO-6] [L-3] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - First Semester <br> MATHEMATICS FOR BIO-TECHNOLOGY - I (BMA-103)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. $1 \quad$ a) Find the determinant of the Matrix $A=\left[\begin{array}{ccc}1 & 1 & -3 \\ 2 & 5 & 3 \\ -2 & -4 & -4\end{array}\right]$
b) Verify the Cayley Hamilton theorem of the Matrix $A=\left[\begin{array}{ll}3 & 3 \\ 2 & 4\end{array}\right]$
c) Express the $z=2-i$ in polar form.
d) Find the modulus and amplitude of $z=\tan \alpha-i$
e) Write the necessary condition for a series to be convergent.
f) Expand $\operatorname{Cos}^{-1}(x)$ in powers of $x$
g) Find the nth derivative of $\log (a x+b)$
h) Find the differentiation of $f(x)=x^{3} \tan ^{-1} x$
i) Find Limit of the $\lim _{(x, y) \rightarrow(0,0)} \frac{\left(1+x^{2}\right) \operatorname{Cos} y}{y}$
j) Evaluate $\int \log 2 x d x$.

## PART-A

Q. 2 a) Find the rank of the matrix $A=\left[\begin{array}{cccc}1 & -1 & 2 & -3 \\ 3 & -1 & 0 & 2 \\ 0 & 3 & 0 & 4 \\ 0 & 4 & 0 & 2\end{array}\right]$
b) Find the eigen values and the corresponding eigen vectors of the matrix:

$$
A=\left[\begin{array}{ccc}
3 & 2 & -1  \tag{CO-1}\\
4 & 2 & 6 \\
7 & 4 & 5
\end{array}\right]
$$

Q. 3 a) Separate into real and imaginary parts: $\cos (x+i y)$
b) Find the general value of $\log (i)$
Q. 4 a) Discuss the convergence of the following series:

$$
\begin{equation*}
x+\frac{2^{2} x^{2}}{2!}+\frac{3^{3} x^{3}}{3!}+\frac{4^{4} x^{4}}{4!}+\frac{5^{5} x^{5}}{5!}+ \tag{CO-3}
\end{equation*}
$$

b) Prove that the series $x-\frac{x^{2}}{2}+\frac{x^{3}}{3}-\frac{x^{4}}{4}+\ldots \ldots \ldots \ldots \ldots \ldots$. converges absolutely.
[CO-3] [L-3] 10

## PART-B

Q. 5 a) If $\mathrm{y}=e^{m \cos ^{-1}(x)}$, calculate $y_{n}(0)$ by using Leibnitz theorem.
[CO-4] [L-3] 10
b) Use Taylor's theorem to express the polynomial $f(x)=3 x^{3}+2 x^{2}+x-5$ in terms of $(x+1)$
[CO-4] [L-3] 10
Q. 6 a) If $u=\sin ^{-1}\left(\frac{x^{2} y^{2}}{x+y}\right)$, show that $x \frac{\partial u}{\partial x}+y \frac{\partial u}{\partial y}=3 \tan u$
[CO-5] [L-3] 10
b) Prove that if the perimeter of a triangle is constant, its area is maximum when the triangle is equilateral.
[CO-5] [L-2] 10
Q. 7 a) Prove that $\int_{1}^{2} \int_{3}^{4}\left(x y+e^{y}\right) d y d x=\int_{3}^{4} \int_{1}^{2}\left(x y+e^{y}\right) d y d x$.
[CO-6] [L-3] 10
b) Evaluate $\int_{0}^{1} \int_{0}^{\sqrt{1-x^{2}}} \sqrt{\sqrt{1-x^{2}-y^{2}}} d x d y d z$
[CO-6] [L-3] 10

## End Semester Examination, Dec. 2022

## B. Tech. - First Semester

MATHEMATICS-I (For All other branches except CSE \& BT) (BMA102)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Evaluate: (a) $\Gamma\left(\frac{7}{2}\right)$
(b) $B(7,9)$
[CO:1]
b) Evaluate: $\int_{0}^{\frac{\pi}{2}} \sqrt{\tan \theta} d \theta$
c) UsingCauchy's mean value theorem, $f(x)=e^{x}$ and $g(x)=e^{-x}$, find c .
d) Find the $n^{t h}$ derivative of $f(x)=\cos ^{2}(4 x+3)$
e) For what value of $a, \vec{V}=(x+7 y) i+(5 y-2 z) j+(2 x+a z) k$ is irrotational vector
f) What is the half range cosine series for $f(x)=1$ in $(0,2)$ ?
g) What are the conditions for the existence of Fourier series?
h) Find $\frac{\partial u}{\partial r}$ and $\frac{\partial u}{\partial \theta}$, if $u=r \sin (r \sin \theta)$
i) If $A=\left[\begin{array}{lll}1 & 2 & 4 \\ 0 & 9 & 7 \\ 0 & 0 & 3\end{array}\right]$ what are the eigen values of $A^{-1}$.
j) For what value of $k$, the given matrix has rank 2 , where $A=\left[\begin{array}{lll}1 & 1 & 4 \\ 0 & 0 & 7 \\ K & 3 & 8\end{array}\right]$

## PART-A

Q. 2 a) Evaluate: $\int_{-\infty}^{-1} \frac{1}{x^{4}} d x$
[CO:1] 5
b) Using the applications of beta and gamma function, Evaluate:

$$
\begin{equation*}
\int_{0}^{1} x^{10}\left(1-x^{3}\right)^{12} d x \tag{CO:1}
\end{equation*}
$$

c) Find the surface of the solid generated by the revolution of the asteroid $x^{2 / 3}+y^{2 / 3}=a^{2 / 3}$ or $x=a \cos ^{3} t ; y=a \sin ^{3} t$ about $x$-axis.
[CO:1] 10
Q. 3 a) Find the maximum and minimum values of $f(x)=8 x^{4}-21 x^{3}+10 x^{2}$.
b) Find the value of $a$ and $b$ such that $\lim _{x \rightarrow \infty}\left[\frac{x(1+a \cos x)-b \sin x}{x^{3}}\right]=1$
c) Expand $\cos \left(m \sin ^{-1} x\right)$ by using Maclaurin's series
Q. 4 a) Discuss the convergence of series: $1+\frac{x}{2}+\frac{2!}{3^{2}} x^{2}+\frac{3!}{4^{3}} x^{3}+\frac{4!}{5^{4}} x^{4}+\cdots$
b) Expand $f(x)=x \sin x ; 0<x<2 \pi$ in terms of fourier series
[CO:3] 12

## PART-B

Q. 5 a) If $x^{x} y^{y} z^{z}=c$, prove that $\frac{\partial^{2} z}{\partial x \partial y}=-\frac{1}{x\left(\log _{e} x\right)}$
b) Find the directional derivative of $f(x, y, z)=x z y^{2}+x y z^{3}$ at the point $(-2,0,1)$ in the direction of the vector $3 \hat{j}-4 \hat{k}$
Q. 6 a) Investigate the value of $\lambda$ and $\mu$ so that the equations:
$x+y+z=6 ; 2 x+2 y+3 z=10 ; 3 x+2 y+\lambda z=\mu$
have (i) No solution, (ii) unique solution and (iii) an infinite number of solutions.
[CO:5] 8
b) Find the eigen values and the corresponding eigen vectors of $\mathrm{A}=\left[\begin{array}{ccc}8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3\end{array}\right]$
[CO:5] 12
Q. 7 a) If $u=\operatorname{cosec}\left(\frac{x^{\frac{1}{2}}+y^{\frac{1}{2}}}{x^{\frac{1}{3}}+y^{\frac{1}{3}}}\right)^{\frac{1}{2}}$, find $x^{2} \frac{\partial^{2} u}{\partial x^{2}}+2 x y \frac{\partial^{2} u}{\partial x \partial y}+y^{2} \frac{\partial^{2} u}{\partial y^{2}}$
b) Find the characteristic equation of the matrix $A=\left[\begin{array}{ll}1 & 4 \\ 2 & 3\end{array}\right]$ and use it to

Find the matrix represented by $A^{5}+5 A^{4}-6 A^{3}+2 A^{2}-4 A+7 I$.
[CO:4] 10

## End Semester Examination, Dec. 2022

## B. Tech. - First Semester

MATHEMATICS-I (For All other branches except CSE \& BT) (BMA102)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Evaluate: (a) $\Gamma\left(\frac{3}{2}\right)$
(b) $B(4,6)$
[CO:1L-3]
b) Evaluate: $\int_{0}^{\frac{\pi}{2}} \sqrt{\tan \theta} d \theta$
c) If in Cauchy's mean value theorem, $f(x)=e^{x}$ and $g(x)=e^{-x}$, show that c is the arithmetic mean between $a$ and $b$.
d) Find the $n^{t h}$ derivative of $f(x)=\sin (-x+3)$
e) Write the necessary condition for a series to be Convergent.
f) What is the half range sine series for $f(x)=T$ in $(0,2)$
g) For what value of $a$, the [CO:3 L-3] $\vec{F}=\left(a x^{2} y+y z\right) \hat{i}+\left(x y^{2}-x z^{2}\right) \hat{j}+\left(2 x y z-2 x^{2} y^{2}\right) \vec{k}$ is solenoidal.
vector
h) Find $\frac{\partial u}{\partial r}$ and $\frac{\partial u}{\partial \theta}$, if $u=r \cos (r \sin \theta)$
i) If $A=\left[\begin{array}{lll}2 & 2 & 3 \\ 0 & 2 & 5 \\ 0 & 0 & 4\end{array}\right]$ what are the eigen values of $A^{-1}$.
[CO:5 L-3]
j) For what value of $k$, the given matrix has rank 2 , where $\mathrm{A}=\left[\begin{array}{lll}1 & 5 & 4 \\ 0 & 0 & 2 \\ \mathrm{k} & 3 & 5\end{array}\right]$ [CO:5 L-]

## PART-A

Q. 2 a) State and prove the relation between Beta and Gamma Function.
[CO:1 L-2] 10
b) Find the volume of the solid obtained by revolving the ellipse $\frac{x^{2}}{a^{2}}+\frac{y^{2}}{b^{2}}=1$ about $x$-axis.
[CO:1 L-2] 10
Q. 3 a) Find the extreme values of $x-\sin 2 x+\frac{\sin 3 x}{3}$ in $[-\pi, \pi]$
[CO:2 L-2] 10
b) Prove that:

$$
\cos \left(m \sin ^{-1} x\right)=1-\frac{m^{2}}{2!} x^{2}-\frac{m^{2}\left(2^{2}-m^{2}\right)}{4!} x^{4}-\frac{m^{2}\left(2^{2}-m^{2}\right)\left(4^{2}-m^{2}\right)}{6!} x^{6}+. .
$$

[CO:2 L-4] 10
Q. 4 a) Discuss the convergence of series: $\frac{x}{1}+\frac{1}{2} \cdot \frac{x^{3}}{3}+\frac{1.3}{2.4} \cdot \frac{x^{5}}{5}+\frac{1.3 .5}{2.4 .6} \cdot \frac{x^{7}}{7}+\cdots \quad$ [CO:3 L-2,3] 10
b) Find the Fourier sine series for $f(x)=x^{2}, 0<x<l$

## PART-B

Q. 5 a) If $x^{x} y^{y} z^{z}=C$, prove that for $x=y=z, \frac{\partial^{2} z}{\partial x \partial y}=(-x \ln (e x))^{-1}$
[CO:4 L-4] 10
b) If $\vec{r}=x \hat{i}+y \hat{j}+z \hat{k}$ and $\|\vec{r}\|=r$, prove that
i) $\operatorname{div}\left(\frac{\vec{r}}{r^{3}}\right)=0$
ii) $\operatorname{div}\left(r^{n} \vec{r}\right)=(n+3) r^{n}$
[CO:4 L-4] 10
Q. 6 a) Investigate the value of $\lambda$ and $\mu$ so that the equations:

$$
x+y+z=6 ; x+2 y+3 z=10 ; x+2 y+\lambda z=\mu
$$

have (i) No solution, (ii) unique solution and (iii) an infinite number of solutions.
b) Find the Eigen values and Eigen vectors of the matrix: $\mathrm{A}=\left[\begin{array}{ccc}2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2\end{array}\right]$
[CO:5 L-4] 10
Q. 7 a) If $u$ is a homogeneous function of $x$ and $y$ of degree $n$, then prove that

$$
x^{2} \frac{\partial^{2} u}{\partial x^{2}}+2 x y \frac{\partial^{2} u}{\partial x \partial y}+y^{2} \frac{\partial^{2} u}{\partial y^{2}}=n(n-1) u
$$

[CO:4 L-4] 10
b) Find the characteristic equation of the matrix $A=\left[\begin{array}{ll}1 & 4 \\ 2 & 3\end{array}\right]$ and use it to express $A^{5}-4 A^{4}-7 A^{3}+11 A^{2}-A-10 I$ as a linear polynomial in A .

# End Semester Examination, Dec. 2022 

# B. Tech. - First Semester <br> MATHEMATICS-I / APPLIED MATHEMATICS-I <br> (BSC-MA-101/BMA-101/ MA-101A) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Evaluate $\int_{0}^{1}\left(1-x^{3}\right)^{-1 / 2} d x$.
b) $\operatorname{Prove} \sqrt{n}=(n-1)$ !.
c) Evaluate $\lim (\cot x) / \log x$.
d) Find $A^{-1}$, if $A=\left(\begin{array}{cc}1 & 2 \\ 2 & -3\end{array}\right)$.
e) Explain composition of two maps.
f) State the properties of definite integrals.
g) For what value of K, the given matrix has rank 2; $A=\left(\begin{array}{ccc}1 & 5 & 4 \\ 0 & 3 & 2 \\ k & 13 & 10\end{array}\right)$
h) State linear dependence of vectors.
i) Prove that $L: R^{2} \rightarrow R^{1}$ defined by $L\left(x_{1}, x_{2}\right)=x_{1}+x_{2}$ is a L.T.
j) State Cauchy's mean value theorem.

## PART-A

Q. 2 a) Prove that: $\beta(m, n)=\frac{\Gamma(m) \Gamma(n)}{\Gamma(m+n)}$.
b) Find the volume of the solid obtained by revolving one arc of the cycloid $x=a(\theta+\sin \theta), y=a(1+\cos \theta)$ about x-axis.
Q. 3 a) Show that the maximum value of $\left(\frac{1}{x}\right)^{x}$ is $(e)^{1 / e}$.
b) Expand $f(x)=\log (1+x), \forall x \in[-1,1)$.
Q. 4 a) Test the consistency of the following system of equations and find the solution, if exist:
$4 x_{1}-x_{2}=12 ;-x_{1}+5 x_{2}-2 x_{3}=0 ;-2 x_{2}+4 x_{3}=-8$
b) Solve by Gauss-elimination methods: $10 \mathrm{X}+\mathrm{Y}+\mathrm{Z}=12 ; \quad \mathrm{X}+10 \mathrm{Y}+\mathrm{Z}=12$; $X+Y+10 Z=12$
Q. 5 a) Show that the matrices $\left[\begin{array}{ll}1 & 5 \\ 5 & 2\end{array}\right],\left[\begin{array}{ll}2 & 1 \\ 1 & 3\end{array}\right],\left[\begin{array}{cc}4 & -2 \\ -2 & 6\end{array}\right]$ form a basis of $V(R)$.
b) Verify Rank Nullity Theorem for the linear transformation $T(x, y)$ where $T: R^{2} \rightarrow R^{3}$ is defined by $T(x, y)=(x+y, x-y, y)$
Q. 6 a) Prove that the sum of two symmetric (skew symmetric) matrices is also symmetric (skew symmetric).
b) Find the Eigen values and Eigen vectors of the matrix: $A=\left[\begin{array}{ccc}4 & 2 & -2 \\ -53 & 2 \\ -24 & 1\end{array}\right]$.
Q. 7 a) Find an invertible matrix $P$ such that $P^{-1} A P$ is a diagonal matrix, where $A=\left[\begin{array}{lll}3 & 2 & 0 \\ 2 & 0 & 0 \\ 1 & 0 & 2\end{array}\right]$.
. Also write down the diagonal matrix.
b) Find the distance from the point $y=(0,0,0,1)$ to the subspace $V \subset R^{4}$ spanned by the vectors $x_{1}=(1,-1,1,-1) x_{2}=(1,1,3,-1)$ and $x_{3}=(-3,7,1,3)$ using Gram-Schmidt Orthogonalization process.

# End Semester Examination, Dec. 2022 

## B. Tech. - First Semester <br> MATHEMATICS-I (BMA-101)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Show that row vectors of matrix $\left(\begin{array}{ccc}2 & -3 & 1 \\ 4 & 3 & 1 \\ -3 & 1 & 9\end{array}\right)$ are linearly independent.
[CO-3, 5] [L-2]
b) Prove that the set of all solutions ( $a, b, c$ ) of the equation $a+b+2 c=0$ is $a$ subspace of the vector space
[CO-2, 4, 5] [L-3]
c) Prove that $\left[\int_{0}^{\infty} e^{-a x} x^{n-1} d x=\frac{\Gamma(n)}{a^{n}}\right]$
[CO-2] [L-2]
d) Find the sum and product of eigen values of $A=\left[\begin{array}{ccc}2 & 1 & 7 \\ 0 & -1 & 4 \\ 0 & 5 & 6\end{array}\right]$
e) Show that the matrix $A=\left[\begin{array}{ll}1 & 5 \\ 0 & 1\end{array}\right]$ is not diagonalizable over C.
f) Find the $n^{t h}$ derivative of $\frac{1}{a x+b}$
g) Evaluate $\operatorname{Lim}_{x \rightarrow 0} \frac{e^{-x}-e^{\sin x}}{x-\sin x}$
h) Test the existence of the integral: $\int_{1}^{\infty} \frac{1}{x \ln (x)} d x$
i) Evaluate $\int_{0}^{\pi / 2} \sin ^{3 / 2} \theta \llbracket \cos ^{2} \theta \llbracket d \theta$
j) Find the rank of matrix $A=\left(\begin{array}{ccc}1 & 2 & 3 \\ 2 & 4 & 7 \\ 3 & 6 & 10\end{array}\right)$

## PART-A

Q. 2 a) Express $\int_{0}^{1} x^{m}\left(1-x^{n}\right)^{k} d x$ in terms of Gamma function and hence evaluate $\int_{0}^{1} x^{7}\left(1-x^{3}\right)^{10} d x$
[CO-2, 3, 4, 5] [L-3] 10
b) Find the surface area of the solid generated by the revolution of the ellipse $x^{2}+4 y^{2}=16$ about its major axis.
[CO-2, 3, 4, 5, 6] [L-3] 10
Q. 3 a) Find the extreme values of $f(x)=x^{4}-62 x^{2}+120 x+9$.
[CO-1, 2, 3, 4, 5] [L-2] 10
b) Express $f(x)=e^{-a \sin ^{-1} x}$ about $x=0$
Q. 4 a) Investigate the value of $\lambda$ and $\mu$ so that the equations: $[C O-2,3,4,5][L-3] \mathbf{1 0}$ $x+y+z=6, x+2 y+3 z=10, x+2 y+\lambda z=\mu$
has i) No solution, ii) unique solution and iii) more than one solution
b) Solve: $10 x+y+z=12 ; x+10 y+z=12 ; x+y+10 z=12$
[CO-2, 4, 5] [L-3] 10

## PART-B

Q. 5 a) Verify Rank Nullity Theorem for the linear transformation $T(x, y)$ where $T: R^{4} \rightarrow R^{3}$ is defined by $T(x, y, z, t)=(x-y+z+t, x+2 z-t, x+y+3 z-3 t) .[C O-2,4,5][\mathrm{L}-3]$
b) Determine whether or not the following vectors form a Basis of $\mathrm{R}^{3}:\{(1,1,2)$, $(1,2,5),(5,3,4)\}$
[CO-2, 3, 5] [L-3] 10
Q. 6 a) Find the Eigen values and Eigen vectors of the matrix: $\left(\begin{array}{ccc}2 & -3 & +1 \\ 4 & 3 & 1 \\ -3 & 1 & 9\end{array}\right)$
[CO-2, 4, 5] [L-3] 10
b) Apply the Gram Schmidt process to the columns of matrix $\left(\begin{array}{lll}1 & 2 & 2 \\ 2 & 1 & 0 \\ 2 & 3 & 1\end{array}\right)$
[CO-2, 4, 5] [L-4] 10
Q. 7 a) Find a matrix $P$ which diagonalizes the matrix $A=\left(\begin{array}{ccc}1 & 1 & 1 \\ 0 & 2 & 1 \\ -4 & 4 & 3\end{array}\right)$ Verify $P^{-1} A P=D$ where D is the diagonal matrix.
[CO-2, 3] [L-3] 10
b) Find the linear transformation $T(x, y)$ where $T: R^{2} \rightarrow R^{3}$ is defined as: $T(2,-5)=(-1,2,3)$ and $T(3,4)=(0,1,5)$
[CO-3, 4] [L-3] 10

# End Semester Examination, Dec. 2022 

## B. Sc. (Interior Design) - First Semester <br> COLOR IN DÉCOR (BID-DS-106)

Time: 2 hrs.
Max Marks: 50
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Write short notes on the following:
a) Contrast of complement.
b) Tint, Tone and Shade.
c) Color Trends.
d) Paint.
e) Color Symbolism.

## PART-A

Q. 2 Color is an important element in an interior space, Comment. (In 250 words)
Q. 3 Discuss the seven types of contrast in detail.
Q. 4 Using colors draw and describe 'Color Wheel'.

## PART-B

Q. 5 Describe the factors which influence the way color schemes are used in planning an interior design.
Q. 6 Write various components to determine sustainability of a paint product.
Q. 7 Write a design concept and compose two wall paper designs for an interior space of a residence using any two principles of design and color as an element.

# End Semester Examination, Dec. 2022 

## B.Sc. (Interior Design) - First Semester <br> HARD MATERIALS AND FINISHES (BID-DS-105)

Time: 3 hrs.
Max Marks: 50
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) How do you compare the properties of Stone and Brick as a building material?

What options can you suggest for flooring in a school in different areas like class rooms, computer lab, toilets, principal room and music and dance room.
b) Discuss the various types of wood and seasoning methods. List the uses of laminate
and veneer.
[CO-1] [L-1] $5 \times 2$

## PART-A

Q. 2 Elaborate the need of use of materials that are made from renewable resources. How will you select materials from the market for flooring, wall coverings, furnishings etc for residential interiors which are eco friendly. [CO-2] [L-2] 10
Q. 3 Demonstrate the methods to calculate the budget estimate, their quantities and pricing for the renovation of the drawing/dining hall for a residential apartment. Client wishes to use wall paper on one wall and rest paint. In which units will you take out the quantities?
[CO-3] [L-3] 10
Q. 4 a) You are required to make a partition in a hall for an office and make a new conference room inside the hall. Suggest partition material and options to cover the walls/partitions.
b) Suggest the use of bamboo in interiors. Why is bamboo preferred over other materials in many areas?
[CO-4] [L-4] 5

## PART-B

Q. 5 a) List few organizations that support Green Materials. How green materials can be
used in the industry.
b) Explain sustainability. What is the need for sustainable materials in today's times?

List few examples where you can use green materials in residences. [CO-5] [L-5] 5
Q. 6 Prepare a proposal for the finishes of a interiors of a luxury villa in Delhi. Specify the composition of various materials for flooring, wall finishes and wood work. How does location and climate affect the choice of materials?
[CO-6] [L-6] 10
Q. 7 Write short notes on the following:
a) Types of boards.
b) Uses of paints.
c) Types of paints.
d) Use of metal in interiors.
e) Use of leather and suede as a soft material.

# End Semester Examination, Dec. 2022 <br> B. Sc. (Interior Design) - First Semester <br> HISTORY OF FURNITURE AND DECORATION-I (BID-DS-104) 

Time: 3 hrs.
Max Marks: 50
No. of pages: 1
Note: Attempt FIVE questions in all; Q. $\mathbf{1}$ is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 What is the importance of history of furniture?

## PART-A

Q. 2 Take elements from Egyptian civilization and design a study table and chair for your room.
Q. 3 Define Hindu period and also draw related sketches.
Q. 4 Draw Doric, Ionic and Corinthian Orders.

## PART-B

Q. 5 Take elements from gothic civilization and design a center table for your living room.
[CO-4] [L-4] 10
Q. 6 Define 'Greek Civilization'. Also, draw one furniture and give specification. [CO5] [L5] 10
Q. 7 Design an exhibition space with the elements taken from Hindu period. [CO-6] [L-6] 10

## End Semester Examination, Dec. 2022

## B. Tech. - Sixth Semester

## QUANTITATIVE APTITUDE AND PERSONALITY DEVELOPMENT-III

 (BHM-MC-009/HM603A/HM-603B)Time: 2 hrs.

Note: All questions are compulsory. Each question has FOUR options with ONE correct answer. Select the correct answer. All questions are of ONE mark each. There is no NEGATIVE marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.

| 101. | 102. | 103. | 104. | 105. | 106. | 107. | 108. | 109. | 110. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 111. | 112. | 113. | 114. | 115. | 116. | 117. | 118. | 119. | 120. |
| 121. | 122. | 123. | 124. | 125. | 126. | 127. | 128. | 129. | 130. |
| 131. | 132. | 133. | 134. | 135. | 136. | 137. | 138. | 139. | 140. |
| 141. | 142. | 143. | 144. | 145. | 146. | 147. | 148. | 149. | 150. |

Q. 1 Two dices are thrown at a time. What is the probability that the sum of the two numbers is 6 or 9?
[CO-1] [L-1]
a) $1 / 2$
b) $1 / 3$
C) $1 / 4$
d) $1 / 5$
Q. 2 In how many different ways can the letters of the word "TABLE" be arranged?
a) 120
b) 1440
c) 1800
d) 3600
[CO-1] [L-1]
Q. 3 There are five stations on a railway line. What is the number of different journey tickets that are required for railway authorities?
[CO-1] [L-1]
a) 30
b) 25
c) 35
d) 20
Q. 4 In how many ways the letters of the word 'CIRCUMSTANCES' can be arranged such that all vowels came at odd places and $N$ always comes at end? [CO-1] [L-1]
a) 1,51,200 ways
b) 5,04,020 ways
c) 72,000 ways
d) None of these
Q. 5 A problem is given to three students whose chances of solving it are $1 / 2,1 / 3$ and 1/4 respectively. What is the probability that the problem will be solved? [CO-1] [L-1]
a) $1 / 4$
b) $1 / 2$
c) $3 / 4$
d) $7 / 12$
Q. 6 Two cards are drawn together from a pack of 52 cards. The probability that one is a spade and one is a heart, is:
[CO-1] [L-1]
a) $3 / 20$
b) $29 / 34$
c) $47 / 100$
d) $13 / 102$
Q. 7 Two dice are thrown together . What is the probability that the sum of the number on the two faces is divided by 4 or 6.
$[C O-1][L-1]$
a) $7 / 18$
b) $14 / 35$
c) $8 / 18$
d) $7 / 35$
Q. 8 In a race, the odd favour of cars $P, Q, R, S$ are 1:3, 1:4, 1:5 and 1:6 respectively.

Find the probability that one of them wins the race.
[CO-1] [L-1]
a) $319 / 420$
b) $27 / 111$
c) $114 / 121$
d) $231 / 420$
Q. $9 f(x)=\left[(x-1)(x-2)^{3}(x-3)^{4}\right] /\left[(x-4)^{6}(x-5)^{5}\right]>0$
$[C O-1][L-1]$
a) $(-i n f, 1) \cup(2,3) \cup(5, i n f)$
b) $(-i n f, 1) \cup(2,3)$
c) $(2,3) \cup(5, i n f)$
d) None of these
Q. 10 Find the minimum value of $(x-2)(x-9)$ ?
[CO-1] [L-1]
a) $49 / 4$
b) 0
c) $11 / 4$
d) $-49 / 4$
Q. 11 Triangle $A B C$ is inscribed in a circle with centre $O$. If $A B=17 \mathrm{~cm}, B C=10 \mathrm{~cm}$ and $A C=9 \mathrm{~cm}$, find the length of $A O$.
[CO-2] [L-1]
a) 18 cm
b) 10.6 cm
C) 16 cm
d) 36 cm
Q. 12 A circle touches all four sides of quadrilateral $P Q R S$. If $P Q=11 \mathrm{~cm} . Q R=12 \mathrm{~cm}$ and $P S=8 \mathrm{~cm}$. Then what is the length of $R S$ ?
[CO-2] [L-1]
a) 7 cm
b) 15 cm
c) 9 cm
d) 7.3 cm
Q. 13 In the figure, $B A C=B C D, A B=32 \mathrm{~cm}$ and $B D=18 \mathrm{~cm}$ and then find the length of side BC.
[CO-2] [L-1]

a) 20 cm
b) 24 cm
c) 30 cm
d) 28 cm
Q. 14 In the given Figure $\angle P Q A=20^{\circ}$ and $\angle A P Q=120^{\circ}$ then the find out the $\angle$ $P A Q=$ ?

a) 120
b) 12
c) 40
d) $60 \quad[\mathrm{CO}-2][\mathrm{L}-1]$
Q. 15 Two paralle/ chords are drawn in a circle of diameter 30 cm . The length of one chord is 24 cm and the distance between the two chords is 21 cm . The length of the other chord is 30 cm .
a) 10 cm
b) 18 cm
c) 12 cm
d) 16 cm
Q. 16 Capacity of a cylindrical vessel is $25,872 \mathrm{~cm} 3$. If the height of the cylinder is $200 \%$ more than the radius of its base, what is the area of the base in square cm ?
a) 336
b) 1232
c) 616
d) 308
[CO-2] [L-1]
Q. 17 The radii of two cylinders are in the ratio of 2: 3 and their heights are in the ratio 5: 3. The ratio of their volumes is:
[CO-2] [L-1]
a) $27: 20$
b) $20: 27$
c) $4: 9$
d) $9: 4$
Q. 18 A cylindrical piece of metal of radius 2 cm and height 6 cm is shaped into a cone of the same radius. The height of the cone is:
[CO-2] [L-1]
a) 18 cm
b) 14 cm
C) 12 cm
d) 8 cm
Q. 19 If the volumes of two cones are in the ratio 1:4 and their diameters are in the ratio $4: 5$, then the ratio of their heights is?
[CO-2] [L-1]
a) $1: 5$
b) $5: 4$
c) $5: 16$
d) $25: 64$
Q. 20 A solid consists of a circular cylinder with an exact fitting right circular cone placed on the top. The height of the cone is h. If the total volume of the solid is three times the volume of the cone then the height of the cylinder is? [CO-2] [L-1]
a) 2 h
b) 4 h
c) $2 \mathrm{~h} / 3$
d) $3 \mathrm{~h} / 2$
Q. 21 If the radius of the sphere is doubled then it's volume is increased by? [CO-2] [L-1]
a) $100 \%$
b) $200 \%$
c) $700 \%$
d) $800 \%$
Q. 22 The curved surface area of a cylindrical pillar is 264 m 2 and its volume is 924 m3. Find the ratio of its diameter to its height.
a) $3: 7$
b) $7: 3$
c) $6: 7$
d) $7: 6$

Read the following paragraph and answer the Questions 23-27:
10 friends $-A, B, C, D, E, P, Q, R, S$, and $T$ have birthdays in different months January, March, April, June and September but not necessarily in the same order. Their birthdays is on 2 different dates -22 and 28. So in each month there are 2 birthdays. There are 2 birthdays after the birthday of B. There are 2 birthdays between the birthdays of B and D. A and T have birthdays in March. There is one birthday between the birthdays of $A$ and $P$. P's birthday is not in same month as $D$. There are same number of birthdays between $T$ and $C$ as between $B$ and Q. C's birthday is not in April. Q's birthday is in a month having 30 days. No birthday is there between the birthdays of $R$ and $E$. Also their birthdays are in different months. E's birthday is exactly between the birthday of $A$ and $S$.
Q. 23 R's birthday is on? [CO-3] [L-1]
a) 22 April
b) 28 March
c) 22 June
d) 28 April
Q. 24 Who has birthday in April?
[CO-3] [L-1]
a) $D$
b) $C$
c) $Q$
d) $P$
Q. 25 How many birthdays are there in between the birthdays of $E$ and $Q$ ? [CO-3] [L-1]
a) Four
b) Two
c) Three
d) One
Q. 26 Which of the following pair has birthday on 22nd of a month?
[CO-3] [L-1]
a) $P, B$
b) $P, D$
c) $C, E$
d) $R, T$
Q. 27 Which of the following combination of MonthPerson-Date is correct as per the given arrangement?
a) June - B-22
b) April $-R-22$
c) March - A - 22
d) January - C-
22

## Read the following paragraph and answer the Questions 28-30:

8 boxes - $A, B, C, D, E, F, G$ and $H$ are placed one above the another but not necessarily in the same order.
Three boxes are placed between D and B. Two boxes are placed between E and B. Two boxes are placed between $A$ and H . H is placed immediately below B. Two boxes are placed between $C$ and $G$. Two boxes are placed between $A$ and $F$.
Q. 28 How many boxes are placed between $D$ and $C$ ?
[CO-3] [L-1]
a) Two
b) None
c) Three
d) Five
Q. 29 If $C$ is placed above $G$, which box is at bottom most position?
[CO-3] [L-1]
a) $B$
b) $C$
c) H
d) $G$
Q. 30 Which box is placed just above box H?
[CO-3] [L-1]
a) $A$
b) $D$
c) $G$
d) $B$
Q. 31 Using Slangs during a presentation is considered cool. True or False. [CO-4] [L-1]
a) True
b) False
Q. 32 Showing your back to the audience is considered a bad etiquette during presentation $\qquad$ .
a) True
b) False
Q. 33 Group Discussion is a form of assessment that can judge a candidate on which of the following skills.
[CO-5] [L-1]
a) Time Management
b) Interpersonal Skills
c) Body Language
d) All of the above
Q. 34 Number of words on a PowerPoint slide should be not more than 50 words. True or False.
[CO-6] [L-1]
a) True
b) False
Q. 35 The person who is presenting should always look at the slides rather than into the eyes of the audience $\qquad$ .
a) True
b) False
Q. 36 Group Discussion is a form of assessment that can judge a candidate on which of the following skills.
a) Time Management
b) Interpersonal Skills
c) Body Language
d) All of the above
Q. 37 At each stage in the process of presentation, there is a possibility of interference which may hinder the process. Such interference is known as $\qquad$ . $[C O-5][L-1]$
a) Sender
b) Receiver
c) Barrier
d) None of them
Q. 38 The most detailed of all the following documents is $\qquad$ .
a) Resume
b) Curriculum Vitae
c) Bio-Data
Q. 39 Most of us use $\qquad$ and $\qquad$ in addition to words when we speak.
[CO-5] [L-1]
a) Words and gestures
b) gestures and body language
c) body language and posture
d) $B$ and $C$
Q. 40 refers to handshake, head nodding, blinking.
b) Prosody
d) Haptics
a) Touches
c) Gestures refers to handshake, head nodding, blinking.
b) Prosody
d) Haptics refers to handshake, head nodding, blinking.
b) Prosody
d) Haptics
$\qquad$
Q. 41 Group Discussions can be argumentative as well. True or False.
a) True
b) False
Q. 42 Correct or Incorrect Body language can totally change the meaning of a message. True or False.
a) True
b) False
Q. 43 A cover letter or covering letter can also be called.
a) A resume or CV
b) A CV sales letter
c) Letter of application
Q. 44 Your cover letter should explain how much you will $\qquad$ the company.
a) Benefit
b) Charge
c) Disrupt
Q. 45 Cover letters often begin with the applicant explaining how they.
a) Began their education
b) Spend their free time
c) Found out about the job
Q. 46 Your cover letter can summarize a key selling point such as yours.
a) Work history
b) Medical history
c) Relevant experience
Q. 47 Use of $\qquad$ and $\qquad$ in addition to words when we speak is a part
of NON VERBAL Communication.
a) Words and sentences
b) Gestures and body language
c) Body language and posture
d) $B \& C$
Q. 48 Self-Introduction can be a deciding factor in a job interview process. True or False.
a) True
b) False
[CO-6] [L-1]
Q. 49 Self-Introduction should always be atleast for 5mins. True or False. [CO-5] [L-1]
a) True
b) False
Q. 50 Cover letters often end with the applicant explaining how they.
a) Will enjoy their work
b) Spend their salary
c) Are best fit for the job

## End Semester Examination, Dec. 2022

B. Tech. - Fifth Semester

QUANTITATIVE APTITUDE AND PERSONALITY DEVELOPMENT-II (ВНМ-MC-008-HM-505-HM-505A-HM-505B)

Time: 2 hrs.
Max Marks: 50
No. of pages: 6
Note: All questions are compulsory. Each question has FOUR options with ONE correct answer. Select the correct answer. All questions are of ONE mark each. There is no NEGATIVE marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.

| 151. | 152. | 153. | 154. | 155. | 156. | 157. | 158. | 159. | 160. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 161. | 162. | 163. | 164. | 165. | 166. | 167. | 168. | 169. | 170. |
| 171. | 172. | 173. | 174. | 175. | 176. | 177. | 178. | 179. | 180. |
| 181. | 182. | 183. | 184. | 185. | 186. | 187. | 188. | 189. | 190. |
| 191. | 192. | 193. | 194. | 195. | 196. | 197. | 198. | 199. | 200. |

Q. 1 is twice as good a workman as B. together they finish the work in 14 days. In how many days can $B$ alone finishes work?
a) 39
b) 29
c) 21
d) 42
[CO-3] [L-1]
Q. 2 An electric pump can fill a tank in 3 hours. Because of a leak in the tank it took $3(1 / 2)$ hours to fill the tank. If the tank is full, how much time will the leak tale to empty it?
a) 21
b) 5
C) 17
d) 8
$[C O-3][L-1]$
Q. 3 If a green painted cube of 16 cm is divided into 16 equal small cubes. How many cubes will have 3 sided painted:
a) 5
b) 7
C) 8
d) 12
[CO-3] [L-1]
Q. 4 How many times do the hands of the clock coincide in a day?
a) 23
b) 22
c) 21
d) 20
[CO-2] [L-1]
Q. 5 If $13^{\text {th }}$ may 1999 is Monday what will be $15^{\text {th }}$ may 2000 will?
a) Monday
b) Wednesday
c) Sunday
d) Friday
[CO-2] [L-1]
Q. 6 In a certain code language, "YEARLY" is written as "BVZIOB". What will be the code for "ANNUAL" in the same language?
a) ZFMOMM
b) ZNNFZA
c) $Z M M F Z O$
d) None of
above
Q. 7 A dice is numbered from 1 to 6 in different ways. If 1 is adjacent to 2, 4 and 6, then which of the following statements is necessarily true?
a) 2 is opposite to 6
b) 1 is adjacent to 3
c) 3 is adjacent to 5
d) 3 is opposite to 5
Q. $8 \quad A$ and $B$ can do a piece of work in 4 days, while $C$ and $D$ can do the same work in 12 days. In how many days will $A, B, C$ and $D$ do it together?
[CO-2] [L-1]
a) 1
b) 3
c) 5
d) 7
Q. 9 How many cubes will be formed of 2 cm edge from 8 cm big cube?
a) 44
b) 64
c) 54
d) 84
[CO-3] [L-1]
Q. 10 Shweta when increasing her speed from $24 \mathrm{~km} / \mathrm{hr}$ to $30 \mathrm{~km} / \mathrm{hr}$ she takes one hour less than the usual time to cover a certain distance. What is the distance usually covered by Shweta?
a) 60
b) 120
C) 110
d) 100
[CO-3] [L-1]
Q. 11 Reema can complete a piece of work in 12 days while Seema can the same work in 18 days. If they both work together, then how many days will be required to finish the work?
a) 6
b) 7.2
C) 8
d) 10.8
Q. 126 men can pack 12 boxes in 7 days by working for 7 hours a day. In how many days can 14 men pack 18 boxes if they work for 9 hours a day?
[CO-3] [L-1]
a) 2.8
b) 3.5
c) 4.9
d) 3.2
Q. 13 Walking at 4/5 of his normal speed, Dewang is 15 minutes late in reaching his club. What is the usual time taken by him to cover the distance? [CO-3] [L-1]
a) 1 hr
b) 2 hr
c) 3 hr
d) 4 hr
Q. 14 A train starts from $A$ to $B$ at 9:00 am and takes 6 hours to travel to $B$. Another train starts from $B$ to $A$ at 10:00 am and takes 8 hours to travel to $A$. At what time both trains will meet?
a) $12: 51 \mathrm{AM}$
b) $12: 45 \mathrm{AM}$
c) $12: 56 \mathrm{AM}$
d) 12:15AM
Q. 15 In a certain code language "EASY" is written as "5117". In the same code language, how will "BEAM" be written as?
[CO-3] [L-1]
a) 2514
b) 2344
c) 2233
d) 2121
Q. 16 A clock which is set right at 12 noon gains 3 secs for every 2 minutes, what will be the correct time when the clock shows 10:15 pm?
[CO-2] [L-1]
a) $10: 18$
b) $10: 08$
c) $10: 00$
d) $10: 05$
Q. 17 Which day of the week will be $15^{\text {th }}$ august 2021?
a) Monday
b) Tuesday
c) Saturday
d) Sunday
Q. 18 Wages for 45 women amount to rupees 15525 in 48 days. How many men require to work 16 days to receive rupees 5750, the daily wages of a man being double of those of a woman?
a) 19
b) 25
c) 34
d) 21
Q. 19 Walking 5/6 of its usual speed, a train is 10 minutes late. Find its usual time to cover the journey?
a) 48
b) 50
c) 22
d) 25
Q. 20 A, B, and $C$ undertakes to do work for Rs 707. A, and B together do $5 / 7$ of the work and rest is done by C alone. How much should C get?
[CO-2] [L-1]
a) 101
b) 202
c) 303
d) 404
Q. 21 A man covered a certain distance at some speed. Had he moved 3 kmph faster, he would have taken 40 minutes less. If he had moved 2 kmph slower, he would have taken 40 minutes more. The distance (in km ) is
[CO-2] [L-1]
a) 19
b) 40
c) 50
d) 70

## Direction for Q. 22 - Q. 25 read the Venn diagram carefully:


[CO-2] [L-1]
Q. 22 How many doctors are neither artists nor players?
a) 17
b) 22
c) 10
d) 28
Q. 23 How many doctors are both players and artists?
a) 22
b) 3
c) 19
d) 10
Q. 24 How many artists are players?
a) 10
b) 15
c) 20
d) 22
Q. 25 How many players are neither artists nor doctors
a) 25
b) 20
c) 15
d) 10

## Directions Q.26-Q.30: Given below is the diagram which shows the passed

 students in 4 different subjects. Total number of students who pass the exam is 600.[CO-4] [L-1]

EEnglish

- Bengali
Q. 26 The ratio of students who passed in Bengali, to the students who passed in History is
a) $1: 2$
b) $2: 1$
c) $2: 3$
d) $4: 5$
Q. 27 The number of students passed in Bengali is greater than the number of students passed in History by
a) 110
b) 180
C) 120
d) 190
Q. 28 The percentage of students who passed in English is
a) $15 \%$
b) $18 \%$
c) $20 \%$
d) $22 \%$
Q. 29 The number of students passed in English is less than the number of students passed in Mathematics by
a) 40
b) 60
c) 80
d) 100
Q. 30 The number of students who passed in Bengali is
a) 240
b) 300
c) 360
d) 400

Directions Q.31-Q.35: Read the following passage and answer the question. [CO-6] [L-2]

Bacteria are extremely small /iving things. While we measure our own sizes in inches or centimeters, bacterial size is measured in microns. One micron is a thousandth of a millimeter a pinhead is about a millimeter across. Rod shaped bacteria are usually from two to tour microns long, while rounded ones are generally one micron in diameter Thus if you enlarged a founded bacterium a thousand times, it would be just about the size of a pinhead. An adult human magnified by the same amount would be over a mile (1.6 kilometers) tall.

Even with an ordinary microscope, you must look closely to see bacteria. Using a magnification of 100 times, one finds that bacteria are barely visible as tiny rods or dots. One cannot make out anything of their structure. Using special stains, one can see that some bacteria have attached to them wavy - looking "hairs" called flagella. Others have only one flagellum. The flagella rotate, pushing the bacteria though the water. Many bacteria lack flagella and cannot move about by their own power while others can glide along over surfaces by some little understood mechanism.
From the bacterial point of view, the world is a very different place from what it is to humans to bacterium water is as thick as molasses is to us. Bacteria are so small that they are influenced by the movements of the chemical molecules around them. Bacteria under the microscope, even those with no flagella, often bounce about in the water. This is because they collide with the water molecules and are pushed this way and that. Molecules move so rapidly that within a tenth of a second the molecules around a bacterium have all been replaced by new ones even bacteria without flagella are thus constantly exposed to a changing environment.
Q. 31 Which of the following is the main topic of the passage?
a) The characteristics of bacteria
b) How bacteria reproduce
c) The various functions of bacteria
d) How bacteria contribute to disease
Q. 32 Bacteria are measured in
a) inches
b) centimeters
c) microns
d) millimeters
Q. 33 Which of the following is the smallest?
a) A pinhead
b) A rounded bacterium
c) A microscope
d) A rod-shaped bacterium
Q. 34 According to the passage, someone who examines bacteria using only a microscope that magnifies 100 times would see
a) tiny dots
b) small "hairs"
c) large rods
d) detailed
structures
Q. 35 The relationship between a bacterium and its flagella is most nearly analogous to which of the following?
a) A rider jumping on a horse's back
b) A ball being hit by a bat
c) A boat powered by a motor
d) A door closed by a gust of wind

Direction Q.36-Q.38: Fill up the blanks with the most effective word from the given words to make the sentence meaningfully complete.
Q. 36 Amie agrees with the $\qquad$ that the grass is always greener on the other side of the fence.
a) perpetuity
b) penchant
c) maxim
d) conformation
Q. 37 Victor Frankenstein's creature was a(n) $\qquad$ , detested by everyone he met.
a) itinerant
b) anathema
c) cosmopolitan
d) mercenary
Q. 38 Jack Nicholson was at the $\qquad$ of his career when he received the Oscar for Best Actor.
a) detriment
b) pinnacle
c) oligarchy
d) d. rogue

## Directions Q.39-Q.40: Choose Synonyms:

a) Evil
b) Deform
c) Wrong
d) Harm
Q. 40 Stigma
a) Stain
b) Trial
c) Difficulty
d) Holiness

Directions for Q. 41 to Q.45: In each of the following sentences, there are two blank spaces. Fill up the sentences with the correct word from the given options to make the sentences grammatically correct.
Q. 41 With borrowing costs set to rise and global trade tensions adding to uncertainties for India's exporters who are yet to capitalize on the rupee weakness, policymakers will need to $\qquad$ populism and stick to policy $\qquad$ if the tenuous momentum is to be sustained.
a) elude; imprudence
b) elope; recklessness
c) eschew; prudence
d) deteriorate; obedient
Q. 42 Due to the $\qquad$ quality of elections, the formerly fifth largest democracy is classified as an autocracy again. These developments are worrying for citizens because corruption, social exclusion and barriers to fair economic competition continue to be more $\qquad$ in autocracies.
a) ameliorate; dominant
b) enhance; rebellious
c) deteriorate; obedient
d) worsened; prevalent
Q. 43 In a country which has had three-decade-long military dictatorships, $\qquad$ caretaker governments are somewhat of a $\qquad$ .
a) interim; novelty
b) volatile; antiquated
c) permanent; complex
d) eternal; innovative
Q. 44 Mandatory pre-litigation mediation puts the $\qquad$ in the court of the parties involved, rather than looking at external agencies like courts, and urges them to
$\qquad$ with and resolve disputes.
a) shuttle; release
b) globe; involved
c) ball; engage
d) sphere; fasten
Q. 45 The youth climbed over the vehicle and started $\qquad$ it with stones, then the driver sensitively $\qquad$ to take the vehicle out of the crowd.
a) smashing; managed
b) mashing; handle
c) break; involve
d) defeat; directed

Directions for Q. 46 to Q.50: In the question a part of the sentence has been highlighted in bold. Alternatives to the highlighted part are given which may improve the construction of the sentence. Select the correct alternative.
Q. 46 To get one's name in the Rowland Ward's book of hunting records was the hot ambition of every serious hunter.
a) extreme
c) reluctant
d)
b) burning
No improvement needed
Q. 47 Due to these reasons we are all in favor of universal compulsory education.
a) Out of these reasons
b) For these reasons
c) By these reasons
d) No improvement needed
Q. 48 I shall not go until I am invited.
a) till $I$ am invited
b) unless I am invited
c) if not I am invited
d) No improvement needed
Q. 49 Please remind me of posting these letters to my relatives.
a) by posting
b) to post
c) for posting
d) No improvement needed
Q. 50 I would have waited for you at the station if I knew that you would come.
a) had known
b) was knowing
c) have known
d) No improvement needed

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester <br> QUANTITATIVE APTITUDE AND PERSONALITY DEVELOPMENT-II (BHM-MC-008)

Time: 2 hrs.
Max Marks: 50
No. of pages: 6
Note: All questions are compulsory. Each question has FOUR options with ONE correct answer. Select the correct answer. All questions are of ONE mark each. There is no NEGATIVE marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.

| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 11. | 12. | 13. | 14. | 15. | 16. | 17. | 18. | 19. | 20. |
| 21. | 22. | 23. | 24. | 25. | 26. | 27. | 28. | 29. | 30. |
| 31. | 32. | 33. | 34. | 35. | 36. | 37. | 38. | 39. | 40. |
| 41. | 42. | 43. | 44. | 45. | 46. | 47. | 48. | 49. | 50. |

Q. 1 What is the right most integer of the expression 65776 ^ $759+54697$ ^ 467 ?
a) 4
b) 6
c) 9
d) 0
Q. 2 If $\log _{\mathrm{a}}(\mathrm{ab})=\mathrm{x}$, then $\log _{\mathrm{b}}(\mathrm{ab})=$ ?
[CO-3] [L-1]
a) $1 / x$
b) $x /(x+1)$
c) $x /(1-x)$
d) $x /(x-1)$
Q. 3 A sum of money lent at compound interest for 2 years at 20\% per annum would fetch Rs. 482 more, if the interest was payable half yearly then if it was payable annually . The sum is
[CO-3] [L-1]
a) 10000
b) 20000
c) 40000
d) 50000
Q. 4 If $n$ is natural number, then ( $6 n^{\wedge} 2+6 n$ ) is always divisible by:
[CO-3] [L-1]
a) 6 only
b) 6 and 12 both
c) 12 only
d) by 18 only
Q. 5 Find the compound interest on Rs. 16,000 at 20\% per annum for 9 months, compounded quarterly
[CO-2] [L-1]
a) 2422
b) 2522
c) 2622
d) 2722
Q. 6 A man on tour travels first 160 km at $64 \mathrm{~km} / \mathrm{hr}$ and the next 160 km at 80 $\mathrm{km} / \mathrm{hr}$. The average speed for the first 320 km of the tour is
[CO-2] [L-1]
A. $35.55 \mathrm{~km} / \mathrm{hr}$
b) $36 \mathrm{~km} / \mathrm{hr}$
c) $71.11 \mathrm{~km} / \mathrm{hr}$
d) $71 \mathrm{~km} / \mathrm{hr}$
Q. 7 It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?[CO-1] [L-1]
a) Sunday
b) Saturday
c) Friday
d) Wednesday
Q. 8 What is the remainder when $15 \wedge 23+23 \wedge 23$ is divided by 19 ?
[CO-3] [L-1]
a) 4
b) 3
c) 1
d) 0
Q. 9 Three number are in the ratio of $3: 4: 5$ and their L.C.M. is 2400 . Their H.C.F. is:
a) 40
b) 80
c) 120
d) 200
[L-1]
Q. 10 The speed of a car increases by 2 kms after every one hour. If the distance travelling in the first one hour was 35 kms . what was the total distance travelled in 12 hours?
a) 456 kms
b) 482 kms
c) 552 kms
d) 556 kms
[CO-2]
Q. 11 January 1, 2008 is Tuesday. What day of the week lies on Jan 1, 2009?
[CO-1] [L-1]
a) Monday
b) Wednesday
c) Saturday
d) Thursday
Q. 12 What was the day of the week on $28^{\text {th }}$ May, 2006?
[CO-1] [L-1]
a) Thursday
b) Friday
c) Saturday
d) Sunday
Q. 13 A person takes 20 minutes more to cover a certain distance by decreasing his speed by $20 \%$. What is the time taken to cover the distance at his original speed?
a) 1 hr
b) 1 hr 20 min
c) 1 hr 10 min
d) 50 min [L-1]
[CO-2]
Q. 14 There is $60 \%$ increase in an amount in 6 years at simple interest. What will be the compound interest of Rs. 12,000 after 3 years at the same rate?
a) 4972
b) 3972
C) 5972
d) 2972
Q. 15 In which year was Rahul born?
I. Rahul at present is 25 years younger to his mother.
II. Rahul's brother, who was born in 1964, is 35 years younger to his mother. [CO2][L1]
a) If the data in statement I alone is sufficient to answer the question.
b) If the data in statement II alone is sufficient answer the question.
c) If the data either in I or II alone is sufficient to answer the question.
d) If the data in both the statements together are needed.
Q.16 A man whose speed is 4.5 kmph in still water rows to a certain upstream point and back to the starting point in a river which flows at 1.5 kmph , find his average speed for the total journey?
[CO-2] [L-1]
a) 5 kmph
b) 7 kmph
c) 3 kmph
d) 4 kmph
Q. 17 Today is Monday. After 61 days, it will be:
[CO-1] [L-1]
a) Wednesday
b) Saturday
c) Tuesday
d) Thurday
Q. 18 Manoj, Prabhakar, Mash and Kamal are four friends. Who among them is the heaviest?
I. Prabhakar is heavier than Manoj and Kamal but lighter than Akash.
II. Manoj is lighter than Prabhakar and Mask but heavier than Kamal.
a) If the data in statement I alone is sufficient to answer the question.
b) If the data in statement II alone is sufficient answer the question.
c) If the data either in I or II alone is sufficient to answer the question.
d) If the data in both the statements together are needed.
Q. 19 At what rate percent per annum will a sum of money double in 8 years under SI?
a) $12.5 \%$
b) $13.5 \%$
c) $11.5 \%$
d) $14.5 \%$ [L-1]
[CO-2]
Q. 20 Is Arun taller than Sachin?
I. Dinesh is of the same height as Arun and Sachin.
II. Sachin is not shorter than Dinesh.
[CO-2] [L-1]
a) If the data in statement I alone is sufficient to answer the question.
b) If the data in statement II alone is sufficient answer the question.
c) If the data either in I or II alone is sufficient to answer the question.
d) If the data even in both the statements together are not sufficient to answer the question.
Q. 21 Which of the following is not a leap year?
[CO-1] [L-1]
a) 600
b) 800
c) 1200
d) 2000
Q. 22 A sum of money at simple interest amounts to Rs. 815 in 3 years and to Rs. 854 in 4 years. The sum is:
[CO-2] [L-1]
a) 650
b) 690
c) 698
d) 700
Q. 23 A 200 m long train passes a motorcycler, running in the same direction at 12 $\mathrm{km} / \mathrm{hr}$, in 15 second and a jeep travelling in the same direction in 20 s . At what speed is the car travelling (length of both the motorcycler and jeep is negligible)? [CO-2] [L-1]
a) 36 kmph
b) 32 kmph
c) 29 kmph
d) 24 kmph
Q. 24 A man can row 6 kmph in still water. When the river is running at 1.2 kmph , it takes him 1 hour to row to a place and back.
What is the total distance traveled by the man?
[CO-2] [L-1]
a) 4.58 kms
b) 6.35 kms
c) 5.76 kms
d) 5.24 kms
Q. 25 How many terms are in the G.P. 3, 6, 12, 24, ......, 384?
[CO-3] [L-1]
a) 8
b) 9
c) 10
d) 11

Study the following line graph and answer the questions based on it.
Number of Vehicles Manufactured by Two companies ove the Years (Number in Thousands)

Q. 26 What is the difference between the number of vehicles manufactured by Company Y in 2000 and 2001? [CO-2] [L-1]
a) 50000
b) 42000
c) 33000
d) 21000
Q. 27 What is the difference between the total productions of the two Companies in the given years?
[CO-
2] [L-1]
a) 19000
b) 22000
c) 26000
c) 28000
Q. 28 What is the average numbers of vehicles manufactured by Company X over the given period? (Rounded off to nearest integer)
[CO-2] [L-1]
a) 119333
b) 113666
c) 112778
d) 111223
Q. 29 In which of the following years, the difference between the productions of Companies X and Y was the maximum among the given years? [CO-2] [L-1]
a) 1997
b) 1998
c) 1999
d) 2000
Q. 30 The production of Company Y in 2000 was approximately what percent of the production of Company X in the same year?
[CO-2] [L-1]
a) 173
b) 164
c) 132
d) 97

## Directions for Q.31-Q.35: Read the following passage and answer the question:

[L-2]
It was cold night in September. The rain was drumming on the car roof as George and Marie Winston drove through the empty country roads towards the house of their friends, the Harrissons, where they were going to attend a party to celebrate the engagement of the Harrisons daughter, Lisa. As they drove, they listened to the local radio station, which was playing classical music. They were about 5 miles from the destination when the music on the radio was interrupted by a news announcement: "The Cheshire police have issued a serious warning after a man escaped from Colford Mental Hospital earlier this evening. The man, John Downey, is murderer who killed 6 people before he was captured 2 years ago. He is described as large, very strong \& extremely dangerous. People in the Cheshire area are warned to keep their doors \& windows locked, \& to call the police immediately if they see anyone acting strangely." Marie shivered, "A crazy killer. And he's out there somewhere. That's scary."'Don't worry about it," said her husband. "We're nearly there now. Anyway, we have more important things to worry about. This car is losing power for some reasonit must be that old problem with the carburetor, If it gets any worse, we'll have to stay at the Harrisons' tonight \& get it fixed before we travel back tomorrow," As he spoke, the car began to slow down, George pressed the accelerator, but the engine only coughed. Finally they rolled to a halt, as the engine died completely, Just as they stopped, George pulled the car off the road, \& it came to rest under a large tree. "Blast!" said George angrily. "Now we'll have to walk in the rain". "But that'll take us an hour at least," said Marie. "And I have my high-held shoes \& my nice clothes on. They'll be ruined!". "Well, you'll have to wait while I run to the nearest house \& call the Harissons. Someone can come out \& picks us up," said George. "But George, Have you forgotten what the radio said? There's a homicidal maniac out there! You can't leave me alone here!". "You'll have to hide in the back of the car. Lock all the doors \& lie on
the floor in the back, under this blanket. No-one will see you, when I come back, I'll knock 3 times on the door. Then you can get up and open it. Don't open it unless you hear 3 knocks." George opened the door and slipped out into the rain. He quickly disappeared into the blackness. Marie quickly locked the doors and settled down under the blanket in the back for a long wait. She was frightened and worried, but she was a strong-minded woman. She had not been waiting long, however, when she heard a strange scratching noise. It seemed to be coming from the roof of the car. Marie was terrified. She listened, holding her breath. Then she heard 3 slow knocks, one after the other, also on the roof of the car. Was it her husband? Should she open the door? Then she heard another knock, and another. This was not her husband. It was somebody--or something--else. She was shaking with fear. But she forced herself to lie still. The knocking continued-- bump, bump, bump, and bump. Many hours later, as the sun rose, she was still lying there. She had not slept for a moment. The knocking had never stopped, all night long. She did not know what to do. Where was George? Why had he not come for her?
Suddenly, she heard the sound of 3 or 4 vehicles, racing quickly down the road. All of them pulled up around her, their tires screeching on the road. At last! Someone had come! Marie sat up quickly and looked out the window.
The 3 vehicles were all police cars, \& 2 still had their lights flashing. Several policemen leap out. One of them rushed towards the car as Marie opened the door. He took her by the hand.
"Get out of the car \& walk with me to the police vehicle. You're safe now. Look straight ahead. Keep looking at police car. Don't look back. Just don't look back."
Something in the way he spoke filled Marie with cold horror. She could not help herself. After 10 yards from the police car, she stopped, turned \& looked back at the empty vehicle.
George was hanging from the tree above the car, a rope tied around his neck. As the wind blew his body back \& forth, his feet were bumping gently on the roof of the car-bump, bump, bump, bump
Q. 31 What was the reason for the news announcement on the radio?
a) 6 people, including, John Downey, had been murdered.
b) A dangerous prisoner had escaped
c) The police were warning of accidents on the roads in the bad
weather
d) Some people had been acting strangely in the Cheshire area
Q. 32 What did George think was causing trouble with the car?
a) The carburetor
b) The rain drumming on the roof
c) The accelerator
d) He had no idea
Q. 33 Why did he pull the car off the road?
a) To have a rest
b) To go for a walk
c) to walk to the nearest house
d) It broke down
Q. 34 Why did Marie stay in the car when George left?
a) She was afraid to go out in the dark
b) So no one could steal the car
c) Her clothes weren't suitable for the rain
d) She wanted to get some sleep
Q. 35 Where did George set off to walk?
a) The mental hospital
b) The nearest house
c) The Harrison's house
d) The police station

Direction for Q.36-Q.38: Read each sentence to find out whether there is any grammatical error or idiomatic error in it. The error, if any, will be in one part of the sentence. If there is no error then mark 5 as the answer. (Ignore errors of punctuation, if any.)
[CO-5] [L-2]
Q. 36 All the members (1) / of the committee are (2) / kindly requested to appear (3) / in the next meeting. (4) / No Error (5)
a) 1
b) 2
c) 3
d) 4
e) 5
Q. 37 He came to (1)/ the final conclusion (2)/ that he would (3)/ not accept the offer. (4)/ No Error (5).
a) 1
b) 2
c) 3
d) 4
e) 5
Q. 38 He wanted (1) / to know whether (2)/ it was right and proper (3)/ way to do it. (4)/ No Error (5).
a) 1
b) 2
c) 3
d) 4
e) 5

Direction for Q.39-Q.41: Fill up the blanks with the most effective word from the given words to make the sentence meaningfully complete.
[CO-5] [L-2]
Q. 39 Ram agrees with the $\qquad$ that the grass is always greener on the other side of the fence.
a) perpetuity
b) penchant
c) maxim
d) conformation
Q. 40 Ricky Smith's creature was a(n) $\qquad$ detested by everyone he met.
a) itinerant
b) anathema
c) cosmopolitan
d) mercenary
Q. 41 Will Smith was at the $\qquad$ of his career when he received the Oscar for best actor.
a) detriment
b) pinnacle
c) oligarchy
d) rogue

## Directions for Q.42-Q.43: Choose Antonyms:

[CO-4] [L-2]
Q. 42 Heartfelt.
a) humorous
b) loving
c) insincere
d) unhealthy
Q. 43 Secret.
a) Friendly
b) Overt
c) Hidden
d) Ample

Directions for Q.44-Q.45: Choose Synonyms:
[CO-4] [L-2]
Q. 44 Prolong.
a) Inquire
b) $\quad \mathrm{Wax}$
c) Wait
d) Extend
Q. 45 Aloof.
a) Reserved
b) Tidy
c) Slope

## d) Foolish

Directions for Q.46-Q.50: In making decisions about important questions, it is desirable to be able to distinguish between 'strong' arguments and weak arguments so far as they relate to the question. "Strong' arguments are those which are both important and directly related to the questions. 'Weak' arguments are those which are of minor importance and also may not be directly related to the questions or may be related to a trivial aspect of the question.
Each question below is followed by two arguments numbered I and II. You have to decide which argument is a strong argument and which is a weak argument.
[CO-6] [L-2]

- Give answer (A) if only argument I is strong
- Give answer (B) if only argument II is strong
- Give answer (C) if either I or II is strong.
- Give answer (D) if neither I nor II strong.
- Give answer (E) if both I and II are strong.
Q. 46 Should there be only one rate of interest for term deposits of varying durations in banks?
Arguments: I. No, people will refrain from keeping money for longer duration resulting into reduction of liquidity level of banks.
II. Yes, this will be much simple for the common people and they may be encouraged to keep more money in banks.
Q. 47 Should there be a cap on maximum number of contestants for parliamentary elections in any constituency?
Arguments: I. Yes, this will make the parliamentary elections more meaningful as the voters can make a considered judgement for casting their vote.
II. No, in a democracy any person fulfilling the eligibility criteria can contest parliamentary elections and there should be no such restrictions.
Q. 48 Should all those who are found guilty of committing homicide or abetting homicide be either given capital punishment or be kept in jail for the entire life?
Arguments: I. Yes, such severe punishments only will make people refrain from committing such heinous acts and the society will be more safe.
II. No, those who are repentant for the crime they committed be given a chance to lead a normal life outside the jail.
Q. 49 Should there be a restriction on the migration of people from one State to another State in India?
Arguments: I. No, any Indian Citizen has a basic right to stay at any place of their choice and hence they cannot be stopped.
II. Yes, this is the way to effect an equitable distribution of resources across the States in India.
Q. 50 Statement: The Central Bureau of Investigation receives the complaint of an officer taking bribe to do the duty he is supposed to.
Courses of Action: I. CBI should try to catch the officer taking bribe redhanded and then take a strict action against him.
II. CBI should wait for some more complaints about the officer to be sure about the matter.


## End Semester Examination, Dec. 2022

B. Tech. - Fourth Semester

## QUANTITATIVE APTITUDE AND PERSONALITY DEVELOPMENT-I (BHM-MC-006)

Time: 2 hrs.
Max Marks: 50
No. of pages: 6
Note: All questions are compulsory. Each question has FOUR options with ONE correct answer. Select the correct answer. All questions are of ONE mark each. There is no NEGATIVE marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.

| 201. | 202. | 203. | 204. | 205. | 206. | 207. | 208. | 209. | 210. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 211. | 212. | 213. | 214. | 215. | 216. | 217. | 218. | 219. | 220. |
| 221. | 222. | 223. | 224. | 225. | 226. | 227. | 228. | 229. | 230. |
| 231. | 232. | 233. | 234. | 235. | 236. | 237. | 238. | 239. | 240. |
| 241. | 242. | 243. | 244. | 245. | 246. | 247. | 248. | 249. | 250. |

Q. $1 \quad A$ and $B$ invest in a business in the ratio $5: 6$. If $12 \%$ of the total profit goes to charity and A's share is Rs. 640, the total profit is:
$[C O-1][L-1]$
a) 1100
b) 1600
c) 1300
d) 1400
Q. 2 A bag contains Rs. 600 in the form of one-rupee, 50 paise and 25 paise coins in the ratio $4: 6: 4$. The number of 50 paise coins is:
[CO-1] [L-1]
a) 600
b) 300
c) 450
d) 150
Q. 3 If Rs. 1380 be divided into three parts, proportional to 1/2: 2/3:3/4, then the first part is:
[CO-1] [L-1]
a) 364
b) 360
c) 392
d) 408
Q. 4 If 3 (A's capital) $=4$ (B's capital) $=8$ (C's capital), then out of of Rs. 255, C will receive $\qquad$
a) 40
b) 50
c) 55
d) 45
Q. 5 Shweta is an expert in bargaining. Once she went to a nearby shop. When Shweta asked the price of Shampoo Sachet the shopkeeper told her the price by increasing $27 \%$ of the original cost. But Shweta insisted to decrease the price by $27 \%$ so the shopkeeper sold it by decreasing the price by $27 \%$. What is the loss or gain of shopkeeper and by how much percent?
[CO-1][L-1]
a) $5.54 \%$ loss
b) $5.54 \%$ gain
c) $7.29 \%$ loss
d) No gain no loss
Q. 6 If the area of a rectangle is increased by $44 \%$ and its breadth increased by $20 \%$, what is the percentage increase in its length?
[CO-1] [L-1]
a) $15 \%$
b) $20 \%$
c) $10 \%$
d) $12 \%$
Q. 7 The weight of a $A$ is 20 \% less than that of B. By what percentage is the weight of $B$ more than that of $A$ ?
a) $75 \%$
b) $50 \%$
c) $25 \%$
d) $33.33 \%$
Q. 8 Initially Ms. Mansi has Rs. 8756.36 in her wallet then she increased it by $20 \%$. Once again she increased her amount by $30 \%$. The final value of money in her wallet will be what percent greater than the initial amount.
$[C O-1][L-1]$
a) $50 \%$
b) $56 \%$
c) $70 \%$
d) $80 \%$
Q. 9 If $x: y=3: 4$ and $y: z=8: 9$, z:a is 5:6. Find $x: y: z: a$
[CO-1] [L-1]
a) $78: 82: 65: 45$
b) $30: 40: 45: 89$
c) $30: 40: 45: 54$
d) $30: 40: 45: 64$
Q. 10 Out of 420 computers, $25 \%$ are non-defective. Find the no of defective computers.
a) 70
b) 80
c) 90
d) None of
these
Q. 11 If the cost price of 25 candies is equal to the selling price of 20 candies, then what is the profit/loss percentage?
a) $16.66 \%$
b) $20 \%$
c) $25 \%$
d) None of
these
Q. 12 I bought a car at Rs 1lakh and marked up the cost by 25\% and sold it at a discount of $20 \%$. What is my profit or loss?
a) 10000
b) 20000
c) 13000
d) No Profit, No
loss
Q. 13 A, B and C can do a piece of work in 10 days, 12 days and 15 days respectively. They began the work together but C left 4 days before the completion of the work. In how many days was the work completed?
[CO-1] [L-1]
a) 5.06
b) 12.5
c) 10.8
d) 14
Q. 14 A can do a piece of work in 10 days, B in 15 days. They work together for 5 days, the rest of the work is finished by C in five more days. If they get Rs. 6000 as wages for the whole work, what is the daily wage of $A$ (in Rs):
a) 6000
b) 3000
c) 2000
d) None of
these
Q. 15 Amar can do a piece of work in 10 days. He works at it for 4 days and then Arun finishes it in 9 days. In how many days can Amar and Arun together finish the work?
a) 6
b) 9
c) 3.5
d) $4.5[\mathrm{CO}-1][L-1]$
Q. 16 A cistern is normally filled in 8 hours but takes two hours longer to fill because of a leak in its bottom. If the cistern is full, the leak will empty it in?
[CO-1] [L-1]
a) 28 hrs
b) 20 hrs
c) 36 hrs
d) 40 hrs
Q. 178 litres are drawn from a cask full of wine and is then filled with water. This operation is performed three more times. The ratio of the quantity of wine now left in cask to that of the water is $16: 240$. How much wine the cask hold originally? $[C O-1][L-1]$
a) 16 L
b) 24 L
c) 32 L
d) 12 L
Q. 18 How many kilograms of sugar costing Rs. 9 per kg must be mixed with 27 kg of sugar costing Rs. 7 per Kg so that there may be a gain of $10 \%$ by selling the mixture at Rs. 9.24 per Kg ?
a) 36 kg
b) 42 kg
c) 54 kg
d) 63 kg
Q. 19 Find the ratio in which rice at Rs. 5 a kg be mixed with rice at Rs. 7 a kg to produce a mixture worth Rs. 6 a kg .
$[C O-1][L-1]$
a) $1: 3$
b) $2: 3$
c) $1: 1$
d) $4: 5$
Q. 20 A container contains 40 litres of milk. From that 4 litres of milk was taken out and replaced by water. This process was repeated further two more time. How much milk is now contained by the container?
[CO-1] [L-1]
a) 35.28 L
b) 29.16 L
c) 37.89 L
d) 25.14 L

## Q. 21 Mark:

a) If only conclusion I is true
b) If only conclusion II is true
c) If either conclusion I or II is true
d) If both conclusion I and II is true
e) If neither conclusion I nor II is true

## Statements:

All the laptop are bike.
Some bike are ants.

## Conclusions:

I. All the laptop are bikes.
II. Some bikes are laptops.

## Q. 22 Mark:

a) If only conclusion I is true
b) If only conclusion II is true
c) If either conclusion I or II is true
d) If neither conclusion I nor II is true

Statements:
All word are lime.
No lime is fruit.
All fruits are flats.

## Conclusions:

I. All word being flat is a possibility.
II. All fruit being word is a possibility.
Q. 23 In a row of boys, if Satish who is 4th from the right and Rahul who is 15th from the left interchange their positions; Rahul becomes 20th from the left. How many boys are there in the row?
a) 221
b) 23
C) 27
d) 28
Q. 24 In a class of 70 students $A$ is eighteenth from top. $B$ is eleventh from bottom. How many students are there between $A$ and $B$ ?
[CO-2] [L-1]
a) 29
b) 41
c) 31
d) 32
Q. 25 In a certain code language the word 'PLAYER' is written as 'AELPRY'. How will the word 'WRITER' be written in that code?
[CO-2] [L-1]
a) EIRTRW
b) EIRTUW
c) IEWRRT
d) IERWRT
Q. 26 In a certain code language the word 'QSNPNPSU' is written as 'ROOT'. How will the word 'EGNPTVQS' be written in that code?
[CO-2] [L-1]
a) $D O O R$
b) $G O O D$
c) $F O \cup R$
d) $D O O T$
Q. 27 In a certain code language the word 'BOND' is written as '31'. How will the word 'DEAN' be written in that code?
[CO-2] [L-1]
a) 16
b) 20
C) 22
d) 18
Q. 28 In a certain code language, "Sun is hot" is written as "fi latmuk", "milk is sour" is written as "mukti mu" and "milk makes sour" is written as "ti mu fa". What is the code for "makes" in that code language?
a) $t i$
b) $f a$
C) $m u k$
d) $m u$

## Q. 29 Mark:

a) If only Conclusion I is true
b) If only Conclusion II is true
c) If either Conclusion I or II is true
d) If neither Conclusion I nor II is true

## Statements:

$A>M \leq X, J<X$

## Conclusions:

I. $A>J \quad I I . M<J$
Q. 30 Select a suitable figure from the Answer Figures that would replace the question mark(?)
[CO-3] [L-1]

## Problem Figures:



Answer Figures:

(1)
(2)
(3)
(4)
(5)
a) 1
b) 2
c) 3
d) 4

Directions for Q31 to Q35: In the question a part of the sentence has been highlighted in bold. Alternatives of the highlighted part are given which may improve the construction of the sentence. Select the correct alternative.
Q. 31 To get one's name in the Rowland Ward's book of hunting records was the hot ambition of every serious hunter.
a) Extreme
b) Burning
c) Reluctant
d) No improvement needed
Q. 32 Due to these reason we are all in favor of universal compulsory education.
a) Out of these reasons
b) For these reasons
c) By these reasons
d) No improvement needed
Q. 33 I shall not go until I am invited.
a) Till I am invited
b) Unless I am invited
c) If not I am invited
d) No improvement needed
Q. 34 Please remind me of posting these letters to my relatives.
a) By posting
b) To post
c) For posting
d) No improvement needed
Q. 35 I would have waited for you at the station if I knew that you would come.
a) Had known
b) Was knowing
c) Have known
d) No improvement needed

Directions for Q36 to Q40: Read the following sentences and identify the tense.
Q. 36 She is teaching her students.
a) Present Continuous Tense
b) Simple Present Tense
c) Present Perfect Tense
d) Present Perfect Continuous Tense
Q. 37 The chief guest addressed the gathering.
a) Simple Past Tense
b) Past Continuous Tense
c) Simple Present Tense
d) Future Tense
Q. 38 They will be having fun.
a) Future Continuous Tense
b) Future Tense
c) Future Perfect Continuous Tense
d) Future Perfect Tense
Q. 39 She had been running for hours
a) Simple Past Tense
b) Past Perfect Continuous Tense
c) Past Continuous Tense
d) Simple Present Tense
Q. 40 He had sought the permission of his boss.
a) Simple Past Tense
b) Simple Present Tense
c) Past Perfect Tense
d) Future Tense

Directions for Q41 to Q50: In the following passage there are blanks, each of which has been numbered. These numbers are printed below the passage and against each, four words are suggested, one of which fits the blank appropriately. Find out the appropriate word in each case.

Visual experiences can .... (41) children, teenagers and even adults learn and absorb more due to its highly stimulating and ... (42) engaging impact. It is for this reason that we are seeing an increase in schools across the globe ... (43) content provider programs into their class curriculum to .... (44) Lessons through video. Visual excursions and school collaborations are ... (45) by advances in high definition video, high fidelity audio and content sharing allowing students to experience a richer and more stimulating learning experience. Schools that have previously transported students to excursions in ... (46), now face increased transportation costs, higher insurance premiums, attendance costs for the families and strict duty of care policies for students while. $\qquad$ (47) School property/ Virtual excursions ... ( (48) students to improve their presentation, research, learning and speaking skills while they engage in a live learning session. Students also now have the ability to meet peers from many cultures, speak to subject-matter ... (49) like scientists or authors practice a foreign language with students from another country, and learn about global issues from the ... (50) of their own classrooms.

| Q. 41 a) help | b) aiding | c) prescribe | d) present |
| :--- | :--- | :--- | :--- |
| Q. 42 a) plus | b) deeply | c) lonely | d) ably |
| Q. 43 a) incorporating | b) pressing | c) parting | d) following |
| Q. 44 a) make | b) impart | c) vision | d) need |
| Q. 45 a) dissolved | b) enhanced | c) measured | d) failed |
| Q. 46 a) parent | b) deed | c) person | d) lieu |
| Q. 47 a) involving | b) saving | c) off | d) vacating |
| Q. 48 a) enable | b) pressure | c) collect | d) let |
| Q. 49 a) dictionaries | b) experts | c) clauses | d) books |
| Q. 50 a) availability | b) comfortable | c) safety | d) knowable |

## End Semester Examination, Dec. 2022

B. Tech. - Third Semester

QUANTITATIVE APTITUDE AND PERSONALITY DEVELOPMENT (MA-301/MA-301A/BHM-MC-004)

Time: 2 hrs.
Max Marks: 50
No. of pages: 5
Note: All questions are compulsory. Each question has FOUR options with ONE correct answer. Select the correct answer. All questions are of ONE mark each. There is no NEGATIVE marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.

| 251. | 252. | 253. | 254. | 255. | 256. | 257. | 258. | 259. | 260. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 261. | 262. | 263. | 264. | 265. | 266. | 267. | 268. | 269. | 270. |
| 271. | 272. | 273. | 274. | 275. | 276. | 277. | 278. | 279. | 280. |
| 281. | 282. | 283. | 284. | 285. | 286. | 287. | 288. | 289. | 290. |
| 291. | 292. | 293. | 294. | 295. | 296. | 297. | 298. | 299. | 300. |

Q. 1 What is the unit digit of the sum of first 111 whole numbers?
a) 4
b) 6
c) 5
d) 0
Q. 2 If the unit digit of $(433 \times 456 \times 43 N)$ is $(N+2)$, then what is the value of $N$ ?
a) 1
b) 8
c) 3
d) 6
[CO-1] [L-1]
Q. 3 In which position from the right is the first non-zero digit present in 334!?
a) $81^{s t}$
b) $82^{\text {nd }}$
c) $83^{\text {rd }}$
d) $84^{\text {th }}$
Q. 4 Find the highest power of 72 in 100 !
[CO-1] [L-1]
a) 22
b) 24
c) 25
d) 27
Q. 5 What is the remainder when $4^{96}$ is divided by 6?
[CO-2] [L-1]
a) 0
b) 2
c) 3
d) 4
Q. 6 Find the remainder when $1!+2!+3!+4!+5!+-1000!$ is divided by 14.
a) 0
b) 2
c) 5
d) 8
[CO-1] [L-1]
Q. 7 Evaluate: $5 \times(2 \times 34) \div 6+7-8$.
a) 134
b) 145
c) 150
d) None of
these
Q. 8 The arithmetic mean between two numbers is 75 and their geometric mean is 21. Find the numbers.
a) 133 and 17
b) 63 and 87
c) 3 and 147
d) 73 and 77
Q. 9 Kanmani ranked sixteenth from the top and twenty ninth from the bottom among those who passed an examination. Six boys did not participate in the competition and five failed in it. How many boys were there in the class? [CO-2] [L-1]
a) 35
b) 45
c) 50
d) 55
Q. 10 The sum of three numbers in a GP is 26 and their product is 216 . Find the numbers.
a) 2,6 and 18
b) 2,6 and 20
C) 4,6 and 18
d) 6,18 and 20
Q. 11 What is the greatest number which divides 639, 1065 and 1491 exactly? [CO-3] [L-1]
a) 193
b) 183
c) 223
d) 213
Q. 12 In a queue of children, Arun is fifth from the left and Suresh is sixth from the right. When they interchange their places among themselves, Arun becomes thirteenth from the left. Then, what will be Suresh's position from the right?[CO-2] [L-1]
a) $8^{\text {th }}$
b) $14^{\text {th }}$
c) $15^{\text {th }}$
d) $16^{\text {th }}$
Q. 13 Find the side of the largest square slab which can be paved on the floor of a room 5 meters 44 cm long and 3 meters 74 cm broad.
[CO-3] [L-1]
a) 56 cm
b) 42 cm
C) 38 cm
d) 34 cm
Q. 14 If $x$ and $y$ are two digits of the number 653xy such that this number is divisible by 80 , then $x+y=$ ?
a) 2
b) 3
c) 4
d) 5
Q. 15 Without any stoppage, a person travels a certain distance at an average speed of $42 \mathrm{~km} / \mathrm{h}$, and with stoppages he covers the same distance at an average speed
of $28 \mathrm{~km} / \mathrm{h}$. How many minutes per hour does he stop?
a) 14 minutes
b) 15 minutes
c) 28 minutes these
[CO-3] [L-1]
Q. 16 The average of 17 numbers is 10.9. If the average of first nine numbers is 10.5 and that of the last nine numbers is 11.4, the middle number is:
[CO-1] [L-1]
a) 11.8
b) 11.4
c) 10.9
d) 11.7
Q. 17 Find the highest power of 24 in 100!
[CO-1] [L-1]
a) 30
b) 32
c) 35
d) 38
Q. 18 Given: $\log _{8}(5)=b$. Express $\log _{4}(10)$ in terms of $b$.
[CO-1] [L-1]
a) $(1+2 b) / 2$
b) $(1+3 b) / 3$
c) $(1+3 b) / 2$
d) $(1+2 b) / 3$
Q. 19 Amit started walking positioning his back towards the sun. After some time, he turned left, then turned right and towards the left again. In which direction is he going now?
a) North or South
b) East or West
c) North or West
d) South or West
[CO-1] [L-1]
Q. 20 Sum of first 25 terms in AP is 525, sum of the next 25 terms is 725 , what is the common difference?
a) $8 / 25$
b) $4 / 25$
c) $6 / 25$
d) $1 / 25$
Q. 21 How many three digit numbers are divisible by 5 or 9 ?
[CO-2] [L-1]
a) 260
b) 280
c) 200
d) 180
Q. 22 Sundar runs 20 m towards East and turns to right and runs 10 m . Then he turns to the right and runs 9 m . Again he turns to right and runs 5 m . After this he turns to left and runs 12 m and finally he turns to right and 6 m . Now to which direction is Sundar facing?
a) East
b) West
c) North
d) South
Q. 23 Suraj has a certain average of runs for 12 innings. In the 13th innings he scores 96 runs thereby increasing his average by 5 runs. What is his average after the 13th innings?
[CO-1] [L-1]
a) 48
b) 64
c) 36
d) 72
Q. 24 If the 3rd and the 9th terms of an AP are 4 and -8 , respectively, then which term of this AP is zero.
a) $7^{n d}$
b) $4^{\text {th }}$
c) $5^{\text {th }}$
d) $6^{\text {th }}$
Q. 25 Solve for $x$ such that $\log _{2} 32+\log _{2} 16=\left(\log _{2} x\right)^{2}$
[CO-2] [L-1]
a) 2
b) 4
c) 6
d) 8
Q. 26 pqr is a three digit natural number such that $p q r=p!+q!+r!$. What is the value of $(q+r)^{*} p$ ?
a) 1296
b) 3125
c) 19683
d) 9
Q. 27 A woman going with a boy is asked by another woman about the relationship between them. The women replied, "My maternal uncle and the uncle of his maternal uncle is the same." How is the lady related with that boy?
[CO-1] [L-1]
a) Mother and Son
b) Aunt and Nephew
c) Grandmother and Grandson
d) None of these
Q. 28 The average monthly expenditure of a family for the first four months is Rs 2,750, for the next three months is Rs 2,940 and for the last five months Rs 3,130. If the family saves Rs 5,330 during the whole year, find the average monthly income of the family during the year.
a) Rs 3,800
b) Rs 3,500
c) $\operatorname{Rs} 3,400$
d) Rs 4,200
Q. 29 The sum of 4th and 8th terms of an AP is 24 and the sum of the 6th and 10th terms is 44 . Find the first three terms of the AP.
[CO-3] [L-1]
a) $-12,-7,-2$.
b) $-4,-6,-10$
c) $-6,-10,-5$
d) $-13,-8$ and -
3.
Q. 30 Pointing to a photograph, Vipul said, "She is the daughter of my grandfather's only son." How is Vipul related to the girl in the photograph?
[CO-1] [L-1]
a) Brother
b) Grandson
c) Cousin
d) Father
Q. 31 Time management refers to a range of skills, tools, and techniques used to manage time when accomplishing specific tasks, projects, and goals.
[CO-2] [L-1]
a) True
b) False
Q. 32 Being busy:
[CO-2] [L-1]
a) Can help you stay more organized
b) Can keep your priorities in order
c) Can be a good thing
d) Wasn't discussed as a part of using time more efficiently
Q. 33 Using a planner or making a "to-do" list every day.
[CO-1] [L-1]
a) Is a waste of paper.
b) Helps keep things "in sight, in mind."
c) Takes too long to fill out
d) None of the above
Q. 34 The 80:20 rule says
[CO-2] [L-2]
a) $80 \%$ of results are achieved with only $20 \%$ the effort
b) Typically $80 \%$ of unfocused effort generates $20 \%$ of results
c) Both of the above are true
d) None of the above
Q. 35 Two other important ways to help manage your time efficiently include [CO-1] [L-1]
a) Doing the best tasks first, and the worst tasks last
b) Having a very structured scheduled and not leaving room to be flexible
c) Being Flexible
d) Doing the worst tasks first while you're alert and not tired
Q. 36 Time management skills include
a) Getting a good nights sleep
b) Procrastinating
c) Having free time
d) Being Flexible
Q. 37 Stress management is about learning
[CO-1] [L-1]
a) How to avoid the pressures of life
b) How to develop skills that would enhance our body's adjustment when we are subjected to the pressures of life
c) Both '1' and '2' are true
d) None of the above
Q. 38 Which of the following are the basic sources of stress
[CO-2] [L-1]
a) The environment
b) Social stressors
c) Physiological
d) All of the above
Q. 39 Always start working on the easiest tasks, even if they are less important. [CO-2] [L-1]
a) True
b) False
Q. 40 Your description of who you are as a person is your
[CO-2] [L-1]
a) Self awareness
b) Self esteem
c) Self concept
d) Self disclose
Q. 41 Which one of the following is a position from which someone is unlikely to move to a higher level of work responsibility?
[CO-1] [L-1]
a) Career goals
b) Career path
c) Career progression
d) Career plateau
Q. 42 Which of the following is not stage in the development of career of any person?
a) Exploration
b) Mid career
c) Exit
d) Late Career
$[\mathrm{CO}-1][\mathrm{L}-1]$
Q. 43 Development of a career of an individual undergoes through a number of
$\qquad$ _.
a) Process
b) Series
c) Stages
d) Activities
Q. 44 As soon as a student graduates from the high school, he/she will:
$[C O-1][L-1]$
a) Know what he/she wants to do for a career
b) Become a more active participant in the learning process
c) No longer need a high school transcript
d) Begin post-secondary part of the career plan.
Q. 45 Which should not be included as activities on a career plan?
a) Education and training
b) Extra-curricular
c) Job research
d) Work experience
Q. 46 A course of action toward achieving career and educational goals is a $\quad[C O-2][L-1]$
a) Resume
b) Career plan
c) Transcript
d) Learning plan
Q. 47 S in SMART goal stands for $\qquad$ .
a) Simple
b) Short
c) Secure
d) Specific
Q. 48 Which is not a major factor in setting career goals?
a) Value
b) Interests
c) Friends
d) Aptitude
Q. 49 Which goals allow adjustments in the be made as an individual moves through his/her career plan?
a) Long term
b) Medium term
c) Short term
d) Stepping stone
Q. 50 If an ultimate goal is to become a physical therapist, a career plan should include:
a) Completing an internship
b) Getting a masters degree/ phD
c) Going to military
d) Going to a community college

## End Semester Supplementary Examination, Dec. 2022

B. Tech. - Third Semester

## QUANTITATIVE APTITUDE AND PERSONALITY DEVELOPMENT-II

 (BHM-MC-004)Time: 2 hrs.
Max Marks: 50
No. of pages: 4
Note: All questions are compulsory. Each question has FOUR options with ONE correct answer. Select the correct answer. All questions are of ONE mark each. There is no NEGATIVE marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.

| 301. | 302. | 303. | 304. | 305. | 306. | 307. | 308. | 309. | 310. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 311. | 312. | 313. | 314. | 315. | 316. | 317. | 318. | 319. | 320. |
| 321. | 322. | 323. | 324. | 325. | 326. | 327. | 328. | 329. | 330. |
| 331. | 332. | 333. | 334. | 335. | 336. | 337. | 338. | 339. | 340. |
| 341. | 342. | 343. | 344. | 345. | 346. | 347. | 348. | 349. | 350. |

Q. 1 Which of the following is the best strategy for effectively planning out your time?
a) Prioritize all your tasks
b) Ignore all the unexpected work
c) Delay any unnecessary work
d) All of the above
Q. 2 Managers and leaders are somewhat similar in their characteristics. $A$ leader is considered a role model for his followers. Choose the best suited qualities of a leader.
a) Vision, commitment, devotion, clear purpose, ability to inspire
b) Honesty, dedication, ambiguous, authoritative
c) Lacking humility, lack of empathy, defiance
d) Authoritative, clear purpose, bossy
Q. 3 is increasing leadership rapidly
a) Strategy
b) Command
c) Control
d) Getting others to follow
Q. 4 Regarding leadership, which statement is false?
a) Leadership does not necessarily take place within a hierarchical structure of an organization
b) When people operate as leaders their role is always clearly established and defined
c) Not every leader is a manager
d) All of the above
Q. 5 $\qquad$ are the approaches to the study of leadership which emphasize the personality of the leader:
a) Contingency theories
b) Group theories
c) Trait theories
d) Inspirational theories
Q. 6 The effectiveness of a leader is dependent upon meeting $\qquad$ areas of need within the workgroup:
a) One
b) Three
c) Five
d) None of the above
Q. 7 Which SMART Goal component is the following: Laila has determined that the opportunity cost of buying new basketball shoes is more valuable than her daily energy drink?
a) Smart
b) Manageable
c) Attainable
d) Realistic
Q. 8 All forms of stress are bad and unhealthy. True or False.
a) TRUE
b) FALSE
Q. 9 Postponing a task for a later time without valid reason is called
a) Waiting
b) Procrastination
c) Laziness them
$\qquad$ .
Q. 10 Time Management is only based on making and following a time table to the $T$. True or False.
a) True
b) False
Q. 11 A short term goal is...
a) months to years
b) days to weeks
c) next year
d) years to decades
Q. 12 What part of SMART is missing? I will lose 20 pounds by exercising at the gym three times a week.
a) Manageable
b) Attainable
c) Realistic
d) Time bound
Q. 13 What part of SMART is missing? I plan to save INR 2,000 by automatically depositing INR 100 from my paycheck into a savings account each month for 2 years
a) Simple
b) Manageable
c) Attainable
d) Realistic
Q. 14 Failing to manage your time can lead to some consequences, like
a) Less stress
b) Missed deadlines
c) Greater productivity and efficiency
d) $A$ better professional reputation
Q. 15 Always start working on the easiest tasks, even if they are less important. True or False
a) True
b) False
Q. 16 One of the following things is not a scheduling method
a) Diary
b) To do list
c) Time Table
d) Social Media
Q. 17 Who is a leader?
a) a person whose behaviour stimulates action in a group.
b) person whose behaviour stimulates leadership in a group.
c) person whose behaviour stimulates adoption in a group.
d) None of the above.
Q. 18 Which is not a type of leader?
a) Autocratic
b) Democratic
c) Self proclaimed
d) None of the above
Q. 19 Which one of the following defines the role of a leader?
a) Group advisor
b) As an analyzer
c) As a listener..
d) All of the above
Q. 20 What is personality theory?
a) The theory which focuses on personal qualities
b) The theory which focuses on personal behaviour.
c) The theory which focuses on personal ideas
d) All of the above.
Q. 21 In a class of 45 students Aditya's rank is twelve from top what is his rank from bottom.
a) 33
b) 34
c) 35
d) cannot be determined
Q. 22 In a class of 42 students Nutan's Rank is 22 from bottom what is her rank from top.
a) 21
b) 22
c) 23
d) Cannot be determined
Q. 23 In a class, Sonal's rank is 10th from top what is his rank from below.
a) 24
b) 25
c) 26
d) Cannot be determined
Q. 24 If $A$ is to the south of $B$ and $C$ is to the east of $B$, in what direction is $A$ with respect to $C$ ?
a) North-east
b) North-west
c) South-east
d) South-west
Q. 25 A is 40 m South-west of $B$. C is 40 m South-east of B. Then, $C$ is in which direction of $A$ ?
a) East
b) West
c) North-east
d) South
Q. 26 Raj travelled from a point $X$ straight towards east to $Y$ at a distance of 80 metres. He turned right and walked 50 metres, then again turned right and walked 70 metres. Finally, he turned right and walked 50 metres. How far is he from the starting point?
a) 10 metres
b) 20 metres
c) 50 metres
d) 70 metres
Q. 27 Pointing to a photograph, a man said, "I have no brother or sister but that man's father is my father's son." Whose photograph was it?
a) His own
b) His son
c) His father's
d) His nephew's
Q. 28 Pointing towards a boy, Veena said, "He is the son of only son of my grandfather." How is that boy related to Veena?
a) Aunt
b) Uncle
c) Mother
d) Data
inadequate
Q. 29 Introducing Reena, Monika said, "She is the only daughter of my father's only daughter." How is Monika related to Reena?
a) Aunt
b) Niece
c) Cousin
d) Data
inadequate
Q. 30 Pointing to a man a woman said, "His mother is the only daughter of my mother. "How is the woman related to the mother?
a) Mother
b) Daughter
c) Sister
d) Grandmother
Q. 31 Find the number of factors of 250?
a) 8
b) 16
c) 24
d) 32
Q. 32 Find the number of even factors of 340?
a) 8
b) 6
c) 4
d) 2
Q. 33 Find the product of factors of 280?
a) $280^{18}$
b) $280^{24}$
c) $280^{8}$
d) $280^{9}$
Q. 34 Find the sum of factors of 4004?
a) $4004^{3}$
b) 5444
c) 9000
d) 9408
Q. 35 Find the number of prime factors of 2187?
a) 1
b) 2
C) 4
d) 8
Q. 36 How many factors of $2^{7} * 3^{6} * 5^{2} * 9^{2} * 10^{2}$ are multiples of 18 ?
a) 496
b) 480
c) 405
d) 505
Q. 37 Find the sum of even factors of 370 ?
a) 656
b) 456
c) 756
d) 750
Q. 38 Find the unit digit of $21^{25} * 784^{125} * 582^{6586}$ ?
a) 2
b) 0
c) 6
d) 8
Q. 39 Find the last digit of $554^{782} * 983^{581}$ ?
a) 8
b) 1
C) 6
d) 3
Q. 40 Find the unit digit of $\left(257^{445}+881^{858}\right) *\left(323^{825}+445^{954}\right)$ ?
a) 0
b) 1
C) 2
d) 4
Q. 41 Find the last digit of $\left(276^{122} * 126^{842}\right)$ ?
a) 0
b) 6
c) 2
d) 3
Q. 42 Sonu is fifteenth from the front in a column of boys. There were thrice as many behind him as there were in front. How many boys are there between Sonu and the seventh boy from the end of the column?
a) 33
b) 34
c) 35
d) Data
inadequate
Q. 43 Forty boys are standing in a row facing the north. Amit is eleventh from the left and Sanjay is thirty-first from the right end of the row. How far will Shreya, who is third to the right of Amit in the row, be from Sanjay?
a) 2 nd to the right
b) 3rd to the right
c) 4th to the right
d) 5th to the right
Q. 44 Kashish goes 30 metres North, then turns right and walks 40 metres, then again turns right and walks 20 metres, then again turns right and walks 40 metres. How many metres is he from his original position?
a) 0
b) 10
c) 20
d) 40
Q. 45 A man walks 30 metres towards South. Then, turning to his right, he walks 30 metres. Then, turning to his left, he walks 20 metres. Again, he turns to his left and walks 30 metres. How far is he from his initial position?
a) 20 metres
b) 30 metres
c) 60 metres
d) None of these
Q. 46 Rohit walked 25 metres towards South. Then he turned to his left and walked 20 metres. He then turned to his left and walked 25 metres. He again turned to his right and walked 15 metres. At what distance is he from the starting point and in which direction?
a) 35 metres East
b) 35 metres North
c) 40 metres East
d) 60 metres East
Q. 47 Starting from a point P, Sachin walked 20 metres towards South. He turned left and walked 30 metres. He then turned left and walked 20 metres. He again turned left and walked 40 metres and reached a point $Q$. How far and in which direction is the point $Q$ from the point $P$ ?
a) 20 metres West
b) 10 metres East
c) 10 metres West
d) 10 metres North
Q. 48 The average expenditure of a man for the first five months is Rs. 120 and for the next seven months is Rs. 130. His monthly average income if he saves Rs. 290 in that year, is
a) Rs. 160
b) Rs. 170
c) Rs. 150
d) Rs. 140
Q. 49 The average salary of 20 workers in an office is Rs. 1900 per month. If the manager's salary is added, the average becomes Rs. 2000 per month. The manager's annual salary (in Rs) is:
a) Rs. 24000
b) Rs. 25200
c) Rs. 45600
d) Rs. 48000
Q. 50 A club has 15 men and 25 women. The average age of men is 10 years and the average age of women is 12 year. What is the average age of the whole club?
a) 11.40 years
b) 11.60 years
c) 11.25 years
d) 12.25 years

## End Semester Examination, Dec. 2022

## B. Tech. - First / Third Semester <br> CONSTITUTION OF INDIA (BHM-MC-001)

Time: 2 hrs.

Max Marks: 50
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Write short notes on the following:
a) Judicial Review.
b) Mandamus.
c) Article 14 .
d) $74^{\text {th }}$ Amendment Act.
e) Judicial Activism.

## PART-A

Q. 2 Discuss Fundamental Rights with special reference to the Right to equality.
[CO-3] [L-1,2] 10
Q. 3 What are the powers and function of the Prime Minister functions it has changed in the recent past?
[CO-2] [L-1,3] 10
Q. 4 Discuss the growth and development of the Panchayati Raj system in India.
[CO-2] [L-1,2,3] 10

## PART-B

Q. 5 Analyze the power of the Judiciary as an important organ of government.
[CO-1] [L-1,2,3,4] 10
Q. 6 Describe in detail the Making of the Indian Constitution.
[CO-1] [L-1,2,3,4] 10
Q. 7 What are the features of Directive Principles of the State Policy? Bring out their relationship with Fundamental Rights.
[CO-3] [L-1,2,3,4,5] 10

## End Semester Examination, Dec. 2022

B. Tech. - First Semester (All Batches)

CONSTITUTION OF INDIA (BHM-MC-001)
Time: 2 hrs.
Max Marks: 50
No. of pages: 4
Note: Attempt 25 questions. Marks are indicated against each question. Only one option is correct among the multiple choices.
Q. 1 Constitution of India is $\qquad$ and a flexible form of constitution.
a) Rigid
b) Malleable
c) Brittle
d) None of the above
Q. 2 Article 12 states:
a) The definition of laws in the country
b) The definition of state
c) The definition of federalism
d) None of the above
Q. 3 Keshavananda Bharti case was a landmark judgement, because it spoke about:
a) Judicial review
b) Basic structure
c) Fundamental rights
d) All the above
Q. 4 Addition of economically weaker section reservation was amendment of which of the following article:
a) Article 16
b) Article 17
c) Article 18
d) Article 32
Q. 5 Right to know is linked to freedom of speech is from which judgement.
a) State of UP v. Raj Narain
b) Minnerva Mills Case
c) Maneka Gandhi Case
d) None of the above
Q. 6 Article 19 comprises of:
a) Right to assemble
b) Right to freedom of expression
c) Right to settle
d) All the above
Q. 7 Right to assemble peacefully has the which of the following restriction:
a) Cannot be against public morality
b) Cannot question Indian integrity
c) Cannot be with arms
d) All of the above
Q. 8 S1: Double jeopardy means that no person will be punished for the same offence twice.
S2: Ex post facto legislation means that no person should be convicted of a crime in retrospect.
a) $S 1$ and $S 2$ are correct
b) Only S2 is correct
c) Only S1 is correct
d) S1 and S2 are incorrect
Q. 9 S1: Article 21 talks about right to life.

S2: Article 21 talks about right to personal liberty.
a) Only S2 is correct
b) Only S1 is correct
c) Both S1 and S2 are incorrect
d) Both S1 and S2 are correct
Q. 10 S1: Under Preventive detention, the person loses the right to be produced in front of the Magistrate within 24 hours.
S2: Preventive detention is mentioned under Article 22.
a) Only S1 is correct
b) Only $S 2$ is correct
c) Both S1 and S2 are correct
d) Both S1 and S2 are not correct
Q. 11 Article 21A talks about:
a) Prevention of dowry
b) Prevention of untouchability
c) Prevention of child labour
d) None of the above
Q. 12 S1: Habeaus corpus means asking the judiciary to produce an illegally detailed person in the court.
S2: Mandamas means issue of a writ when higher judiciary wants a case transferred to the lower courts.
a) Only S1 is correct
b) Only S2 is correct
c) Both S1 and S2 are incorrect
d) Both S1 and S2 are correct
Q. 13 Madrassas are administered under:
a) Article 32
b) Article 25
c) Article 26
d) Article 30
Q. 14 The term "minority" is defined under:
a) Article 12
b) Article 14
c) Article 15
d) None of the above
Q. 15 "Right to constitutional remedies is the very soul of the constitution" was said by:
a) Sardar Vallabbhai Patel
b) Rajendra Prasad
c) Homi Bhaba
d) BR Ambedkar
Q. 16 Article 29 talks about:
a) Protection of language
b) Protection of cultural minorities
c) Protection of tribal values
d) All of the above
Q. 17 Public interest litigation has which of the features:
a) Can be only produced in lower courts
b) Cannot be produced in Supreme Court
c) Can be directly taken up by the Supreme Court
d) All of the above
Q. 18 S1: Lok Adalats are not registered bodies

S2: Lok Adalats are regulated by the Governor of the State
a) Only S1 is correct
b) Only $S 2$ is correct
c) Both S1 and S2 are correct
d) Both S1 and S2 are incorrect
Q. 19 Advocate general is appointed by the:
a) President
b) Chief Minister
c) Governor
d) Chief justice of high court
Q. 20 S1: Amicus Curiae is giving legal representation.

S2: Amicus Curiae is given to someone who cannot afford legal defense.
a) Only S1 is correct
b) Only $S 2$ is correct
c) Both S1 and S2 are correct
d) Both S1 and S2 are incorrect
Q. 21 S1: Constitutional remedies are writs which can only be produced in judicial magistrate court.
S2: Constitutional remedies can be heard by the Supreme Court directly.
a) Only S1 is correct
b) Only S2 is correct
c) Both S1 and S2 are correct
d) Both S1 and S2 are incorrect
Q. 22 S1: The supreme court can advise the president.

S2: The supreme court does not have administrative functions.
a) Both S1 and S2 are correct
b) Only S1 is correct
c) Only S2 is correct
d) Both S1 and S2 are incorrect
Q. 23 Freedom from taxation in the name of religion is mentioned.
a) Article 23
b) Article 25
c) Article 26
Q. 24 The recent entry issue in Jama Masjid can be related to which two Articles:
a) Article 15 and Article 26
b) Article 23 and 24
c) Article 26 and 27
d) None of the above
$[C O-3][L-4] 2$
Q. 25 Article 370 is related to:
a) Jammu and Kashmir
b) Manipur
c) Nagaland
d) All of the above

# End Semester Examination, Dec. 2022 <br> B. Tech. - First Semester (All Batches) <br> CONSTITUTION OF INDIA (BHM-MC-001) 

Time: 2 hrs.
Max Marks: 50
No. of pages: 4
Note: Attempt 25 questions. Marks are indicated against each question. Only one option is correct among the multiple choices.
Q. 1 Article 13 states:
a) The definition of laws in the country
b) The definition of state
c) The definition of federalism
d) None of the above
Q. 2 Keshavananda Bharti case was a landmark judgement, because it spoke about:
a) Judicial review
b) Basic structure
c) Fundamental rights
d) All the above
Q. 3 Addition of $O B C$ Section reservation was amendment of which of the following Article:
a) Article 16
b) Article 17
c) Article 18
d) Article 32
[CO-2] [L-4] 2
Q. 4 Right to know is linked to freedom of speech is from which judgement. [CO-2] [L-3] 2
a) State of UP v. Raj Narain
b) Minnerva mills case
c) Maneka Gandhi case
d) None of the above
Q. 5 Article 19 comprises of:
$[C O-3][L-4] 2$
a) Right to reside
b) Right to freedom of expression
c) Right to settle
d) All the above
Q. 6 Right to assemble peacefully has the which of the following restriction: [CO-2] [L-4] 2
a) Cannot be against public morality
b) Cannot question Indian integrity
c) Cannot be violent
d) All the above
Q. 7 Constitution of India is $\qquad$ and a flexible form of constitution. [CO-1] [L-2] 2
a) Rigid
b) Malleable
c) Brittle
d) None of the above
Q. 8 S1: Double jeopardy means that no person will be punished for the same offence twice.
[CO-2] [L-1, 4] 2
S2: Ex post facto legislation means that person should be convicted of a crime in retrospect.
a) $S 1$ and $S 2$ are correct
b) Only $S 2$ is correct
c) Only S1 is correct
d) S1 and S2 are incorrect
Q. 9 S1: Article 21 talks about right to education.

S2: Article 21 talks about right to personal liberty.
a) Only S2 is correct
b) Only S1 is correct
c) Both S1 and S2 are incorrect
d) Both S1 and S2 are correct
Q. 10 S1: Under preventive detention, the person has to be produced in front of the magistrate within 24 hours.
S2: Preventive Detention is mentioned under Article 22.
a) Only S1 is correct
b) Only S2 is correct
c) Both S1 and S2 are correct
d) Both S1 and S2 are not correct
Q. 11 Article 24 talks about:
$[C O-2][L-4] 2$
a) Prevention of assault
b) Prevention of untouchability
c) Prevention of child labour
d) None of the above
Q. 12 S1: Mandamus means asking the judiciary to produce an illegally detailed person in the court
[CO-3] [L-4] 2
S2: Prohibition means issue of a writ when higher judiciary wants a case transferred to the lower courts
a) Only S1 is correct
b) Only $S 2$ is correct
c) Both S1 and S2 are incorrect
d) Both S1 and S2 are correct
Q. 13 Madrassas are administered under:
$[C O-3][L-1] 2$
a) Article 32
b) Article 25
c) Article 26
d) Article 30
Q. 14 The term "minority" is defined under:
$[C O-1][L-2] 2$
a) Article 12
b) Article 13
c) Article 14
d) None of the above
Q. 15 "Right to constitutional remedies is the very soul of the constitution" was said by:
a) Jawarharlal Nehru
b) Rajendra Prasad
c) Homi Bhaba
d) BR Ambedkar
Q. 16 Article 29 talks about:
a) Protection of minority language
b) Protection of cultural minorities
c) Protection of tribal values
d) All the above
Q. 17 Public interest litigation has which of the features:
[CO-2] [L-1] 2
a) Can be only produced in lower courts
b) Cannot be produced in Supreme Court
c) Can be directly taken up by the Supreme Court
d) All the above
Q. 18 S1: Lok Adalats are not voluntary bodies.
[CO-1] [L-1] 2
S2: Lok Adalats are regulated by the Governor of the State.
a) Only S1 is correct
b) Only $S 2$ is correct
c) Both S1 and S2 are correct
d) Both S1 and S2 are incorrect
Q. 19 Advocate General is appointed by the:
[CO-3] [L-1] 2
a) President
b) Chief Minister
c) Chief Justice
d) None of the above
Q. 20 S1: Amicus Curiae is giving legal representation.
$[C O-1][L-4] 2$
S2: Amicus Curiae is given to someone who cannot afford legal defense.
a) Only S1 is correct
b) Only $S 2$ is correct
c) Both S1 and S2 are correct
d) Both S1 and S2 are incorrect
Q. 21 S1: Constitutional remedies are writs which can only be produced in judicial magistrate court.
$[C O-3][L-4] 2$
S2: Constitutional remedies cannot be heard by the Supreme Court directly.
a) Only S1 is correct
b) Only $S 2$ is correct
c) Both S1 and S2 are correct
d) Both S1 and S2 are incorrect
Q. 22 S1: The Supreme Court cannot advise the President.
$[C O-3][L-3] 2$
S2: The Supreme Court does not have administrative functions.
a) Both S1 and S2 are correct
b) Only S1 is correct
c) Only S2 is correct
d) Both S1 and S2 are incorrect
Q. 23 Freedom from taxation in the name of religion is mentioned in:
$[C O-2][L-3] 2$
a) Article 23
b) Article 25
c) Article 26
d) Article 27
Q. 24 Sabarimala temble entry issue was related to which two Articles:
a) Article 15 and Article 26
b) Article 25 and 26
c) Article 28 and 29
d) Article 34 and 35
Q. 25 Article 370 is related to:
a) Jammu and Kashmir
b) Manipur
c) Nagaland
d) All the above

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester <br> UNIVERSAL HUMAN VALUES (BHM-320) 

Time: 2 hrs.
Max Marks: 50
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer any two of the following:
a) Recall the concept of definite conduct.
(CO-1) (L-1)
b) List the differences between respect and differentiation.
c) List the differences between society and crowd.
(CO-2) (L-1)
d) Recall the basis of holistic education.
(CO-1) (L-1) $\mathbf{5 \times 2}$
PART-A
Q. 2 Criticize the concept of right understanding in detail.
(CO-1) (L-4) 10
Q. 3 How would you do to correct appraisal of the physical needs?
(CO-1) (L-3) 10
Q. 4 Discuss the nine universal values in relationships and the program for its fulfillment to ensure mutual happiness.
(CO-2) (L-2) 10

## PART-B

Q. 5 Analyze how co-existence can be seen as a comprehensive human goal by human beings.
(CO-3) (L-4) 10
Q. 6 Assess the interconnectedness and mutual fulfillment among the four orders of nature.
(CO-2) (L-4) 10
Q. 7 Illustrate the steps involved in living in harmony at all the levels of human beings.
(CO-2) (L-4) 10

# End Semester Examination, Dec. 2022 <br> B. Tech. / B. Sc. (Microbiology) - First /Second Semester 

ENGLISH (BHM-201)
Time: 2 hrs.
Max Marks: 50
No. of pages: 4
Note: All questions are compulsory. Each question has FOUR options with ONE correct answer. Select the correct answer. All questions are of ONE mark each. There is no NEGATIVE marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.

| 1) | 2) | 3) | 4) | 5) | 6) | 7) | 8) | 9) | 10) |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 11) | 12) | 13) | 14) | 15) | 16) | 17) | 18) | 19) | 20) |
| 21) | 22) | 23) | 24) | 25) | 26) | 27) | 28) | 29) | 30) |
| 31) | $32)$ | $33)$ | $34)$ | $35)$ | $36)$ | $37)$ | $38)$ | $39($ | 40) |
| 41) | $42)$ | $43)$ | $44)$ | $45)$ | $46)$ | $47)$ | $48)$ | $49)$ | 50) |

Q. 1 With respect to the workplace, attitudes are defined as $\qquad$ . [L1][CO1]
a) A coworker's reaction to your suggestion of performing a specific task in a different manner.
b) A way of thinking that shapes how we behave both at work and outside of work.
c) Emotional outbursts among employees, resulting from differing opinions on completing a task.
d) An employee's reaction after being informed of an unpopular decision by management.
Q. 2 Judy has been assigned to complete an important project using new software. She is afraid that she will be unable to do so. Judy's fear is an example of the
$\qquad$ attitude component.
[L3][CO1]
a) Cognitive
b) Affective
c) Group
d) Individual
Q. 3 What does it mean to form an attitude?
[L3][CO1]
a) It means to develop a particular behavior.
b) It means to think critically about advertising.
c) It means to form an opinion or approach.
d) It means to advertise a product you love.
Q. 4 The teacher $\qquad$ completed this chapter.
[L3][CO1]
a) have
b) has
c). is
d) are
Q. 5 Ram and Shyam $\qquad$ business partners.
[L1][CO1]
a) have
b) has
c) are
d) had
Q. 6 She $\qquad$ her office by 9 a.m. daily.
[L1][CO1]
a) reach
b) reaches
c) reached
d) reaching
Q. 7 Rahul and his friends $\qquad$ also invited to the party. [L1][CO1]
a) is
b) was
c) had
d) were
Q. 8 Neither you nor your sister should $\qquad$ to them. [L1][CO1]
a) talk
b) talks
c) talked
d) talking
Q. 9 Twenty years $\qquad$ the minimum age to fill this form. [L3][CO1]
a) are
b) is
c) has
d) have
Q. 10 A bouquet of flowers $\qquad$ required for the event. [L3][CO1]
a) are
b) have
c) has
d) is
Q. 11 The wise leader and politician $\qquad$ assassinated.
[L1][CO1]
a) are
b) has been
c) have been
d) had been
Q. 12 Belief, opinion, knowledge, emotions feelings intention are the components of
[L2][CO1]
a) Communication
b) Attitude
c) Personality
d) Behavior
Q. 13 Physical growth, Intellectual Development, Emotional Development are factors influencing
a) Behavior
b) Personality
c) Communication Style
d) Attitude
Q. 14 $\qquad$ is the only component of attitude which is visible and can be observed directly.
[L1][CO1]
a) Behavior
b) Cognitive
Q. 15 I $\qquad$ working all afternoon and have just finished the assignment.
[L1][CO1]
a) Have been
b) had been
c) shall be
d) am
Q. 16 Rohan $\qquad$ the movie before he read the review.
[L1][CO1]
a) Watches
b) have watched
c) had watched
d) was watching
Q. 17 Every boy and girl $\qquad$ in the class today.
[L1][CO2]
a) Are present
b) is present
c) have present
d) had present
Q. 18 Which tense is used to express general truths and facts?
[L2][CO1]
a) Present continuous tense
b) Present perfect tense
c) Past perfect tense
d) Present indefinite tense
Q. 19 According to the prevailing rate, two dozen $\qquad$ rupees one hundred.
[L1][CO1]
a) costs
b) cost
c) costing
d) costed
Q. 20 Which one is not a benefit to employee which results through positive attitude of an employee?
[L3][CO1]
a) Promotion
b) Less Stress
c) Job Security
d) Enjoying Life
Q. 21 Each and every member $\qquad$ to vote.
[L3][CO1]
a) has
b) have
c) having
d) are
Q. 22 A large number of soldiers $\qquad$ died for the country. [L1][CO1]
a) has
b) is
c) are
d) have
Q. 23 Half of the class $\qquad$ empty. [L3][CO1]
a) were
b) was
c) has
d) have
Q. 24 He $\qquad$ (write) to me every month.
[L1][CO1]
a) is writing
b) writing
b)has been writing
d) has been writing
Q. 25 This servant $\qquad$ (work) with us for ten years.
[L3][CO1]
a) works
b) whas been working
c) is working
d) does work
Q. 26 How $\qquad$ you $\qquad$ (get) on with your studies?
[L1][CO1]
a) is get
b) do get
c) is getting
d) have got
Q. 27 She $\qquad$ (leave) for Jammu yesterday.
[L3][CO1]
a) leaves
b) is leaving
c) has been leaving
d) left
Q. 28 I......... (write) to her last week.
[L3][CO1]
a) wrote
b) has been writing
c) had been writing
d) written
Q. 29 He $\qquad$ (be) weak in English in the beginning.
[L1][CO1]
a) being
b) been
c) was
d) had been
Q. 30 He ....... (teach) in this college for five years.
[L1][CO1]
a) teaches
b) is teaching
c) taught
d) has been teaching
Q. 31 He $\qquad$ (buy) a car one month ago.
a) bought
b) has bought
c) has been buying
d) had been buying
Q. 32 What time $\qquad$ you $\qquad$ (reach) home in the evening?
[L3][CO1]
a) do, reach
b) does, reach
c) did, reached
d) have, reached
Q. 33 Where $\qquad$ he $\qquad$ (go) to play in the evening?
[L1][CO1]
a) did, go
b) has, gone
c) does, go
d) does, going
Q. 34 What is the best preferred dress to wear in a corporate setting?
[L1][CO1]
a) business formals
b) semi formals
c) informal clothes if it is with known business contacts
d) depends on one's own comfort
Q. 35 What is the best way to dress up if the interview is for a job in a more casual setting or in any other scenario?
a) follow your own dress code and judgment
b) match your interview attire to the prospective job
c) try with all dress codes and choose one that you look best in
d) be in formals (at least as formal as the employer)
Q. 36 What should be avoided while getting a new suit or a dress for the interview? [L3][CO1]
a) getting too trendy
b) consulting someone with experience
c) ensuring the right fit
d) ensuring the colour and look is formal (even if it looks extra formal)
Q. 37 What shoes should be preferred for a general interview (for women)? [L3][CO1]
a) closed-toe shoes
b) sandals
c) high heels
d) casual shoes
Q. 38 What is the rule to decide the color of the belt (for men)?
[L3][CO1]
a) always wear black
b) thecolour of the belt should match the colour of the shoe
c) thecolour of the belt should match the colour of the pair of trousers
d) thecolour of the belt should match the colour of the tie
Q. 39 Listening is the ability to $\qquad$ and appropriately respond to the meaning of another person's spoken and nonverbal messages.
[L3][CO1]
a) Understand
b) Analyze
c) Respect
d) all of these
Q. 40 How much types of memory?
[L3][CO1]
a) one
b) two
c) three
d) four
Q. 41 Types of Memory $\qquad$ .
[L3][CO1]
a) Short Term Memory
b) Working Term Memory
c) Both a and b
d) none
Q. 42 Which of these is not a step in the listening process?
[L3][CO1]
a) To stop talking
b) Receiving
c) Misinterpreting
d) Responding
Q. 43 What are the $\qquad$ listening levels?
[L1][CO1]
a) one
b) two
c) four
d) five
Q. 44 Mostly emotional barriers are faced by:
[L1][CO1]
a) Introverts
b) Extroverts
c) Listeners
d) Talkative persons
Q. 45 Fear of rejection is a type of:
[L1][CO1]
a) Depression
b) Failure
c) Sadness
d) Speech anxiety
Q. 46 Neither you nor your sister should $\qquad$ to them. [L1][CO1]
a) talk
b) talks
c) talked
d) talking
Q. 47 Twenty years $\qquad$ the minimum age to fill this form. [L3][CO1]
a) are
b) is
c) has
d) have
Q. 48 A bouquet of flowers $\qquad$ required for the event. [L3][CO1]
a) are
b) have
c) has
d) is
Q. 49 A pair of socks $\qquad$ been missing from my wardrobe. [L1][CO1]
a) have
b) has
c) were
d) is
Q. 50 Much $\qquad$ been said in the news reports. [L3][CO1]
a) were
b) have
c) has
d) was

# End Semester Examination, Dec. 2022 

B. Tech. - First / Second Semester

ENGLISH (BHM-201/BHM-201A/HSMC-101)
Time: 2 hrs.
Max Marks: 50
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) What are the barriers to communication?
b) What are 7 C's of communication?
c) What is self-awareness? How to develop self-awareness?
d) What is grooming?
e) What is inter-cultural communication? Explain with an example.
[CO1][L1] 2×5

## PART-A

Q. 2 What do you understand by SWOT? Explain with your self-assessment. [CO2][L1] 10
Q. 3 What is personality development? How to bring out the best in one's personality?
Q. 4 Write your Self Introduction.
[CO2][L1] 10

## PART-B

Q. 5 As a recent buyer of their car, write an E-mail to the Manager of XYZ automotive company, Mr. Kishore, regarding the poor quality of service facility available in the city. Sign the E-mail as Anil.
[CO3][L1] 10
Q. 6 What are the smart goals? Why should we set goals? Explain five principles of goal setting.
[CO3][L1] 10
Q. 7 Write a cover letter to ABC Company where you got to know about an internship opportunity.

# End Semester Examination, Dec. 2022 <br> B. Tech. - First / Second Semester <br> ENGLISH (BHM-201/BHM-201A/HSMC-101) 

Time: 2 hrs.
Max Marks: 50
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) What is self-awareness? How to develop self-awareness?
b) What is grooming?
c) What is inter-cultural communication? Explain with an example.
d) Name the styles of communication.
e) Define 'barriers in communication'.

## PART-A

Q. 2 What do you understand by SWOT? Explain with your self-assessment. [CO-2] [L-1] 10
Q. 3 What is personality development? How to bring out the best in one's personality?
[CO-2] [L-1] 10
Q. 4 Write your Self Introduction.
[CO-2] [L-1] 10

## PART-B

Q. 5 Write a letter to your society secretary complaining about the garbage collection problem in your society.
Q. 6 What are the smart goals? Why should we set goals? Explain five principles of goal setting.
[CO-3] [L-1] 10
Q. 7 Write a letter to your Mentor to allow you to attend Company Specific Crash Course on 30/12/2022 in your college.
[CO-3] [L-1] 10

## End Semester Examination, Dec. 2022

## B. Tech. - First Semester

ENGLISH (BHM-121)
Time: 2 hrs.
Max Marks: 50
No. of pages: 4
Note: All questions are compulsory. Each question has FOUR options with ONE correct answer. Select the correct answer. All questions are of ONE mark each. There is no NEGATIVE marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.

| 351. | 352. | 353. | 354. | 355. | 356. | 357. | 358. | 359. | 360. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 361. | 362. | 363. | 364. | 365. | 366. | 367. | 368. | 369. | 370. |
| 371. | 372. | 373. | 374. | 375. | 376. | 377. | 378. | 379. | 380. |
| 381. | 382. | 383. | 384. | 385. | 386. | 387. | 388. | 389. | 390. |
| 391. | 392. | 393. | 394. | 395. | 396. | 397. | 398. | 399. | 400. |

Q. 1 What is an effect of attitude
a) Get you fired
b) Get you nowhere
c) Helps you do more
d) none of the above
Q. 2 What are the characteristics of attitude?
a) Personality, beliefs, values, behaviors, and motivations.
b) People, groups, ideas and objects communication.
c) Behavior and ideas.
Q. 3 Personality is a trait that can be completely changed?
a) TRUE
b) False
Q. 4 is the only component of attitude which is visible and can be observed directly.
[CO-1] [L-1]
a) Behavior
b) Cognitive
c) Happiness
d) Kinesthetic
Q. 5 Radhika $\qquad$ the pictures before she printed them.
[CO-1] [L-1]
a) Seen
b) have seen
c) hadseen
d) was seeing
Q. 6 All the actors and performers $\qquad$ in the theatre.
[CO-2] [L-1]
a) are present
b) is present
c) have present
d) had present
Q. 7 Which tense is used to express general truths and facts?
[CO-1] [L-2]
a) Present continuous tense
b) Present perfect tense
c) Past perfect tense
d) Present indefinite tense
Q. 8 According to the prevailing rate, two dozen $\qquad$ rupees one hundred. [CO1][L1]
a) costs
b) cost
c) costing
d) costed
Q. 9 Which one is a benefit to employee which results through good communication?
$[C O-1][L-3]$
a) Clarity of thought
b) Good interpersonal relation
c) Self-confidence
d) All of the above
Q. 10 Which of the following is a part of the definition of attitudes?
$[C O-1][L-3]$
a) Acquired
b) Learned
c) Can be changed
d) $A \& C$
Q. 11 The way you feel or think about something or someone is known as your [CO-1] [L-1]
a) Emotions
b) Personality
c) Genetics
d) Attitude
Q. 12 How do you develop a positive attitude?
[CO-1] [L-1]
a) Avoid negative thinking.
b) Spend time with the people who have a positive attitude.
c) Be thankful.
d) All of the above.
Q. 13 To show $\qquad$ means to take responsibility for a task or project
[CO-1] [L-3]
a) Initiative
b) Action
c) Organization
d) Purpose
Q. 14 With respect to the workplace, attitudes are defined as $\qquad$
a) A coworker's reaction to your suggestion of performing a specific task in a different manner.
b) A way of thinking that shapes how we behave both at work and outside of work.
c) Emotional outbursts between employees, resulting from differing opinions on completing a task.
d) An employee's reaction after being informed of an unpopular decision by management.
Q. 15 Jameson has been assigned to complete an important project using new software. She is afraid that she will be unable to do so. Judy's fear is an example of the $\qquad$ attitude component.
a) Cognitive
b) Affective
c) Group
d) Individual
Q. 16 What does it mean to form an attitude?
[CO-1] [L-3]
a) It means to develop a particular behavior.
b) It means to think critically about advertising.
c) It means to form an opinion or approach.
d) It means to advertise a product you love.
Q. 17 The teacher $\qquad$ this chapter.
a) will have completed
b) has completed
c) is completing
d) are completed
Q. 18 Ram and Shyam $\qquad$ go for the trip.
a) will not
b) has not
c) are not
d) had not
$\qquad$
Q. 19 She $\qquad$ reach on time.
$[C O-1][L-1]$
a) did not
b) had not
c) having
d) have
Q. 20 Rahul and his friends $\qquad$ invited to the party.
a) is not
b) was not c) had not
d) were not
Q. 21 Neither you nor your sister should $\qquad$ to them.
a) have talk
c) have talked
b) talks
[CO-1] [L-1]
$\qquad$ the minimum age to fill this form.
$[C O-1][L-1]$
$[C O-1][L-1]$
Q. 22 Twenty years
a) are
b) is
c) has
d) have
$[C O-1][L-3]$
Q. 23 A bouquet of flowers $\qquad$ for the event.
a) are bought
b) have bought
c) has bought
[CO-1] [L-3]
Q. 24 The denims $\qquad$ been stolen from my wardrobe.
a) have
b) has
c) were
d) is
Q. 25 Nothing $\qquad$ been said done for the needy.
a) were
b) have
c) has
d) was
Q. 26 The information provided to you $\qquad$ wrong.
[CO-1] [L-3]
a) were
b) was
c) are
d) have been
Q. 27 The company $\qquad$ of its stakeholders.
a) think
b) thought
c) thinks
d) thinking
Q. 28 Either of the two dresses shall $\qquad$ [CO-1] [L-1]
good.
a) looking
b) 100 K
c) looks
d) looked
Q. 29 Each and every member $\qquad$ to vote.
[CO-1] [L-3]
a) has
b) have
c) having
d) are
Q. 30 A large number of common people $\qquad$ died during the pandemic. [CO-1] [L-1]
a) has
b) is
c) are
d) have
Q. 31 The classroom empty.
$[\mathrm{CO}-1][\mathrm{L}-3]$
a) were
b) was
c) has
d) have
Q. 32 He $\qquad$ (write) to me every month.
a) is writing
b) writing
c) has been writing
d) has been writing
Q. 33 This servant $\qquad$ (work) with us for ten years.
a) Works
b) has been working
c) is working
d) does work
[CO-1] [L1] you $\qquad$ (get) on with your studies?
[CO-1] [L-1]
Q. 34 How $\qquad$
b) do get c) is, getting
d) have got
Q. 35 She $\qquad$ (leave) for Jammu yesterday.
[CO-1] [L-3]
a) leaves
b) is leaving
c) has been leaving
d) left
Q. $36 I$ (write) to her last week.
$[C O-1][L-3]$
a) wrote
b) has been writing
c) had been writing
d) written
Q. 37 He $\qquad$ (be) weak in English in the beginning.
$[C O-1][L-1]$
a) being
b) been
c) was
d) had been
Q. 38 He $\qquad$ (teach) in this college for five years.
a) teaches
b) is teaching
c) taught
[CO-1] [L-1] teaching
Q. 39 He $\qquad$ (buy) a car one month ago.
[CO-1] [L-1]
a) bought
b) has bought
c) has been buying
d) had been buying you $\qquad$ (reach) home in the evening?
[CO-1] [L-3]
Q. 40 What time $\qquad$
b) does, reach
c) did, reached
reached
Q. 41 Where $\qquad$ he $\qquad$ (go) to play in the evening?
[CO-1] [L-1]
a) did, go
b) has, gone
c) does, go
d) does, going
Q. 42 What is the best preferred dress to wear in a corporate setting?
b) semi formals
c) informal clothes if it is with known business contacts
d) depends on one's own comfort
Q. 43 What is the best way to dress up if the interview is for a job in a more casual setting or in any other scenario?
a) follow your own dress code and judgment
b) match your interview attire to the prospective job
c) try with all dress codes and choose one that you look best in
d) be in formals (at least as formal as the employer)
Q. 44 What should be avoided while getting a new suit or a dress for the interview?
[CO-1] [L-3]
a) getting too trendy
b) consulting someone with experience
c) ensuring the right fit
d) ensuring the colour and look is formal (even if it looks extra formal)
Q. 45 What shoes should be preferred for a general interview (for women)? [CO-1] [L-3]
a) closed-toe shoes
b) sandals
c) high heels
d) casual shoes
Q. 46 What is the rule to decide the color of the belt (for men)?
$[C O-1][L-3]$
a) always wear black
b) the colour of the belt should match the colour of the shoe
c) the colour of the belt should match the colour of the pair of trousers
d) the colour of the belt should match the colour of the tie
Q. 47 Listening is the ability to $\qquad$ and appropriately respond to the meaning of another person's spoken and nonverbal messages.
[CO-1] [L-3]
a) Understand
b) Analyze
C) Respect
d) all of these
Q. 48 How many types of memory are there?
a) one
b) two
c) three
d) four
Q. 49 Which of these is a type of memory in human mind?
$[C O-1][L-3]$
a) Short term memory
b) Working term memory
c) Both $a$ and $b$
d) none of these
Q. 50 Good communication skills is only about speaking correct and Fluent English?
a) True
b) False

# End Semester Examination, Dec. 2022 

## B. Tech. - First Semester PROFESSIONAL COMMUNICATION-I (BHM-101/HM-104)

Time: 3 hrs.
Max Marks: 50
No. of pages: 3

Note: Attempt ALL questions are compulsory. Marks are indicated against each question.

## SECTION-A

Q. 1 a) How much of listening affect our communication?
i) $20-35 \%$
ii) $5-15 \%$
iii) $25-40 \%$
iv) $40-70 \%$
b) We listen at $\qquad$ \% efficiency without training?
i) $20 \%$
ii) $25 \%$
iii) $30 \%$
iv) $35 \%$
c) What will be the third stage of listening?
i) Responding
ii) Evaluating
iii) Understanding
iv) Remembering
d) Listening means to respond to advice or request?
i) True
ii) False
e) Which of these is not step in the listening process?
i) To stop talking
ii) Receiving
iii) Misinterpreting
iv) Responding
f) Which of these is the first step in the listening process?
i) Stop talking
ii) Receiving
iii) Interpreting
iv) Responding
g) Without $\qquad$ skills, the ability to progress in the working world and in life, itself would be nearly impossible.
i) Listening
ii) Speaking
iii) Writing
iv) All of Them
h) Which of these is not an element of the speaking technique?
i) Voice Quality
ii) Word Stress
iii) Appearance
iv) Correct Tones
i) Which of these factors is not involved in the determination of correct tone?
i) Pitch
ii) Dressing Style
iii) Quality
iv) Strength
j) Which of these should be avoided for an effective speech?
i) Determination of the purpose
ii) Selection of message
iii) Lack of interest
iv) Selection of theme
$1 \times 10$

## SECTION-B

Q. 2 What do you understand by Intercultural Communication?
Q. 3 What is the importance of facial expression while speaking to a group of people? Mention example.
Q. 4 Explain the importance of etiquette and grooming in a professional setting. State an example of consequence of incorrect etiquette.

## SECTION-C

Q. 5 Read the following paragraph and answer the questions.

## Student Volunteers Needed!

On Saturday, December 12th, from 10 A.M. until 4 P.M MRIIRS will be holding a music festival in the school gymnasium. The special event will feature a variety of professional musicians and singers.

TASK
Make Posters
Set Up Gym
Help Performers
Welcome Guests
Clean up Gym

## TIME

1 P.M.-4 P.M.
11 A.M.-4 P.M.
9 A.M.-4 P.M.
10 A.M.-2 P.M.
4 P.M.-7 P.M.

## DATE

December 5th
December 11th
December 12th
December 12th
December 12th

Interested students should speak to Ms. Sharma, the music teacher. Students who would like to help in the festival must have written permission from a parent or guardian.
a) At what time the festival will begin?
i) 10 A.M.
ii) 11 A.M.
iii) 1 P.M.
iv) 2 P.M.
b) In line 3, the word feature is the closest in meaning to $\qquad$ .
i) Look
ii) Keep
iii) Include
iv) entertain
c) Which job will be done the day prior to the beginning of festival?
i) Making posters
ii) Setting up the gym
iii) Cleaning up the gym
iv) Helping the performers
d) Who is being told to talk to Ms. Sharma?
i) Parents
ii) Students
iii) Teachers
iv) Performers
e) Which task needs to be done at the end?
i) Talk to Ms. Sharma
ii) Clean up Gym
iii) Make Posters
iv) Read Notice
Q. 6 Read the passage and answer the questions.

When another old cave is discovered in the south of France, it is not usually news. Rather, it is an ordinary event. Such discoveries are so frequent these days that hardly anybody pays heed to them. However, when the Lascaux cave complex was discovered in 1940, the world was amazed. Painted directly on its walls were hundreds of scenes showing how people lived thousands of years ago. The scenes show people hunting animals, such as bison or wild cats. Other images depict birds and, most noticeably, horses, which appear in more than 300 wall images, by far outnumbering all other animals.Early artists drawing these animals accomplished a monumental and difficult task. They did not limit themselves to the easily accessible walls but carried their painting materials to spaces that required climbing steep walls or crawling into narrow passages in the

Lascaux complex. Unfortunately, the paintings have been exposed to the destructive action of water and temperature changes, which easily wear the images away. Because the Lascaux caves have many entrances, air movement has also damaged the images inside. Although they are not out in the open air, where natural light would have destroyed them long ago, many of the images have deteriorated and are barely recognizable. To prevent further damage, the site was closed to tourists in 1963, 23 years after it was discovered.
a) Which title best summarizes the main idea of the passage?
i) Wild Animals in Art
ii) Hidden Prehistoric Paintings
iii) Exploring Caves Respectfully
iv) Determining the Age of French Caves
b) In line 4, the words pays heed to are the closest in meaning to $\qquad$ .
i) Discovers
ii) Watches
iii) Notices
iv) Buys
c) Based on the passage, what is probably true about the south of France?
i) It is home to rare animals.
ii) It has a large number of caves.
iii) It is known for horse-racing events.
iv) It has attracted many famous artists.
d) According to the passage, which animals appear most often on the cave walls?
i) Birds
ii) Bison
iii) Horses
iv) Wild cats
e) In line 10, the word depict is the closest in meaning to $\qquad$ .
i) Show
ii) Hunt
iii) Count
iv) Draw
Q. 7 Write an email application to your HOD for 10 days leave for sister's marriage? Please follow all aspects and format of an actual email.

## End Semester Examination, Dec. 2022

B. Tech. - First Semester PROFESSIONAL COMMUNICATION-I (BHM-100)

Time: 3 hrs.
Max Marks: 50
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Explain the concept of communication with examples of different types of communications.

## PART-A

Q. 2 What do you understand by non-verbal communication? Explain with examples.
Q. 3 Discuss the greatest challenges of effective communication in detail. [CO-2] [L-1] $\mathbf{1 0}$
Q. 4 What role do facial expressions, gestures and pauses play in communication?
[CO-3] [L-1] 10

## PART-B

Q. 5 What is the purpose of E-mail in business communication?
[CO-1] [L-1] 10
Q. 6 Can culture, gender, nationality or social class have an effect on communication?
[CO-3] [L-1] 10
Q. 7 Define 'Barriers in Communication'. Give examples.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester CYBER LAW AND ETHICS (BHM-001/ BHM-001A) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Describe the different components of Cyber security.
b) What are the three most important aspects of information security?
c) Illustrate the main reasons behind cyberstalking.
d) Discuss aims of cyber law.
e) Explain briefly the benefits of Cyber Laws.
f) Describe the features of phishing.
e) What is the need of cyber ethics?
g) Are cyber ethics issues unique? Justify your answer.
h) What do you understand by data protection?
i) Does intellectual property (IP) protection have a time limit?
j) Describe any two violations of intellectual property rights.

## PART-A

Q. 2 a) Explain Internet architecture in detail with the help of block diagram.[CO-1] [L-2] 10
b) Why we use uniform resource locator? Illustrate the categories of uniform resource locator?
[CO-1] [L-2] 10
Q. 3 a) What do you understand by information and why its security is most important? Also, explain how you will achieve information security? [CO-2] [L-3] 10
b) Illustrate different types of security issues and also explain how you will avoid them?
[CO-2] [L-3] 10
Q. 4 a) What do you understand by Investment Fraud and how you will protect yourself against it?
[CO-3] [L-2] 10
b) Explain the cyber law, its nature and scope.

## PART-B

Q. 5 Discuss the reasons behind the development of cyber law? Illustrate its implementation and importance. Also, discuss the IT laws in India. [CO-4] [L-2] 20
Q. 6 a) What are the key components of cyber ethics? Justify that freedom to speech and expression will be considered as a fundamental right in cyberspace.[CO-5] [L-2] 10
b) Compare the terms data security, data privacy and data utility. Also explain their dependency on each other.
Q. 7 a) Illustrate the historical background and objectives of Information and Technology Act.
b) Explain the intellectual property rights in detail. Also discuss how the penalty is imposed if intellectual property rights and violated.

## End Semester Examination, Dec. 2022

## B. Tech. - Third Semester CYBER LAW AND ETHICS (BHM-001/ BHM-001A)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) Define ports in networking with suitable example.
[CO-1] [L-1]
b) Compare IP Address and MAC Address. [CO-1] [L-5]
c) Explain DNS poisoning attack. [CO-3] [L-2]
d) Define malware and how can you stop it? [CO-3] [L-1]
e) Explain phishing.
f) Describe various modes of committing cybercrime.
g) Explain digital signature.
h) List out some tools used by ethical hackers.
i) Define ransomware.
j) Compare patent and trademark.

## PART-A

Q. 2 a) Compare classful addressing and classless addressing.
[CO-1] [L-5] 10
b) Explain the functionality of ping and traceroute command.
[CO-1] [L-2] 10
Q. 3 a) Explain Do Sattacks and how to prevent it?
[CO-3] [L-2] 10
b) Explain the role of cryptography in information security.
[CO-2] [L-2] 10
Q. 4 a) Explain identity theft with suitable example.
[CO-3] [L-2] 10
b) Analyze the importance of protection against cybercrime
[CO-3] [L-4] 10
PART-B
Q. 5 Discuss different types of cyber laws and explain its need laws in detail. [CO-4] [L-2] 20
Q. 6 a) Explain the importance of cyber ethics with suitable example.
[CO-5] [L-2] 10
b) Explain different elements of cyber security.
[CO-5] [L-2] 10
Q. 7 Discuss different types of IPR, and explain who is benefitted from each type of IPR and how?

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester CYBER LAW AND ETHICS (BHM-001) 

Time: 3 hrs.

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Explain the term Internet.
b) What are Malwares?
c) How DNS Spoofing effect the cyber security?
d) What are the IP addresses and its type?
e) What do you understand by the term URL?
f) Explain the term Internet fraud
g) What are Cyber laws?
h) What do you understand by the term Intellectual property law?
i) What is hacking?
j) What is the impact of internet on copyright?

## PART-A

Q. 2 a) What do you understand by DNS phishing? Discuss how this threat can affect cyber security.
b) What are different types of IP addresses? Mention the various protocols that are considered in them.
Q. 3 a) Mention the various Basic security terminologies. Explain with examples. $\mathbf{1 0}$
b) Convert IP address 172.16.2.17 into binary and also write its class.

Mention the various ranges of classful addressing.
Q. 4 a) Explain auction fraud and its types in detail. $\mathbf{1 0}$
b) Mention the various secure browser settings in context with Internet Explorer10. 10

## PART-B

Q. 5 a) Explain the cyber laws in India, their scope and coverage in detail. $\mathbf{1 0}$
b) Explain the needs of Cyber Law in $21^{\text {st }}$ century. $\mathbf{1 0}$
Q. 6 a) Explain the role of ethics in computer security. $\mathbf{1 0}$
b) How an organization can take legal protection against cyber-crime? $\mathbf{1 0}$
Q. 7 a) Describe the cyber law under IT ACT, 2000.Mention the amendments in IT ACT, 2008.
b) Explain intellectual property rights in detail. $\mathbf{1 0}$

# End Semester Examination, Dec. 2022 

## B. Sc. (Hons.) Geology - Fifth Semester <br> MINING (BGE-DS-506)

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO
questions from PART-A and TWO questions from PART-B. Each question
carries equal marks.
Q. 1 Write the short notes on following:
a) Diamond Drilling.
b) Subsidence above Mine.
c) Geochemical Sampling.
d) Geological Reserve.
e) Mineral Beneficiation.
f) True North.
g) Geobotanical survey.
h) Radioactive methods.
i) Mineral economics.
j) Crushing.

## PART-A

Q. 2 a) Justify the importance of mining in present condition.
[CO-2][L5] 10
b) Explain requirement of topographical survey in mining.
Q. 3 a) Describe Percussion and Rotary drilling.
b) Discuss underground Mining methods.
Q. 4 a) Discuss function of Theodolite.
[CO-4][L6] 10
a) Discuss the process of Mineral beneficiation for Coal.
[CO-5][L6] 10

## PART-B

Q. 5 a) Discuss stereoscopy and its use in surveying.
[CO-3] [L-4] 10
b) Explain how the geochemical prospecting in important for mining. [CO-2] [L-5] 10
Q. 6 a) Explain why feasibility study required before mining, give the reason. [CO4] [L3] 10
b) Discuss national mineral policies of India.
[CO-4] [L-4] 10
Q. 7 a) Explain comair underground and open caste mining.
[CO-5] [L-5] 10
b) Write the short notes on iron ore deposit.
[CO-3] [L-4] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester RESEARCH INNOVATION AND CATALYST-III (BGE-DS-504)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer in brief:
a) Explain i10 index.
b) Classify journals.
c) Compare ISSN with ISBN.
d) Examine open access journals.
e) Explain h-index.
f) Discuss proto type.
g) Argue on data validation.
h) Examine results for discrepancies.
i) Repeatability and reproducibility.
j) Deciding the hypothesis.
$2 \times 10$

## PART-A

Q. 2 a) Describe choosing the appropriate research methodology.
b) Formulate experimental procedures.
Q. 3 a) Discuss about analyzing the data set.
b) Build arguments on primary and secondary data.
Q. 4 a) Explain listing and analyzing the observations.
b) Discuss analysis and interpretation of the data.

## PART-B

Q. 5 a) Explain graphical abstract.
b) Compare Abstract and conclusion.
Q. 6 a) Comment quality of research journals.
b) Describe the format of a review paper.
Q. 7 Write a model paper on Groundwater recharge in India.

# End Semester Examination, Dec. 2022 

# B. Tech. - Fifth Semester <br> BASIC ENGINEERING GEOLOGY (BGE-DS-503) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Attempt all questions. Elaborate the terminologies:
a) Physical property of rock.
b) Discuss the two forces acting on Bridge.
c) Shear test and seismic test.
d) Mass movement.
e) Grouting and rock bolting.
f) Earthquake.
g) Shoreline treatment.
h) Road material.
i) Soil Profile.
j) Rock bolting.
[CO-2][L4] 2x10

## PART-A

Q. 2 a) Justify the durability of rock for road construction.
[CO-4][L6] 10
b) Discuss elastic behavior of the rock.
[CO-3][L5] 10
Q. 3 a) Discuss the safe geological condition for Dam construction.
[CO-5][L5] 10
b) Discuss the common rock aggregate? Give example.
[CO-3][L4] 10
Q. 4 a) Justify the geological investigation required for road and highways. [CO-4][L6] 10
b) Explain Grouting and its requirement.
[CO-4][L4] 10

## PART-B

Q. 5 a) Describe Gravity Dam and Arch Dam.
[CO-4][L6] 10
b) Discuss uniaxial compressive strength.
[CO-3][L6] 10
Q. 6 a) Explain the Seismic zones? How it's helpful in engineering design. [CO-4][L4] 10
b) Discusses Insitu stress test.
[CO-2][L6] 10
Q. 7 a) Explain the causes of Mass movement and its type.
[CO-5][L4] 10
b) Discuss the application of remote sensing and geographic information systems (GIS) in field of planning.
[CO-4][L6] 10

## End Semester Examination, Dec. 2022

# B. Tech. - Fifth Semester <br> GROUND WATER GEOLOGY (BGE-DS-502) 

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer in briefly:
a) Draw subsurface water profile.
b) Groundwater flow and storage.
c) Compare drawdown with water level fluctuation.
d) Perched water table vs water table.
e) Bore well vs tube well.
f) Seismic reflection vs refraction.
g) Electrical resistivity profiling.
h) DTH drilling vs rotary drilling.
i) Zone of interference.
j) Sodium absorption Ratio value.
[CO-2][L4] 2x10

## PART-A

Q. 2 a) Describe runoff, long term rainfall analysis and normal rainfall.
b) Discuss DWLR generated hydrograph.
Q. 3 a) With the help of a suitable diagram discuss transmissivity and storativity.
[L4][CO-2] 10
b) Build arguments how primary porosity is more homogeneous than secondary.
[L4][CO-2] 10
Q. 4 a) Explain Darcy's Law considering groundwater flow.
[L6][CO-3] 10
b) Discuss bore well construction and testing.
[L1][CO-3] 10

## PART-B

Q. 5 a) Describe with drawing the method of map preparation for EC.
[L6][CO-4] 10
b) Describe type of Graphical presentation of water quality data used.
Q. 6 a) Comment on geophysical methods of groundwater exploration. [L4][CO-5] 10
b) Explain litholog. Elaborate on construction of lithologs.
Q. 7 a) Discuss groundwater quality issues in India.
b) Discuss Roof top Rainwater harvesting.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Fifth Semester ECONOMIC GEOLOGY (BGE-DS-501) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Attempt all questions. Elaborate the terminologies:
a) Gangue Minerals.
b) Varieties of coal.
c) Diamond bearing rocks.
d) Hypogene ore deposit.
e) Geophysical anomalies.
f) Grade of ores.
g) Oil traps.
h) Metalogenic epoch.
i) Syngenetic ores.
j) Gossan.
[CO-2][L4] 2x10

## PART-A

Q. 2 a) How will you identify the order of ore genesis? Discuss the significance of paragenesis.
[CO-1][L4] 10
b) Describe three ore textures found in the ores of igneous origin.
[CO-1][L-2] 10
Q. 3 Discuss the process of hydrothermal ore formation. What is the sources of hydrothermal fluids?
[CO-6][L-2] 20
Q. 4 a) In which type of rock diamond is found. In India where do we get diamonds?
[L3][CO-3] 10
b) How the bauxite deposit of India have formed? Which are the main locations and mineralogy of aluminum ores in India?
[L3][CO-3] 10

## PART-B

Q. 5 Describe the process of coal formation. In which age of rocks we get coal in India. Give examples of coal deposits in India.
[L4][CO-4]
20
Q. 6 a) Discuss the objectives of geophysical surveys in locating mineral deposits.
[L4][CO-5] 10
b) Describe gravity and seismic geophysical methods in ore prospecting.
[L4][CO-5] 10
Q. 7 Describe different types of sampling methods employed in discovering the ores and estimating the ore reserves during drilling.
[L6][CO-6]

# End Semester Examination, Dec. 2022 OPEN ELECTIVE - COMMON FOR ALL BRANCHES GREEN ENERGY RESOURCES (BEE-OE-004) 

Time: 3 hrs.
Max Marks:
100
No. of pages:
1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) How many different types of renewable sources energy are there?
b) What are the environmental impacts of using geothermal energy?
c) List any four advantages of wind turbine.
d) How is the energy being continuously produced in the sun?
e) Design a solar array of rating 18V, 15 amp with 6V, 1.5 amp PV cell.
f) How does the production of biomass and ethanol affect the environment?
g) What is the source of heat contained in geothermal energy?
h) Name four gases commonly present in biogas. State two advantages of using this gas over fossil fuels.
i) Define 'tidal energy'.
j) Why a solar cooker painted black form outside? $2 \times 10$

## PART-A

Q. 2 Explain the main features of various types of renewable energy resources. Also discuss their use as in context of Indian energy need.
[CO-1] [L-2] 20
Q. 3 a) Describe the construction and working of solar flat plate collectors.
[CO-2][L-2] 10
b) Differentiate between flat plate collectors and concentrating collectors. Why orientation is needed in concentrating type collectors?
[CO-2][L-3] 10
Q. 4 a) List the advantages and disadvantages at photovoltaic solar energy conversion.
[CO-2] [L-3] 10
b) Explain Solar cell, Array with their working in series and parallel both. [CO2][L2] 10

## PART-B

Q. 5 a) Discuss about different configurations of wind turbines and their advantage and disadvantages.
[CO-3] [L-2] 10
b) Explain the mechanism of production of local winds. What are the most favorable sites for installing wind turbines? Explain the major application of wind power.
[CO-3] [L-3] 10
Q. 6 a) What are bio-mass energy resources and what is energy yield from each of them?
b) Examine the fermentation and Wet process.
Q. 7 a) What are the difficulties in large scale utilization of geothermal energy? Explain the development required to increase the role of geothermal energy in future?
[CO-1] [L-2] 10
b) Discuss Fuel cells use as alternative energy sources.

# End Semester Examination, Dec. 2022 OPEN ELECTIVE - COMMAN FOR ALL BRANCHES AUTOMATION IN INDUSTRY (BEE-OE-003) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Examine on instruction in PLC language is symbolically represented by what shape.
b) To reset the time for a PLC which condition must be true?
c) Write the examples of input devices in PLC.
d) List the languages used in programming of PLC.
e) Which type of sensors are used for water and pressure control?
f) Describe at which voltage and current the analog/digital output Works in PLC.
g) Illustrate the applications of industrial automation.
h) Explain 'DCS'.
i) Memorize how addressing is implemented in PLC?
j) Identify the areas in which robots are used.

## PART-A

Q. 2 a) Describe the role of industrial automation in ensuring overall profitability of an industrial production system.
b) Compare the PLC and microcontrollers.
Q. 3 Explain the architecture of PLC in detail.
[CO-2] [L-1] 20
Q. 4 Develop PLC Programming for the digital logic gates: OR, AND, NAND, XOR, NOR.
[CO-3] [L-3] 20

## PART-B

Q. 5 Illustrate with example the use of timers and counters in PLC.
Q. 6 Explain in detail about DCS with block diagram for industrial automation. [CO3] [L1] 20
Q. 7 Explain the applications of Robots in various industries.
[CO-4] [L-1] 20

# End Semester Examination, Dec. 2022 

OPEN ELECTIVE - COMMON FOR ALL
BRANCHES
ROBOTICS AND ITS APPLICATIONS (BEE-OE-002)
Time: 3 hrs.
Max Marks:
100
No. of pages: 1
Note: Attempt FIVE questions in all. Q. 1 is compulsory attempt any TWO questions from PART-A and TWO questions from PART-B Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) What are the advantages of robots?
[CO-1][L-1]
b) What is an end effector?
[CO-2][L-1]
c) Define the term: 'kinematics'.
[CO-2][L-2]
d) Name two tactile sensors used in robot.
[CO-1][L-2]
e) How computer vision improves the capability of robot?
[CO-3][L-1]
f) What is meant by degree of freedom in robot?
[CO-4][L-2]
g) Differentiate between 'manipulation' and 'locomotion'.
[CO-4][L-1]
h) Name the two types of joints commonly used in robots.
[CO-3][L-2]
i) What is meant by robot work envelope?
j) What is sensor noise?

## PART-A

Q. 2 a) Narrate the history of robots.
[CO-1] [L-2] 10
b) Explain the different characteristics which make a robot efficient/intelligent.
[CO-2] [L-2] 10
Q. 3 a) Explain different types of grippers.
[CO-1] [L-2] 10
b) Explain the different mechanism of motion used in robot.
[CO-2] [L-2] 10
Q. 4 a) Compare hydraulic and pneumatic types of actuators. [CO-2][L-2] 10
b) Explain any two non-tactile sensors used in robots.
[CO-1] [L-2] 10
PART-B
Q. 5 a) Explain the architecture of map based localization.
[CO-2] [L-2] 10
b) State and explain different kinematic pair.
[CO-3] [L-2] 10
Q. 6 a) Compare legged and wheeled locomotion in mobile robots. [CO-3][L-2] 10
b) Analyze the different tasks involved in digital image processing. Describe its advantages and disadvantages.
[CO-3][L-2] 10
Q. 7 a) Explain the applications of robots in industrial sector. [CO-4][L-2] 10
b) Explain the applications of robots in healthcare sector.
[CO-4][L-2] 10

# End Semester Examination, Dec. 2022 OPEN ELECTIVE - COMMAN FOR ALL BRANCHES HYBRID VEHICLES (BEE-OE-001) 

Time: 3 hrs.
Max. Marks:
100
No. of pages:
1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) Deliberate the brief history of electric cars.
[CO-1] [L1]
b) Differentiate between IC engine-based vehicle and electric vehicles. [CO1][L1]
c) List the modes of the hybrid electric vehicles. 1]
d) What is meant by electric braking?

2]
e) Enumerate the types of DC motors.
[CO-2] [L2]
f) Write expression of Duty ratio in step up converters.
[CO-3] [L2]
g) List the types of power converters. [CO-3] [L1]
h) What are the different types of batteries used in EV? 2]
i) What are the requirements of fast charging?
[CO-4] [L1]
j) Enumerate the components of charging stations.

## $2 \times 10$

## PART-A

Q. 2 a) What were the major reasons for the development of electric and hybrid electric vehicles?
[CO-1][L-1] 10
b) Draw the block diagram and discuss the major components of hybrid electric vehicle.
[CO-1] [L-2]
10
Q. 3 a) Deliberate the parallel hybrid mode of operation in hybrid vehicles. Also, discuss its power flow.
[CO-2]
[L-2] 10
b) Describe the working of solar photovoltaic based electric vehicle. [CO2][L2] 10
Q. 4 a) Enumerate working principle of DC motor.
[CO-2] [L-2]
b) Classify the electric motors employed in EV applications and also enumerate the requirement of motors being employed in EV. [CO-2] [L-2] 10

## PART-B

Q. 5 a) Enumerate the operation of Single-phase Voltage source Inverters. Support the answer with appropriate waveform
b) List the types of DC-DC Converters and Analyse the working of Buck Converter
Q. 6 Enumerate the types of batteries used in EV. Recall the Working Principle and Applications of Lithium-ion batteries. Also list its advantages and disadvantages.
[CO-5]

## [L-2] 20

Q. 7 a) Deliberate the factors considered while selection and sizing of charging stations.
b) List different types of charging techniques. Enumerate the principle of inductive charging employed in electric vehicle.
[CO-5] [L-2] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Seventh Semester <br> ROBOTICS AND AUTOMATION (BEE-DS-726) 

Time: 3 hrs.
Max Marks: 100 No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) What is programmable automation?
[CO1][L2]
b) Mention any two differences between hard and soft automation.
c) State two disadvantages of automation.
d) Name the components of manufacturing system?
[CO1][L2]
e) Describe a revolute joint.
[CO1][L1]
[CO2][L2]
f) What is resolution referred to robots.
[CO3][L2]
g) Compare between rotational joint and revolving joint.
h) What do you mean by work space of a robot?
i) Name any two non tactile sensors used in robot.
j) What are the basic components of a feedback control system?
[CO3][L2]
[CO3][L2]
[CO3][L2]
[CO4][L1]
[CO5][L2]
$\mathbf{2 x 1 0}$

## PART-A

Q. 2 a) Explain the automation strategies in production in detail.
[CO1][L3] 10
b) Explain the different types of automation with examples.
[CO1][L3] 10
Q. 3 a) Explain the different layouts of flexible manufacturing system. [CO2][L2] 10
b) Discuss how automation improves profit in a manufacturing industry?
[CO1][L3] 10
Q. 4 a) Narrate the history of robots in detail.
[CO3][L2] 10
b) Describe the different configuration of robots.

## PART-B

Q. 5 a) Explain P, PI and PID Controller used in Industry.
b) Explain any one type of stepper motor used as controller in robots.
Q. 6 a) Differentiate between pneumatic and hydraulic actuators.
b) Explain the different robot mechanisms and transmission systems.
[CO5][L3] 10 [CO4][L2] 10
[CO5][L3] 10 [CO3][L2] 10
Q. 7 a) Explain the robot vision systems in detail.
[CO4][L2] 10
b) Explain the different types of sensors used in robots.

# End Semester Examination, Dec 2022 

## B. Tech. - Seventh Semester <br> SMART GRID TECHNOLOGY (BEE-DS-725)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) What are major points which are forced drivers for demanding Smart Grid? [CO- 1] [L- 1,2]
b) Why smart meter is an important component of the Smart grid? [CO- 1] [L- 1,2]
c) Compare the concept of resilient and self healing Grid. [CO-3] [L- 4]
d) Explain the concept of plugin hybrid electric vehicles. [CO-3] [L- 2]
e) Do microgrids increase the reliability of the grid?
[CO-5] [L-2,4]
f) What is power quality conditioner?
[CO-4] [L-1,2]
g) What is a Macro grid?
[CO-5] [L-1]
h) State the advantages of plastic solar cell over solar cell? [CO- 2] [L-4]
i) What do you understand by Islanding?
j) Why signal conditioning is necessary in Smart Grid?

## PART-A

Q. 2 a) Describe the opportunities and challenges related to smart grid. [CO-1] [L-1,2] 10
b) How evolution of electric Grid happened and also explain the concept of Smart Grid.
[CO-1] [L-1,3] 10
Q. 3 a) Classify Demand Response programs and explain one in detail. [CO-1] [L-2] 10
b) Discuss benefits of using PMU. Also compare PMU with SCADA. [CO-3] [L-2,4] $\mathbf{1 0}$
Q. 4 a) Explain the role of smart meters to make the system smart.
[CO-2] [L-2] 10
b) Explain fundamentals of phasor measurement unit and their applications in power system.
[CO-3] [L-1,3] 10

## PART-B

Q. 5 a) Describe \& explain the power quality issues of grid connected renewable energy resources.
[CO-4] [L-1,2] 10
b) What is power quality management in smart grid?
[CO-4] [L-1,2] 10
Q. 6 Describe the concept of micro grid, and its need applications. Demonstrate Microgrid using a case study.
[CO-2] [L-2,3] 20
Q. 7 a) Explain following network architecture in smart grid communication entities:
i) Local Area Network
ii) Wide Area Network
[CO-5] [L-1,2] 10
b) Explain concept of Web based Power Quality monitoring.
[CO-5] [L-1,2] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester WIND AND SOLAR ENERGY SYSTEM (BEE-DS-724)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions in brief:
a) How is wind energy related to solar energy?
b) Give advantages of wind energy?
c) Name different types of turbines used in wind energy conversion.
d) What are the different features of wind turbine safety systems?
e) What is the need of storage system with wind energy systems?
f) List the drawbacks of solar energy.
g) What is solar constant?
h) Define air mass.
i) What is green house effect?
j) List the methods used for storing solar energy. 2×10

## PART-A

Q. 2 a) Derive an expression for determining power in wind.
[CO-1] [L-3] 10
b) Wind at 1 standard atmospheric pressure and $15^{\circ} \mathrm{C}$ has velocity of $15 \mathrm{~m} / \mathrm{s}$ calculate the total power density in the wind stream and the maximum obtainable power density; when turbine diameter is 120 m , turbine operating speed is 40 rpm .
[CO-1] [L-4] 10
Q. 3 a) Classify different types of wind energy conversion systems.
[CO-2] [L-1] 10
b) With diagram explain the different components of wind electric generating station.
[CO-2] [L-2] 10
Q. 4 a) Derive an expression for estimation of average solar radiation. [CO-3] [L-3] $\mathbf{1 0}$
b) Explain how solar radiation can be measured using pyranometer.

## PART-B

Q. 5 a) Compare polycrystalline and monocrystalline solar cells.
[CO-4] [L-3] 10
b) Explain the operation of maximum power point tracking algorithm. [CO4] [L2] 10
Q. 6 a) Explain the different issues related with grid integration of solar and wind power plants.
[CO-5] [L-2] 10
b) What are the different power quality issues with renewable energy power plants?
[CO-5] [L-1] 10
Q. 7 a) With block diagram explain solar thermal power plants.
b) Compare parabolic and flat plate collectors.

# End Semester Examination, Dec. 2022 <br> B.Tech. - Sixth Semester <br> ADVANCED CONTROL SYSTEM (BEE-DS-623) 

Time: 3 hrs.
Max Marks: 100

No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer in brief:
a) What are draw backs of transfer function model analysis?
b) List advantages of state space analysis.
[CO-1] [L-1]
c) Explain rank of a matrix.
d) What are linear systems and nonlinear systems? Give examples?
e) Define 'state and state vector'.
f) When a system is observable?
g) Explain $A B C D$ parameters in state space.
h) Specify the different matrics used for state space representation.
[CO-2] [L-2]
i) What is the necessary condition to be satisfied for controller design using state feedback?
j) How the modal matrix is determined?
[CO-2] [L-3] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Find the state space model for a system described by the following differential equation.

$$
\begin{equation*}
\dddot{c}+9 \ddot{c}+26 \dot{c}+24 c=24 r \tag{CO-1}
\end{equation*}
$$

b) Find the transfer function from the following transfer function:

$$
\dot{x}=\left[\begin{array}{ccc}
0 & 1 & 0 \\
0 & 0 & 1 \\
-1 & -2 & -3
\end{array}\right] x+\left[\begin{array}{c}
10 \\
0 \\
0
\end{array}\right] u \quad y=\left[\begin{array}{lll}
1 & 0 & 0
\end{array}\right] x
$$

Q. 3 a) How diagonalization of a matrix is done? Explain in detail.
b) How do you find the transfer function of a system from its state diagram?
Q. 4 a) The state space representation for a system is given by:

$$
\begin{aligned}
& \dot{x}=\left[\begin{array}{ccc}
0 & 1 & 0 \\
0 & 0 & 1 \\
0 & -36 & -15
\end{array}\right] x+\left[\begin{array}{l}
0 \\
0 \\
1
\end{array}\right] u \\
& y=\left[\begin{array}{lll}
1000 & 100 & 0
\end{array}\right] x
\end{aligned}
$$

Determine the stability of the process.
b) List properties of Eigen values. Prove that if $A$ and $A^{t}$ have the same eigen values.

## PART-B

Q. 5 a) Determine the state transition matrix for:

$$
A=\left[\begin{array}{ccc}
0 & 1 & 0  \tag{CO-2}\\
0 & 0 & 1 \\
1 & -3 & 3
\end{array}\right]
$$

b) Explain properties of the state transition matrix.
Q. 6 a) Find whether the system is obseervable or not.

$$
\left[\begin{array}{l}
\dot{x}_{1} \\
\dot{x}_{2} \\
\dot{x}_{3}
\end{array}\right]=\left[\begin{array}{ccc}
0 & 1 & 0 \\
0 & 0 & 1 \\
-6 & -11 & -6
\end{array}\right]\left[\begin{array}{l}
x_{1} \\
x_{2} \\
x_{3}
\end{array}\right]+\left[\begin{array}{l}
0 \\
0 \\
1
\end{array}\right] u
$$

[CO-3] [L-5] 10
b) Examine the controllability of the system given below:

$$
\begin{gathered}
{\left[\begin{array}{l}
\dot{x}_{1} \\
\dot{x}_{2} \\
\dot{x}_{3}
\end{array}\right]=\left[\begin{array}{ccc}
0 & 1 & 0 \\
0 & 0 & 1 \\
0 & -2 & -3
\end{array}\right]\left[\begin{array}{l}
x_{1} \\
x_{2} \\
x_{3}
\end{array}\right]+\left[\begin{array}{l}
0 \\
0 \\
1
\end{array}\right] u} \\
y=\left[\begin{array}{lll}
3 & 4 & 1
\end{array}\right]\left[\begin{array}{l}
x_{1} \\
x_{2} \\
x_{3}
\end{array}\right] \\
{[C O-3][\text { L-5] } \mathbf{1 0}}
\end{gathered}
$$

Q. 7 a) Discuss tracking problem in state feedback design.
b) Explain pole placement design technique.

## End Semester Examination, Dec. 2022

## B. Tech. - Fifth Semester <br> POWER SYSTEM PROTECTION (BEE-DS-525)

Time: 3 hrs.

Max Marks: 100
No. of pages: 2

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Discus the significance of symmetrical components. Prove that $1+a+a 2=0$.
[CO-2][L-2]
b) Why distance protection is preferred as primary protection over overcurrent protection for transmission lines?
[CO-1][L-4]
c) Classify the different types of overcurrent relay based on the inverse time characteristics.
[CO-1][L-2]
d) What action is carried out by the relay and circuit breaker during fault condition?
e) For what type of fault does Buchholz relay is employed?
[CO-3] [L-2]
f) What are the hazards of having the CT secondary open-circuited?
[CO-5] [L-2]
g) Why biased differential protection is preferred over simple differential protection?
[CO-3] [L-3]
h) What is Computer Aided protection of power system?
i) How does a PMU work?
[CO-4] [L-2]
j) Why is a power system divided into a number of protective zones? Why do adjacent zones overlap?
[CO-5] [L-2] 2x10

## PART-A

Q. 2 a) Review in detail power system protection scheme as used for protection of various equipment's.
[CO-1] [L-4] 10
b) Why Instrument transformers are used in power system. A relay is connected to 500/5 ratio current transformer with current setting of $125 \%$.Calculate the plug setting multiplier when circuit carries a fault current of 2000A. [CO-2] [L-2] 10
Q. 3 a) Sketch the different inverse-time characteristics of over current relays and mention how the characteristics can be achieved in practice for an electromagnetic relay?
[CO-3] [L-3] 10
b) A 3-phase, 10 MVA, 11 kV generators with a solid earthed neutral point supplies a feeder. The relevant impedances of the generator and feeder in ohms are as under:

|  | Generator | feeder |
| :---: | :---: | :---: |
| Positive sequence impedance | $\mathrm{j} 1 \cdot 2$ | $\mathrm{j} 1 \cdot 0$ |


| Negative sequence impedance | j 0.9 | j 1.0 |
| :--- | :--- | :--- |
| Zero sequence impedance | j 0.4 | j 3.0 |

If a fault from one phase to earth occurs on the far end of the feeder, calculate:
i) The magnitude of fault current.
ii) Line to neutral voltage at the generator terminal.
[CO-2] [L-3] 10
Q. 4 Explain with sketches and their R-X diagrams of distance relays:
a) Impedance relay.
b) Mho relay.
c) Reactance relay.
[CO-3] [L-2] 20

## PART-B

Q. 5 a) How DFT is used for estimation of PMU in power system.
[CO-4] [L-3] 10
b) State the convergence condition on Fourier series. Illustrate the main features of digital proactive relays.
[CO-4] [L-2] 10
Q. 6 a) Enumerate the relaying schemes which are employed for the protection of a modern alternator.
[CO-5] [L-2] 10
b) Why relays are being tested? Describe the test done on relays.
[CO-4] [L-3] 10
Q. 7 a) Discuss the essential properties of a protective system? Interpret the characteristics of ROCOF relay.
[CO-5] [L-2] 6
b) Analyzing the 2 system area, explain power swing and Distance relaying perspective of power swings.
[CO-5] [L-4] 14

# End Semester Examination, Dec. 2022 <br> B. Tech. - Fifth Semester <br> ELECTRICAL MACHINE DESIGN (BEE-DS-521) 

Time: 3 hrs.
Max Marks: 100

No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) What are the advantages of using copper for the winding of an electrical machine?
b) Which factors are involved in design considerations of a machine?
i) Cost
ii) Durability
iii) Compliance with specifications
iv) All of these
c) What are the factors to determine the rotor slots in induction motor?
d) What are the different circuits considered in basic structure of a machine?
e) What is difference between natural and forced cooling?
f) Which type of ventilation is used for high power machines?
i) Natural
ii) Self
iii) Separate
iv) None of these
g) Why in an induction motor, the number of slots should never be equal to the number of rotor slots?
h) How are primary and secondary windings of three phase transformer connected?
i) With increasing number of armature slots, which quantity is decreased?
i) Economy
ii) Efficiency
iii) Commutation
iv) Cooling
j) What is the function of damper winding?

2x10

## PART-A

Q. 2 a) What are the different types of ventilation used in electrical machines?
b) Explain the type of enclosures for electric machines.
[CO-1] [L-2] 10
Q. 3 a) Derive the output equation of single phase transformer.
b) Classify different types of windings used in transformer.
[CO-2] [L-3] 10
Q. 4 a) Explain the design of stator winding in an induction motor. [CO-3] [L-2] 10
b) Analyze the factors affecting the voltage developed in an induction motor.
[CO-3] [L-3] 10

## PART-B

Q. 5 a) Write a note on i) mmf for teeth ii) Real and apparent flux density. [CO-4] [L-1] 10
b) Determine the apparent flux density in the teeth of a dc machine when the real flux density is $2.15 \mathrm{~Wb} / \mathrm{m}$; slot pitch 28 mm ; slot width 10 mm and the
gross core length 0.35 m . The number of ventilating ducts is 4 , each 10 mm wide. The magnetizing force for a flux density of $2.15 \mathrm{~Wb} / \mathrm{m}^{2}$ is $55000 \mathrm{~A} / \mathrm{m}$. The iron stacking factor is 0.9 .
Q. 6 a) Explain the methods of heat dissipation in alternators.
[CO-5] [L-2] 10
b) Derive the expression for output equation of synchronous machine. [CO-5] [L-4] 10
Q. 7 a) Explain the different constraints involved in designing of electric machines.
[CO-6] [L-1] 10
b) Compare traditional methods with computer aided designing for machine design.
[CO-6] [L-3] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester CONTROL SYSTEM (BEE-DS-502)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) What are the conditions for a system to be linear? 1][L-2]
b) What are the components of feedback control system?
[CO-1][L-4]
c) What is Mason Gain's formula?
[CO-2][L-2]
d) Define 'transfer function'.
[CO-2][L-1,2]
e) Differentiate between type and order of the system.
[CO-3][L-4]
f) Define 'observability'.
[CO-3][L-1,2]
g) What is the effect of PI controller on the system performance?
[CO-4][L-5]
h) What are the main advantages of State variable analysis? 5][L-2]
i) Explain Nyquist stability criterion. [CO-4][L-5]
j) Why do we use lag-lead compensator?
[CO-5][L-2] 2x10
PART-A
Q. 2 a) Determine the transfer function $C(s) / R(s)$ from the block diagram:

[CO- 1][L-
5] 10
b) Obtain the overall transfer function $C / R$ of the signal flow graph shown below using Mason's gain formula.
Q. 3 a) What are position, velocity and acceleration error constants? Find the value of steady state error with unit step and unit ramp input for type 0,1 and 2 systems.

2,3] 10
b) Derive an expression for rise time for second order system subjected to unit step input.
[CO- 3][L-2,3] 10
Q. 4 a) Determine the stability of closed loop control system using Routh stability criterion whose characteristic equation is:

$$
s^{6}+5 s^{5}+11 s^{4}+25 s^{3}+36 s^{2}+30 s+36=0
$$

[CO- 2][L-4,5] 10
b) The open loop transfer function of a closed loop system is:
$G(s) H(s)=\frac{k}{s\left(s^{2}+2 s+5\right)}$
Draw the root locus as $K$ is varied from 0 to $\infty$.
[CO- 2][L-5,6] 10

## PART-B

Q. 5 a) Explain the procedure of drawing Polar Plot and how can we analyze the stability through it.

$$
\text { [CO-2][L-3,4]. } 10
$$

b) Applying Nyquist stability criterion, determine the closed loop stability for the following open loop transfer functions: $G(s)=\frac{1}{s(1+s)(1+2 s)}$
[CO-2][L-3,4] 10
Q. 6 a) Explain how PD controller functions with its effect on overshoot and steady state error.
[CO-3][L-1,2] 10
b) Discuss phase lag compensation with circuit diagram and Bode plot.

$$
[C O-3][L-4,6] 10
$$

Q. 7 a) Obtain the state space representation for a system characterized by the differential equation:
$\frac{d_{y}^{3}}{d t^{3}}+4 \frac{d^{2} y}{d t^{2}}+9 \frac{d y}{d t}+8 y=7 u(t)$ where $y$ is the output and $u$ is the input to the system.
[CO-3][L-4,6] 10
b) Explain stepper motor its construction and working with its applications.

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester <br> POWER ELECTRONICS (BEE-DS-501)

Time: 3 hrs.

MaxMark

s: 100
No.ofpages: 1
Note: Attempt FIVE questions in all. Q. 1 is compulsory. Attempt any TWO questions from
PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) List the advantages of IGBT over MOSFET and BJT?
[CO1][L-1,2]
b) Compare uncontrolled and controlled rectification.
c) Interpret the significance of duty ratio.
d) Why dv/dt protection is required in SCR?
e) What are line commutated converters?
f) List the types of switched mode converters.
g) Enumerate the effect of chopping frequency on filter size.
h) Discuss the need of feedback diodes connected in inverters.
i) Classify types of commutation techniques.
j) List the applications of three phase Inverters.

## PART-A

Q. 2 a) Discuss the construction features and operation of IGBT. Also List its applications.
[CO1][L-2] 10
b) Enumerate the Forced commutation technique (anyone) with appropriate wave forms.
[CO1][L-3] 10
Q. 3 a) Appraise the operation of single-phase full wave converters with RLE load. Sketch the waveforms of Load Voltages and current. Also derive the expression for average and rms Load voltage.
[CO2][L-4] 10
b) Examine the effect of source impedance on single phase full wave converter. Derive the expression of change in load voltage considering the source impedance.

$$
[C O 2][L-3] 10
$$

Q. 4 a) Enumerate the operation of four quadrant chopper and explain its each mode.
[CO2][L-3] 10
b) Draw the circuit of buck regulator has an input voltage $\mathrm{Vs}=12 \mathrm{~V}$. the required average output voltage is $\mathrm{Va}=5 \mathrm{~V}$ at $\mathrm{R}=200$ ohms. And the peak to peak output ripple voltage is 20 mV . The switching frequency is 25 kHZ . If
peak to peak ripple current of inductor is0.8A Determine (a) Duty Cycle (b) Filter Inductance (c) Filter capacitance (d) critical values of Land C. [CO2][L3] 10

## PART-B

Q. 5 a) Discuss the Boost Converter and determine the expression of ripple current and ripple voltage.
[CO2][L-3] 10
b) Interpret the operation of Fly back converter with suitable circuit diagram.
[CO5][L-2] 10
Q. 6 a) Discuss the operation of single-phase bridge inverter and list its applications.
[CO5][L-3] 10
b) List the Pulse width modulation techniques and explain any one in detail. [CO5][L1] 10
Q. 7 a) Analyze the operation of 120 mode three phase inverter with suitable circuit diagrams and wave form of phase voltages and a line voltage.
[CO5][L5] 15
b) Compare Voltage source inverter and current source inverters. [CO5][L3] 5

# End Semester Examination, Dec. 2022 

# B. Tech. - Fourth Semester POWER SYSTEM - I (BEE-DS-402/BEE-DS-402A) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Why thermal plants are not suitable for supplying fluctuating loads?
[CO-1] [L-2]
b) Define "diversity factor".
[CO-1] [L-2]
c) What are the advantages of using bundled conductors?
[CO-1] [L-1]
d) Define voltage regulation in connection with transmission line.
[CO-3] [L-2]
e) What do you understand by the term "short circuit Mva"? How is the breaking capacity specified?
[CO-3] [L-2]
f) Why the circuit breakers to be used on 6.6 Kv , 11 Kv , 33 Kv , 66 Kv , and 132 Kv

Lines should be of rated voltage $7.2 \mathrm{Kv}, 12 \mathrm{Kv}, 36 \mathrm{Kv}, 72 \mathrm{Kv}$, and 145 Kv respectively?
g) What will be the value of $\mathrm{I}_{\mathrm{a}}$, if $\mathrm{I}_{\mathrm{a} 1}=110<35^{\circ}$ and $\mathrm{I}_{\mathrm{b} 2}=30<80^{\circ}$ ?
h) Enlist the various unsymmetrical fault occurring in power system.
i) Define insulation coordination?
j) What are the different causes of Local Winds?
[CO-5] [L-1]
k) Why DFIG is used in wind turbine?
[CO-5] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) A domestic consumer has 10 lamps of 60 watts each, connected in his house. His
demand is given as follows:
Midnight to 5 am ............ 50 watt
5 am to 6 pm .................no-load
6 pm to 7 pm ................ 390 watt
7 pm to 9 pm ................. 340 watt
9 pm to 12 midnight ........ 190 watt
Plot the load curve and determine:
i) Average load.
ii) Maximum load.
iii) Load factor.
iv) Energy consumption during one day.
[CO-1] [L-3] 10
b) Write an explanatory note on the economics of power generation. [CO-1] [L-2] 10
Q. 3 a) A balanced 3-phase load of 30 MW is supplied at $132 \mathrm{kV}, 50 \mathrm{~Hz}$ and 0.85 p.f. lagging by means of a transmission line. The series impedance of a single conductor
is $(20+j 52)$ ohms and the total phase-neutral admittance is 315106 siemen.

Using nominal T method, deter- mine: i) the A, B, C and D constants of the line
sending end voltage iii) regulation of the line.
b) Analyze the expression for capacitance of bundled conductor for three phase
transmission line.
[CO-3] [L-2] 10
Q. 4 a) Describe the action of an oil circuit breaker. How does oil help in arc extinction?
[CO-4] [L-2] 10
b) Define and explain the following terms as applied to protective relaying:
i) Pick-up value.
ii) Current setting.
iii) Plug-setting multiplier.
iv) Time-setting multiplier.
v) Time lag.
[CO-4] [L-2] 2×5

## PART-B

Q. 5 a) Consider the one-line diagram of a simple power system shown in the figure.

Systemdata in per-unit on a 100-MVA base are given as follows:
Synchronous generators:
G1 100 MVA $20 \mathrm{kV} \mathrm{X1}=\mathrm{X} 2=0: 15 \quad \mathrm{X} 0=0: 05$
G2 100 MVA 20 kV X1 $=$ X2 $=0: 15$ X0 $=0: 05$
Transformers:
T1 $\quad 100$ MVA $\quad 20 / 220 \mathrm{kV} \mathrm{X1}=\mathrm{X} 2=\mathrm{X} 0=0.1$
T2 $\quad 100$ MVA $20 / 220 \mathrm{kV} \mathrm{X1}=\mathrm{X} 2=\mathrm{X} 0=0.1$
Transmission lines:
L12 100 MVA 220 kV X1 $=$ X2 $=0.125$ X0 $=0: 3$
L13 100 MVA 220 kV X1 $=$ X2 $=0.15$ X0 $=0: 35$
L23 100 MVA 220 kV X1 $=\mathrm{X} 2=0.25 \mathrm{X0}=0.7125$


The neutral of each generator is grounded through a current-limiting reactor of 0.08333 per unit on a $100-$ MVA base. All transformer neutrals are solidly grounded. The generators are operating no-load at their rated voltages and rated frequency with their EMFs in phase. Determine the fault current for a balanced three-phase fault at bus 3 through a fault impedance $Z_{f} 1 / 40: 1$ per unit on a $100-\mathrm{MVA}$ base. Neglect D-Y phase shifts.
b) Using appropriate interconnection of sequence networks, derive the equation for
Q. 6 a) Draw and explain the procedure to draw Bewley lattice diagram for a two substations system.
[CO-3] [L-3] 10
b) Starting from the first principle, show that surges behave as travelling waves. Derive expressions for surge impedance and wave velocity.
Q. 7 a) Describe the solar power plant. Draw and explain I-V and P-V characteristics
of panels.
b) Justify the suitability of induction generator in windmills.
c) Differentiate between fixed and variable speed wind turbines.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester <br> ELECTRICAL MACHINES - I (BEE-DS-302) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) Why is belt drive not suitable for DC series motor?
b) List the conditions for parallel operation of transformers.
c) Why short circuit test is conducted on LV side?
d) What are the requirements of excitation system?
e) What is the function of commutator?
f) Why interpoles are used in DC machines?
g) Draw the power flow diagram of $D C$ motor.
h) What is back emf?
i) Transformer is rated in kVA. Why?
j) What is need of a starter in a DC motor?

## PART-A

Q. 2 a) Compare electric circuit with magnetic circuit.
[CO-1] [L-3] 10
b) Draw and explain B-H curve of magnetic materials.
[CO-1] [L-2] 10
Q. 3 a) Analyze the principle of operation of a DC generator.
[CO-2] [L-2] 10
b) Explain the process of commutation.
[CO-2] [L-1] 10
Q. 4 a) Classify DC generators on the basis of excitation.
[CO-3] [L-3] 10
b) A dc shunt motor connected to 125 V dc supply line and is found to have a back emf of 90 V at 1200 rpm . Find the speed of this machine when it develops a torque of $30 \mathrm{~N}-\mathrm{m}$, with $\mathrm{Ra}=.20$ ohm.
[CO-3] [L-4] 10

## PART-B

Q. 5 a) Derive equivalent circuit of a single phase transformer.
[CO-4] [L-4] 10
b) Analyze the procedure to determine iron and copper losses in a single phase transformer.
[CO-4] [L-3] 10
Q. 6 a) Explain the construction of a three phase transformer.
[CO-4] [L-1] 10
b) Draw and explain Scott connection. Prove that if secondary load is balanced then primary side is also balanced.
[CO-2] [L-4] 10
Q. 7 Write short notes on (any two) of the following:
a) Reluctance Motor.
b) Permanent Magnet Brushless Motor.
c) Stepper motor.
[CO-5][L-1] 10x2

# End Semester Examination, Dec. 2022 

# B. Tech. - Third Semester <br> ELECTRICAL CIRCUIT ANALYSIS (BEE-DS-301) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) State two advantages of Laplace transform.
[CO2][L2]
b) State maximum power transfer theorem.
[CO1][L2]
c) What are the assumptions made in mesh current analysis?
[CO1][L1]
d) Differentiate independent and dependent voltage sources.
[CO1][L2]
e) Define 'step signal'.
[CO2][L2]
f) The characteristic impedance of a symmetrical T network is given as
$\qquad$ _.
g) What are zeros and poles of network function?
[CO5][L2]
h) Write the condition for symmetry of two port network.
[CO4][L2]
i) Differentiate twig and link of a graph.
[CO3][L1]
j) What is a fundamental tie set matrix?
[CO1][L2]
[CO1][L2] $\mathbf{2 x 1 0}$

## PART-A

Q. 2 a) Evaluate the current in the $5 \Omega$ resistor of figure (all resistance values are in ohms) by Superposition theorem.
[CO1][L4] 10

b) Prove that the current in $7 \Omega$ resistor of network in figure using mesh analysis:
[CO1][L4] 10

Q. 3 a) Derive the transient response of an RLC series circuit subjected to step input.
b) Express the waveform in figure in terms of standard test signals.

c) A function is given by $E(s)=\frac{10}{s^{2}+4 s-3}$, Find $\mathrm{e}(\mathrm{t})$.
[CO2][L4] 5
Q. 4 a) Obtain the driving point impedance of the network in Fig. 4 at port 1

b) Obtain $\mathrm{v}(\mathrm{t})$ from pole zero plot of $V(s)=\frac{10 s}{(s+3)\left(s^{2}+2 s+4\right)}$
[CO4][L3] 10

## PART-B

Q. 5 a) Derive A B C D parameters in terms of $h$ parameters.
[CO3][L3] 10
b) The transmission parameters of a circuit is given as $\left[\begin{array}{ll}4 & 1 \\ 3 & 3\end{array}\right]$. Obtain its $y$ parameters.
Q. 6 a) Derive the fundamental equation of a $T$ type filter
[CO4][L3] 10
b) Design a high pass constant k type filter with T and $\pi$ sections when the cut off frequency is 10 KHz and nominal characteristic impedance of 600 . [CO4][L4] 10
Q. 7 a) For the network shown in fig 5, all the resistance are $1 \Omega$ each. Draw the possible trees and oriented graph for this network.
[CO1][L2] 10

b) Obtain the fundamental loop and fundamental cut set matrices for the graph shown in figure 6.


# End Semester Examination, Dec. 2022 

## B. Tech. - First Semester BASIC ELECTRICAL ENGINEERING (BEE-101/BEE-101A/ESC-EE101)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) Find the impedance of a coil whose resistance and reactance are 6 and 8 ohms
respectively.
[CO-1] [L-3]
b) The voltage across an inductor $\qquad$ the current flowing through it.
c) An alternating voltage of $220 \sin \omega t$ is connected across a coil. Find the rms value
of
voltage.
[CO-1] [L-2]
d) State the condition of resonance.
[CO-1] [L-1]
e) Name two types of batteries.
f) Explain current division rule using a network as example.
g) List two differences between star and delta connected system.
[CO-3] [L-2]
h) What is the condition for maximum efficiency in a transformer?
i) What is a commutator?
j) Can an induction motor run at synchronous speed? Justify your answer.
[CO-4] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Explain Superposition theorem.
[CO-2] [L-1] 10
b) Obtain the current in the 6 resistor using Superposition's theorem:

[CO-2] [L-4] 10
Q. 3 a) A coil of resistance $10 \Omega$ and an inductance of 100 mH is connected in series with
a
capacitance of $55 \mu \mathrm{~F}$ across $200 \sin 314 \mathrm{t}$ ac supply. Calculate:
i) Impedance.
ii) Magnitude of current.
iii) Power factor.
iv) Voltage across the capacitance.
v) Power dissipated in the network.
b) State the advantages of three phase system over single phase system.
c) Explain the phenomena of resonance in a RLC series circuit.
Q. 4 a) Derive the emf equation of transformer.
b) Differentiate between core and shell type transformer.
c) Explain the hysteresis loop of a magnetic material.

## PART-B

Q. 5 a) Draw and explain the parts of dc machine.
[CO-4] [L-3] 10
b) Explain the different methods of speed control of dc shunt motor.
[CO-4] [L-2] 10
Q. 6 a) Explain how a rotating magnetic field is produced in a 3 phase induction motor.
[CO-3] [L-2] 10
b) Explain the working of any two types of single phase induction motors.
[CO-4] [L-3] 10
Q. 7 a) What is earthing? Why is it necessary?
[CO-1] [L-1] 5
b) Explain the working of lead acid battery with charging and discharging equations.
[CO-1] [L-2] 10
c) Write a short note on 'power factor improvement'.

# End Semester Examination, Dec. 2022 

## B. Tech. - First Semester <br> BASIC ELECTRICAL ENGINEERING (BEE-101/BEE-101A)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) State the condition of resonance of a series R L C network.
[CO1] [L2]
b) Superposition theorem can be applied to $\qquad$ circuits. [CO2] [L2]
c) Explain Kirchoff's voltage law.
[CO1] [L1]
d) The slip of three phase induction motor at starting is $\qquad$ .
e) In a pure inductive circuit $\qquad$ lags $\qquad$ .
f) Differentiate star and delta connected system.
g) Briefly explain MCB.
h) Can a three phase induction motor run at synchronous speed? Justify.
i) Write down the emf equation of the transformer.
j) Mention two ways to reduce eddy current losses in a transformer.

## PART-A

Q. 2 a) Explain Superposition Theorem.
[CO-1] [L-2] 10
b) Find the current in $4 \Omega$ resistor.
[CO-2] [L-4] 10

Q. 3 a) An alternating current is represented by $i=220 \sin (314 t+80)$

Find i) peak value. ii) Average value iii) RMS value of current, and iv) frequency.
[CO-2][L-2] 5
b) Derive the relation between line voltage and phase voltage for a three phase star connected system. Also draw the phasor diagram.
[CO-3] [L-4] 10
c) State the advantages of three phase system over single phase system. [CO3][L4] 5
Q. 4 a) Derive the emf equation of a transformer.
[CO-4] [L-3] 6
b) Differentiate between 'shell type' and 'core type' single phase transformer.
[CO4] [L2] 6
c) Derive the condition of maximum efficiency in a transformer.
[CO-4][L-2] 8

## PART-B

Q. 5 a) Draw the parts of dc machine and explain each part.
b) Draw and explain the shunt motor characteristics.
Q. 6 a) Explain the working of three phase induction motor.
b) Explain any two starting methods of three phase induction motor. [CO-6] [L-4] $\mathbf{1 0}$
Q. 7 a) Explain plate earthing with the help of diagram.
[CO-1] [L-1] 10
b) Explain the charging and discharging procedure of Lead acid battery with the relevant equations.

# End Semester Examination, Dec. 2022 OPEN ELECTIVE - COMMAN FOR ALL BRANCHES <br> INTERNET OF THINGS: BASICS AND APPLICATIONS (BEC-OE-005) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) What are the main challenges of an Internet of Things (IoT)?
[CO-1] [L-1]
b) Which class does 224.0.0.0 belong to?
[CO-3] [L-3]
c) Does proxy server provide security to the network?
[CO-3] [L-2]
d) How many analog pins are present on the arduino development board? [CO-4] [L-3]
e) Write the commands used to read analog and digital data from a sensor in arduino.
[CO-4] [L-3]
f) What is the task of message area and text console in arduino IDE?
g) Elaborate various challenges in the implementation of IoT.
[CO-4] [L-1]
h) Describe the role of Internet of Things in shopping [CO-1] [L-2]
i) Build the physical design of IoT.
[CO-5] [L-2]
j) What is the role of setup method in arduino program?
[CO-1] [L-3]
PART-A
Q. 2 a) Explain the different characteristics of IoT.
[CO-1] [L-2] 10
b) Explain about Industrial Internet of things (or IIoT).
[CO-1] [L-2] 10
Q. 3 a) How do IoT devices communicate? Explain with suitable diagrams. [CO-2] [L-3] 10
b) Explain modified OSI Stack for the IoT / M2M Systems.
[CO-2] [L-2] 10
Q. 4 a) What is the need of network? Also, explain in detail the LAN and WAN. [CO3][L2] 10
b) List out the properties used to characterize the devices.
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Writ a program to blink default LED on arduinoboard with the delay of 2 sec .
[CO-4] [L-6] 10
b) Draw the block diagram of arduino development board.
[CO-4] [L-2] 10
Q. 6 a) Why do security issues exist in IoT? What are the key security factors to be considered when deploying IoT devices?
[CO-4] [L-3] 10
b) Illustrate IoT security threats in terms of Botnet, Denial of service, man in the middle and Ransomware.
[CO-4] [L-4] 10
Q. 7 Write short notes on:
a) Home automation.
b) Smart irrigation.

# End Semester Examination, Dec. 2022 OPEN ELECTIVE - COMMAN FOR ALL BRANCHES EVERYDAY ELECTRONICS (BEC-OE-004) 

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Define the term 'electronics'. [CO-1] [L-1]
b) Differentiate between 'active and passive components' with examples. [CO-1] [L-2]
c) Define transistor and explain its types with symbols. [CO-2] [L-1]
d) Calculate the value of resistor which has first 3-color bands green yellow and black.
[CO-3] [L-1]
e) Explain diffusion current and drift current. [CO-1] [L-2]
f) Define 'phased array antennas'. [CO-4] [L-1]
g) Describe sensors and its types. [CO-5] [L-2]
h) Define 'chrominance signal'.
i) List five special function registers.
[CO-5] [L-3]
j) Explain the term Mechatronics.

## PART-A

Q. 2 a) With the help of a diagram explain PN junction diode with its biasing conditions and V-I characteristics. [CO-2][L-2] 10
b) Explain various advantages and disadvantages of electronics using various applications.
Q. 3 a) Explain LED and Varactor diode in detail.
b) Explain the term transistor and operation of PNP transistor.
Q. 4 a) Describe the working principle of television with its block diagram.
[CO-3] [L-2] 10
b) What is Android and why it is used? Explain its main features.

## PART-B

Q. 5 a) Explain the working principle of RADAR with a block diagram.
[CO-4] [L-2] 10
b) Define SONAR and also describe its principle with its applications.
[CO-4] [L-2] 10
Q. 6 a) What is microwave communication? Explain EM spectrum in brief. [CO-5] [L-1] 10
b) Give brief introduction about microwave ovens, refrigerators and washing machine.
[CO-5] [L-2] 10
Q. 7 a) Draw pin diagram of 8051 Microcontroller and detail each pin in brief. [CO5][L2] 10
b) Define robotics and differentiate between actuators and sensors. [CO-5][L-2] 10

# End Semester Examination, Dec. 2022 OPEN ELECTIVE - COMMON FOR ALL BRANCHES SOLAR TECHNOLOGY (BEC-OE-003) 

Time: 3 hrs.
Max Marks: 100
No.
of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) A fan consumed 200 W in 30 min . Evaluate energy required by fan.
[CO1] [L-2]
b) A 25 MW rated power plant running at its full capacity would generate
$\qquad$ kWh of electricity per year (365 days).
[CO1] [L-2]
c) Describe MPPT in solar technology.
[CO3] [L-2]
d) Define principle of operation of solar cell.
[CO2] [L-4]
e) Write steps offault in PV module.
[CO2] [L-3]
f) State charge controllers.
[CO3] [L-2]
g) Input DC power of an inverter is 1000 W . Output AC power efficiency is 50 W. Calculate the efficiency of the inverter.
[CO4] [L-3]
h) Draw block diagram of grid connected without battery back-up system.
i) Define role of tachometer in solar setup design. [CO5] [L-1]
j) Write the safety measures adopted in installation of Solar PV Systems. [CO5] [L-3] $\mathbf{2 \times 1 0}$

## PART A

Q. 2 a) Differentiate between renewable and non renewable sources of energy. [CO1] [L2] 12
b) 100 Wp solar panels are used to supply energy requirement of a house alongside battery bank. The house has a daily consumption of 15 units. Assuming 5 hours of peak sun insolation at the location of the house daily, find out the number of such solar panels required for the energy compensation. Assume each panel operates at its rated capacity and battery has negligible loss.
[CO1] [L3] 8
Q. 3 a) Write note on solar PV module array connections series, parallel, series parallel.
b) Calculate the number of modules to be connected in series to obtain the open circuit voltage of the array as 50 V and / or maximum power point voltage of 24 V . The modules available for connection are having the following parameters. Voc=20 V, $\quad \mathrm{Vm} \quad 16 \mathrm{~V}$, $\mathrm{Isc}=4 \mathrm{~A}$ and $\mathrm{Im}=3 \mathrm{~A}$.
[CO2] [L3] 8
Q. 4 a) Explain role of power converter in solar system.
[CO3] [L2] 10
b) Evaluate role of solar energy in developing countries (in 250 words).
[CO3][L2] 10

## PART B

Q. 5 a) Describe types of solar PV systems. Explain hybrid and standalone PV system in details.

$$
\text { [CO4] [L2] } 12
$$

b) For a DC to DC converter as shown in fig. below, a battery of 25 V is connected and the input current is 4 A . At the output side, a voltmeter shows 50 V across the load and the output current is 1.8 A .

Find: i) Power input to the converter.
ii) Power output by the converter or absorbed by load.
iii) Power lost in the converter due to losses.
iv) Efficiency of the converter.

[CO3][L-2] 8
Q. 6 a) Explain role of solar design software in site mapping.
[CO4] [L-2] 10
b) Explain in detail about the software used for solar design lab. [CO4] [L2] 10
Q. 7 Discuss in detail the electrical testing of PV Array. [CO5] [L2] 20

# End Semester Examination, Dec. 2022 

# B. Tech. -Seventh Semester <br> SATELLITE COMMUNICATION (BEC-DS-715) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions in brief:
a) Define the terms- Ascending and Descending Nodes.
b) Distinguish between pre-assigned and demand assigned traffic related to a satellite communication network.
c) State Kepler's law of planetary motion.
d) Calculate the EIRP of a satellite downlink which at 12Ghz operates with a transmit power of 6 W and an antenna gain of 50.2 db .
e) Differentiate between analog and digital satellite communication. Mention merits and demerits of each.
f) Summarize the advantages of FM on satellite communication.
g) Differentiate between active and passive satellites.
h) Discuss the role of look angles in satellite communication.
i) A satellite in an elliptical orbit has an apogee of $30,000 \mathrm{~km}$ and a perigee of 1000km . Determine the semi-major axis of the elliptical orbit.
j) In a satellite link, thermal noise in an earth station results in a ratio of 25db. A signal is received from a transponder with a carrier to noise ratio of 20 db . Find the value of overall $(\mathrm{C} / \mathrm{N})_{0}$ at the earth station.

## PART A

Q. 2 a) Describe the block diagram of satellite communication system and explain each block in detail.
[CO1][L2] 12
b) Classify the various application of satellite communication.
[CO1] [L3] 8
Q. 3 a) The Semi major axis and the semi minor-axis of an elliptical satellite orbit are 20000 km and 16000 km respectively. Determine the apogee and perigee distances.
b) Discuss the various orbital elements which are required to specify the location of satellite in its elliptic orbit around the Earth.
Q. 4 a) Derive the expression for complete link design equation for satellite communication.
[CO3] [L5] 10
b) What is System Noise temperature? How does it effect the $\mathrm{C} / \mathrm{N}$ and G/T ratio?
[CO3] [L2] 10

## PART B

Q. 5 a) Prove that for FM signal $(\mathrm{s} / \mathrm{n})_{\mathrm{o}}=(\mathrm{C} / \mathrm{N})_{\mathrm{I}} 3(1+\mathrm{m}) \mathrm{m}^{2}$.
[CO3] [L5] 12
b) Compare the various digital modulation Techniques.
[CO4] [L2] 8
Q. 6 a) Justify, Why TDM is the only option for digital satellite link and why intermodulation products are not present in TDM?
b) Analyze demand assignment multiple access techniques.
Q. 7 Write short notes on (any four):
a) GPS.
b) VSAT.
c) Laser Satellite Communication.
d) Earth Sensing Satellite.
e) SARSAT.
[CO5] [L2]4x5

## End Semester Examination, Dec. 2022

# B. Tech. - Seventh Semester <br> RADAR AND NAVIGATION (BEC-DS-712) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Define second time around echo.
b) List any two remedial measures to overcome blind speed problem in an MTI radar.
c) PPI means $\qquad$ .
d) What is probability of miss and probability of False Alarm?
e) A radar operates at a PRF of 1000 Hz with a pulse width of $2 \mu \mathrm{~s}$ at an average power of 100 w . Find its peak power.
f) Mention the various system losses in a radar.
g) What is COHO and STALO in a Radar System?
h) What is the advantage of using staggered frequency in MTI radar?
i) Calculate the range of a target if the time taken by radar signal to travel to the target and back is $80 \mu \mathrm{~s}$.
j) What is the significance of a duplexer in a Radar System? $\mathbf{2 \times 1 0}$

PART-A
Q. 2 a) Explain the block diagram of a conventional radar with a super heterodyne receiver.
b) What are the major applications of radar? Discuss each application in detail. $\mathbf{1 0}$
Q. 3 a) Derive the simple form of radar range equation. 12
b) Calculate the maximum Range of a Radar for the following specifications:

Operating Frequency= 10 GHz
Peak Power transmitted by Radar $\mathrm{P}_{\mathrm{t}}=400 \mathrm{KW}$
Effective aperture of receiving Antenna $A_{e}=5 \mathrm{~m}^{2}$
Radar cross section of Target $\sigma=30 \mathrm{~m}^{2}$
Power of minimum detectable signal $=10^{-10} \mathrm{~W}$
Q. 4 a) Describe the principle of operation of CW Radar with the help of a block diagram.
b) If the Radar operates at a frequency of 5 GHZ , then find the Doppler frequency of an aircraft moving with a speed of 100 KMph .

## PART-B

Q. 5 a) What is an MTI radar? Draw its block diagram and explain its principle of operation.
b) An MTI Radar operates at a frequency of 9 GHz with a pulse repetition frequency of 3000 pps . Calculate the first two lowest blind speeds of this Radar.
Q. 6 a) What is range tracking? What is its significance in radar? Explain the process of range tracking in detail.
b) What is the principle of operation of a conical scan tracking radar? Briefly discuss its operation with the help of a block diagram.

10
Q. 7 Write short notes on:
a) Mixer.
b) Duplexer. c) Synthetic aperture radar. d) SONAR
$5 \times 4$

# End Semester Examination, Dec. 2022 

## B. Tech. - Sixth Semester <br> MOBILE COMMUNICATION (BEC-DS-602)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Explain briefly WLAN (IEEE 802.11) standard.
[CO-3] [L-2]
b) List the various goals, assumptions and requirements in mobile IP.
[CO-2] [L-2]
c) Compare fixed and wireless networks.
[CO-1] [L-2]
d) Define tunneling and encapsulation in mobile IP.
[CO-2] [L-1]
e) What do you understand by consistency in file system?
[CO-4] [L-3]
f) Explain the features of distributed file systems.
g) What do you understand by transaction and mobile transaction?
[CO-5] [L-2]
h) Explain the term routing.
i) Compare class 0 , class 1 and class 2 in wireless transaction protocol.
j) Discuss the role of home agent and foreign agent in Mobile IP.

## PART-A

Q. 2 a) Draw and explain the architecture of mobile computing with design considerations.
[CO-2] [L-2] 10
b) Define mobile computing and explain briefly the functions and applications of mobile computing.
[CO-2] [L-2] 10
Q. 3 a) With the help of a diagram, complete the generic WATM reference model and its various access scenario.
[CO-2] [L-3] 10
b) Demonstrate the concept of IP micro-mobility with the help of its three prominent approaches: cellular IP, HAWAII and hierarchical mobile IPV6.[CO-3] [L-3]
Q. 4 a) Explain WSP/B over WTP, session establishment, suspension and termination in detail.
[CO-4] [L-2] 10
b) Describe WAP 1.X (Wireless Application Protocol) layered architecture in detail.
[CO-4] [L-2] 10

## PART-B

Q. 5 a) Define CODA. Explain the three states of client in CODA.
[CO-4] [L-2] 10
b) Describe the various components of data video broadcasting systems and also detail about DAB.
[CO-4] [L-2] 10
Q. 6 a) Define mobile ad-hoc network. What is the need of ad-hoc networks? Explain routing in mobile ad-hoc network based on destination sequence distance vector.
[CO-5] [L-2] 10
b) Classify various types of ad-hoc routing protocols. Discuss about route discovery and route maintenance in dynamic source routing.
[CO-5] [L-4] 10
Q. 7 a) Describe briefly Kangaroo and Joey model. How will you handle movement and disconnections in Kangaroo and Joey transaction model?
[CO-5] [L-2] 10
b) Discuss mobile banking services and challenges. List the attributes of M commerce, its advantages and disadvantages.

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester <br> DIGITAL SIGNAL PROCESSING AND ITS APPLICATIONS (BEC-DS510)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) State and prove time scaling property of $z$-transform.
b) Sketch the following signals.
i) $u(n)=u(n)+u(n-1)+u(n-2)$
ii) $x(n)=\delta(n-1)+\delta(\mathrm{n}+1)$
c) Check the system for causality: $y(n)=x(2 n)$.
d) Find the $z$ transform and ROC of the signal:

$$
x(n)=\{1,2,3,0,0,-1,-2\}
$$

e) What do you mean by aliasing effects? How can it be eliminated?
f) Define BIBO stability.
g) Distinguish between FIR and IIR systems.
h) What is finite word length effect in digital filters?
i) Use the backward difference for the derivative to convert the analog LPF with the system function: $\mathrm{H}(\mathrm{s})=1(\mathrm{~s}+2)$
j) Explain sample and hold circuit.

## PART-A

Q. 2 a) Define signal. Explain different types of signals with suitable examples. [CO1][L4] 10
b) Determine which of the following signals are periodic and determine the fundamental period:
i) $X(t)=10 \sin 100 \Pi t$
ii) $X(t)=\cos (2 n)$
[CO-1] [L-3] 10
Q. 3 a) How are systems classified?
[CO-2][L-3] 8
b) Check the following system for linearity and time invariance:

$$
\begin{equation*}
y(n)=\mathrm{Ax}(n)+\mathrm{B} \tag{CO-2}
\end{equation*}
$$

Q. 4 a) State and prove sampling theorem.
b) Given the continuous-time signal $\mathrm{x}(\mathrm{t})=5 \cos 200 \Pi \mathrm{t}$. Find:
i) Minimum sampling rate required to avoid aliasing.
ii) If $\mathrm{F}_{\mathrm{s}}=150 \mathrm{~Hz}$, what is the discrete time signal obtained after sampling?
[CO-1] [L-4] 12

## PART-B

Q. 5 a) Find the $z$ transform of the signal: $x(n)=n a^{n} u(n)$
[CO-3] [L-3] 10
b) Find the inverse $z$ transform of $X(z)=z /\left(3 z^{2}-4 z+1\right)$ when ROC is:
i) $\left\lvert\, \begin{aligned} & z \\ & \text { ii) } \\ & z \mid<1 / 3\end{aligned}\right.$
[CO-3] [L-3] 10
Q. 6 a) Explain the process of sampling rate conversion using the decimation and interpolation.
b) Explain DSP processor in detail.
c) Discuss the various applications of DSP.
Q. 7 a) What is bilinear transformation? Derive the mapping formula. Compare bilinear transformation with other transformations based on their stability.[CO-4] [L-3] 8
b) Explain the design technique for FIR filters using rectangular window. [CO4] [L4] 12

# End Semester Examination, Dec. 2022 

# B. Tech. - Fifth Semester <br> MACHINE LEARNING (BEC-DS-505) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) What is Goodness of fit?
[CO1] [L-2]
b) Explain Polynomial Regression.
c) How does machine learning differ from deep learning?
[CO4] [L-1]
d) What is the use of NumPy as a toolkit?
e) What do you understand by Decision Tree classifier?
f) What is the most important value in ANOVA Table?
[CO2] [L-3]
g) How can you create a Pandas Data Frame using python List?
h) Define 'Correlation and Regression'.
i) What are Convolutional Neural Networks?
j) Discuss Lasso Regularization.
[CO4] [L-2] 2x10

## PART-A

Q. 2 a) What is the difference between Supervised, Semi-Supervised and Unsupervised Learning?
[CO1] [L-2] 10
b) What is involved in 'training' a machine learning model? What are the challenges faced in 'testing' the model?
[CO1] [L-3] 10
Q. 3 a) What are the three important Measures of Central Tendency? Discuss their advantages.
[CO2] [L-2] 10
b) Using chi square test, find out if gender influences choice of pets.

|  | Dogs | Cats | Total |
| :--- | :---: | :---: | :---: |
| Males | 207 | 282 | 489 |
| Females | 231 | 242 | 473 |
| Total | 438 | 524 | 962 |

(Take critical statistic=3.841)
Q. 4 a) Why does data need to be preprocessed? Explain with examples. [CO3] [L-3] 10
b) What is the utility of Dimensionality Reduction?
[CO3] [L-2] 10

## PART-B

Q. 5 a) Write a short note on support vector machine.
[CO4] [L-2] 10
b) Explain CART analysis in detail.
[CO4] [L-2] 10
Q. 6 a) What do you understand by Principal Component Analysis? Why is it needed?
b) 10000 patients got tested for flu. Out of them, 9000 are actually healthy and 1000 are actually sick. For the sick people, a test was positive for 620 and negative for 380 . For the healthy people, the same test was positive for 180 and negative for 8820. Construct a confusion matrix for the data and compute accuracy, precision and recall for the data.
[CO5] [L-4] 10
Q. 7 a) How does K-means clustering differ from KNN algorithm? [CO6] [L-2] 10
b) What are the different types of Neural Networks? Explain any one in detail.
[CO6] [L-2] 10

# End Semester Examination, Dec. 2022 <br> B. Tech - Fifth Semester <br> ANTENNAS (BEC-DS-503) 

Time: 3 hrs
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from
PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Define Vector Potential and explain its need with suitable flow diagram. [CO-1][L-2]
b) Describe Conduction and dielectric loss. [CO-1][L-2]
c) Distinguish the terms "Isotropic", "Directional" and "Omni directional". [CO-1][L-2]
d) Describe Radiation pattern lobe. [CO-2][L-2]
e) Identify [CO-3][L-3]
f) Define folded dipole antenna. Derive its input impedance. [CO-3][L-2]
g) State Babinet's principle. [CO-3][L-4]
h) If the critical frequency of ionized layer is 1.5 MHz , calculate electron density of the layer. [CO-4][L-5]
i) Justify bending mechanism of ionosphere. [CO-4][L-4]
j) Identify challenges in antenna design.

5][L-3] $\mathbf{2 x 1 0}$

## PART-A

Q. 2 a) Derive mathematical expression for Vector potential of Magnetic current source.
[CO-1][L-6] 12
b) Distinguish among various types of polarization of Electromagnetic wave in antenna.
[CO-2][L-3] 8
Q. 3 a) Evaluate Radiation resistance of infinitesimal dipole.
[CO-1][L-5] 14
b) Calculate the gain of antenna with a circular aperture of diameter 3 meter at frequency of 10 GHz .
[CO-2] [L-4] 6
Q. 4 a) State and describe Reciprocity Theorem of antenna.
[CO-2][L-3] 5
b) Analyze the nulls of the total field when $d=\lambda / 4$ and $\beta=0,+\pi / 2$ and $-\pi / 2$ for two element array (Fig.1).
[CO-3] [L-5] 7


Two Infinitesimal Dipoles
Fig. 1
c) Derive mathematical expression for directivity of End-fire antenna array. [CO-3][L-6] 8

## PART-B

Q. 5 a) Design a $\log$ Periodic antenna to obtain a gain of 9 dB and to operate over a frequency range of 125 MHz to 400 MHz . [CO-3][L-6] 8
b) A paraboloid reflector has radiation characteristics whose half power beamwidth is $50 . \quad$ Evaluate its null-to-null beamwidth and power gain. [CO-3][L-5] 6
c) Evaluate impedance of $n$-fold dipole antenna.
[CO-3][L-5] 6
Q. 6 a) Evaluate refractive index of Ionosphere region.
[CO-4] [L-5] 10
b) Describe various modes of propagation of radio waves. [CO-4] [L-2] 10
Q. 7 a) Demonstrate test setup use for plotting of radiation pattern of antenna.
[CO-5][L-2] 10
b) Justify that swept frequency technique is better than single frequency technique used for measurement of antenna gain. [CO-5][L-5] 10

End Semester Examination, Dec. 2022

## B. Tech. - Fifth Semester <br> VLSI TECHNOLOGY AND CIRCUITS (BEC-DS-502)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) What are the advantages of ICs over discrete component circuits?
[CO1][L1]
b) What are the important IC technologies used?
[CO1][L2]
c) Why is $\mathrm{SiO}_{2}$ layer formed over the entire surface in a monolithic IC?
[CO3][L2]
d) Why is Silicon preferred over Germanium for the fabrication of ICs? [CO2][L2]
e) Give the advantage of using SiCl 4 for epitaxial growth. [CO2][L2]
f) Differentiate between Wet and Dry Etching.
[CO4][L3]
g) Why aluminium is preferred for metallization?
[CO3][L2]
h) What is Channel length modulation?
[CO3][L1]
i) Why NMOS technology is preferred over PMOS technology?
[CO4][L2]
j) Design SR flip flop using CMOS.
[CO4][L6] 2x10

## PART-A

Q. 2 a) Define the Moore's law. Draw and Explain the VLSI Design flow?
(CO.1)(L2) 10
b) Describe the evolution of integrated circuit technology.
(CO.1) (L2) 10
Q. 3 a) What are different oxidation techniques for growing oxide layer? Explain any one in detail.
(CO.2)(L2) 10
b) How would you define the Fick's law of diffusion? How boron is doped using diffusion?
(CO.2) (L2) 10
Q. 4 State and interpret the term Lithography. Describe the steps followed for electron beam lithographic process; also discuss the advantages and disadvantages of electron beam lithographic.
(CO.2) (L1\&L2) 20

## PART-B

Q. 5 a) How would you explain AC and DC plasma excitation in detail? (CO.5) (L2) $\mathbf{1 0}$
b) Describe any one technique for doing the process of metallization in detail.
(CO.5)(L2) 10
Q. 6 a) Derive the current equation for saturation and non-saturation region of operation?
(CO.5)(L2) 10
b) What do you understand by channel length modulation? Discuss its impact on the saturation region in MOSFET.
(CO.3)(L2) 10
Q. 7 a) Design a SR Flip Flop using NAND Gate with the help of CMOS technology.
(CO.4)(L6) 10
b) Design a circuit for the equation given below using CMOS. Also draw its stick diagram.

## End Semester Examination, Dec. 2022

## B. Tech. - Fifth Semester

## DIGITAL SIGNAL PROCESSING (BEC-DS-501)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all. Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Calculate $z$-transform of $3 \delta(n)+2 \delta(n-1)+6 \delta(n-3)+5 \delta(n+2)$. [CO2] [L-2]
b) What is ROC? Give its two properties. [CO2] [L-1]
c) Check the system for time variance $y(n)=5 \sin x(n)$. [CO1] [L-2]
d) What is twiddle factor? Write expression.
[CO3] [L-1]
e) Calculate DTFT of $a^{n} u(n)$.
[CO3] [L-2]
f) Explain Butterworth Filter.
[CO5] [L-1]
g) What do you mean by linear phase response? What is the condition for linear phase response?
[CO4] [L-1]
h) Write down mapping formula for approximation of derivative method for designing of IIR filter. Convert $\mathrm{H}(\mathrm{S})=1 / \mathrm{S}+2$ into digital filter using approx. of derivative method with $\mathrm{T}=1 \mathrm{sec}$.
[CO5] [L-2]
i) What is frequency warping? Derive the relation between $\omega$ and $\Omega$.
[CO5] [L-2]
j) A signal $x(n)=\left\{\begin{array}{cc}a^{n} \quad n \geq 0 \\ 0 & \text { otherwise }\end{array}\right.$

Obtain decimated signal with a factor of 3.
[CO1] [L-2] 2x10

## PART-A

Q. 2 a) Determine $x(n)$, if $x(z)=\frac{z+2}{2 z^{2}-7 z+3}$ when ROC is given as:
i) $|z|>3$
ii) $|z|<\frac{1}{2}$
b) Find $y(n)$ by using convolution property of z-transform when
$x(n)=[1,2,3,1,-1,1]$ and $h(n)=[1,1,1]$
[CO2] [L-3] 10
Q. 3 a) Use a four point DFT and IDFT to determine the circular convolution of the following sequences: $\quad x_{1}(n)=(1,2,3,1)$

$$
x_{2}(n)=(4,3,2,2)
$$

[CO3] [L-4] 12
b) Calculate DIT FFT of $x(n)=[1,1,1,0,0,1,1,1]$.
Q. 4 a) A low pass filter is to be designed with the following desired frequency response:
$H_{d}\left(e^{j \omega}\right)=\left\{\begin{array}{cc}e^{-j 2 \omega,} & -\pi / 4 \leq \omega \leq \pi / 4 \\ 0, & \pi / 4<|\omega| \leq \pi\end{array}\right.$
Determine the filter coefficients $h_{d}(n)$ if the window functions is defined as:
$\omega(n)= \begin{cases}1, & 0 \leq n \leq 4 \\ 0, & \text { otherwise }\end{cases}$
Also determine the frequency response $H\left(e^{j \omega}\right)$ of the designed filter.
[CO4] [L-4] 10
b) Explain Fourier series method for designing of FIR filter. [CO4] [L-3] 10

## PART-B

Q. 5 a) What is bilinear transformation? Derive the mapping formula. Compare bilinear transformation with other transformations based on their stability.
[CO5] [L-3] 15
b) Convert the analog filter $\mathrm{H}(\mathrm{s})=1 /(\mathrm{s}+1)^{3}$ into a digital filter. [CO5] [L-3] 5
Q. 6 a) Explain in detail the effect of finite word length in DSP.
b) Write applications of DSP.
c) Describe Multistage design of decimator.
Q. 7 a) Draw a block diagram representation for the following system:
$y(n)=a y(n-1)+a x(n)-x(n-1)$
[CO5][L-3] 6
b) Determine the parallel realization of the IIR digital filter transfer function:
$H(z)=\frac{3\left(2 z^{2}+5 z+4\right)}{(2 z+1)(z+2)}$
[CO5] [L-4] 7
c) Realize the following casual linear phase FIR system function:

$$
H(z)=(2 / 3)+z^{-1}+(2 / 3) z^{-2}
$$

[CO4][L-3] 7

End Semester Examination, Dec. 2022
B. Tech. - Fifth Semester

DIGITAL SIGNAL PROCESSING (BEC-DS-501)
Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) State and prove time scaling property of z-transform.
b) Sketch the following signals:
i) $x(\mathrm{n})=u(\mathrm{n}+3)+u(\mathrm{n}-3)$
ii) $x(\mathrm{n})=\delta(\mathrm{n}-1)$
c) Check the system for time variance: $y(n)=3 n \cos x(n)$.
d) Find the $z$ Transform and ROC of the signal:
e) Calculate DTFT of $x(n)=a^{n} u(n),|a|<1$
f) Explain Chebyshev Filter.
g) What are Gibb's oscillations? Give some ways by which these oscillations can be reduced.
h) Write down mapping formula for bilinear transformation method for designing of IIR filter. Convert $H(S)=1 / s+2$ into digital filter using bilinear transformation method with $\mathrm{T}=1 \mathrm{sec}$.
i) What is finite word length effect in digital filters?
j) A signal $x(n)= \begin{cases}a^{n} & n \geq 0 \\ 0 & \text { otherwise }\end{cases}$ Obtain interpolated signal with a factor of 2.

## PART-A

Q. 2 a) Determine $x(n)$, if $X(z)=\frac{z}{(z-1 / 2)(z-1 / 4)}$ by using partial fraction expansion method
[CO-2] [L-4] 10
b) Find correlation of two signals by using property of z-transform when $x(n)=[1,-2,1]$ and $y(n)=[1,1,1]$
Q. 3 a) Compute circular convolution of the sequences $x[n]=\{1,2,1,2\}$ and $h[n]=$ $\{3,2,1,4\}$.
[CO-3] [L-3] 8
b) Given $x(n)=\{1,-1,-1,-1,1,1,1,-1\}$, find $X(K)$ using Radix -2 DIT FFT algorithm.
[CO-3] [L-4] 12
Q. 4 a) Explain design of linear phase FIR filters by the frequency sampling method.
[CO-4] [L-3] 8
b) The desired frequency response of a LPF is:
$\mathrm{H}_{\mathrm{d}}\left(\mathrm{e}^{\mathrm{jw}}\right)=\left\{\begin{array}{ll}1 & -\pi / 2 \leq w \leq \pi / 2 \\ 0 & \pi / 2 \leq|w| \leq \pi\end{array}\right.$. Find $\mathrm{h}(\mathrm{n})$ using rectangular window of length 5.
Q. 5 a) Explain approximation of derivative technique for IIR filter designing in detail.
[CO-5] [L-3] 10
b) Convert the analog filter into digital filter whose system function is $H(s)=36 /\left[(s+0.1)^{2}+36\right]$
The digital filter should have a resonant frequency $\omega_{r}=0.2 \pi$. Use impulse invariant mapping.
[CO-5] [L-3] 10
Q. 6 a) What is multirate DSP? Why is it required?
b) Explain in detail TMS320C5X processor.
c) Discuss the various applications of DSP.
Q. 7 a) Explain the Direct-I and Direct-II structure of IIR filter system.
[CO-5] [L-3] 8
b) For the system function given by:

$$
\mathrm{H}(\mathrm{z})=\left(1+2 \mathrm{z}^{-1}+\mathrm{z}^{-2}\right) /\left(1+(3 / 4) \mathrm{z}^{-1}+(1 / 8) \mathrm{z}^{-2}\right)
$$

Draw a signal flow graph that implements this system as a cascade form and parallel form realization.
[CO-5] [L-4] 12

# End Semester Examination, Dec. 2022 

## B. Tech. - Fourth Semester <br> BASIC OF ELECTRONICS ENGINEERING (BEC-DS-421)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Distinguish between intrinsic and extrinsic semiconductor.
[CO-1] [L-2]
b) Evaluate $\mathrm{I}_{\mathrm{dc}}$ for full-wave rectifier.
c) Derive relation between $a \& \beta$.
[CO-2] [L-2]
d) Draw circuit diagram for transistor as amplifier.
[CO-2] [L-2]
e) Evaluate CMRR of operational amplifier if differential gain $4 \times 10^{6}$ and common mode gain is $1 \times 10^{3}$.
f) Draw circuit diagram of current to voltage converter.
g) Justify the use of role of RC network in phase shift oscillator.
h) Design basic gates from NOR gate.
i) Minimize the function: $\mathrm{F}(\mathrm{A}, \mathrm{B}, \mathrm{C})=\Sigma \mathrm{m}(0,1,2,4,5,7)$
j) Illustrate type of channel.

## PART-A

Q. 2 a) Explain V-I characteristics of PN junction diode in brief.
[CO-1] [L-3] 10 Or
a) Derive diode current equation for PN junction diode.
b) Explain working of full wave rectifier. Also derive expression for efficiency of it.
[CO-1] [L-3] 10
Q. 3 a) Describe input and output characteristics of common base configuration of BJT.
[CO-2] [L-2, 4] 10
b) Explain frequency response RC coupled amplifier. Also explain effect of cascading on frequency response.
[CO-2] [L-4] 10
Q. 4 a) Re-analyze AC analysis of dual input unbalanced output differential amplifier. Or
[CO-3] [L-6] 10
a) Draw circuit diagram for integrator and derive equation for output voltage. Also Draw input and output voltage waveform for the given function.

$$
X=+5 \text { for } \quad 0 \leq t \leq 10 \mathrm{~ms}
$$

$$
\mathrm{X}=-5 \text { for } \quad 1 \mathrm{~ms} \leq \mathrm{t} \leq 20 \mathrm{~ms}
$$

b) State ideal characteristics of operational amplifier. Also draw its block diagram.
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Draw Pin configuration of IC 555 Timer. Explain as table mode of 555 Timer.
b) Design comparator circuit by operational amplifier.
Q. 6 a) Design full subtractor by half subtractor.
b) Design the circuits given below.
i) Design JK flip-flop using SR flip-flop
ii) Design 16:1 MUX using 4:1 MUX
Q. 7 a) Draw block diagram of communication system. Illustrate its each block.
[CO-5] [L-5, 4] 10
b) Explain spectrum allocation in automobile industry.

# End Semester Examination, Dec. 2022 

## B. Tech. - Fourth Semester ARTIFICIAL INTELLIGENCE (BEC-DS-406)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Explain the different domains of artificial intelligence.
[CO-1] [L-2]
b) How is machine learning related to artificial intelligence?
c) What is deep learning?
[CO-4] [L-3]
d) What is Alpha-beta pruning?
[CO-1] [L-1]
e) How can AI be used in detecting fraud?
[CO-2] [L-1]
f) What is overfitting? How can it be overcome in Machine Learning?
[CO-5] [L-3]
g) Explain confusion matrix.
h) What is the inference engine, and why it is used in AI?
i) What is a Bayesian network, and why is it important in AI?
[CO-2] [L-2]
[CO-4] [L-2]
j) What are the different software platforms for AI development?

## PART-A

Q. 2 a) What is an Intelligent agent?
[CO-1] [L-2] 10
b) Explain turing test approach.
[CO-1] [L-2] 10
Q. 3 a) Explain A* algorithm with an example.
[CO-2] [L-2] 10
b) Discuss local search and optimization algorithms that are used in AI.
[CO-2] [L-2] 10
Q. 4 a) What are expert systems? Explain MYCIN system in detail.
[CO-3] [L-2] 10
b) What is HMM model? Explain with an example.
[CO-3] [L-2] 10
PART-B
Q. 5 a) Discuss different strategies that are used for data cleaning in machine learning.
[CO-3] [L-3] 10
b) Explain Naïve Bayes classifier algorithm in detail.
[CO-3] [L-3] 10
Q. 6 a) What is regression? Explain linear regression in detail with a suitable example.
[CO-4] [L-3] 10
b) Discuss reinforcement learning in detail.
[CO-4] [L-3] 10
Q. 7 Write short notes on the following:
a) AI chatbot.
[CO-5] [L-3] 10
b) Self driven vehicles.

# End Semester Examination, Dec. 2022 

## B. Tech. - Fourth Semester <br> MICROPROCESSOR AND MICROCONTROLLERS (BEC-DS-403)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Why the address /data bus is multiplexed in 8085 and what is its disadvantage?
[CO-1] [L-3]
b) Find out the number of address lines required to access 8KB of RAM.
[CO-3] [L-3]
c) State the function of given 8085 instructions: JP, JPE, JPO, JNZ.
[CO-4] [L-2]
d) What will be the status of carry flag, zero flag, parity flag, auxiliary carry flag, sign
flag and accumulator after execution of ADC B instructions? (Assume $A=3 F$, $B=20$,

$$
\begin{equation*}
C y=1) . \tag{CO-3}
\end{equation*}
$$

e) How register bank selection is done in 8051 microcontroller assembly programming?
[CO-3] [L-4]
f) Does the stack of 8051 microcontroller grows upwards or downwards? What is the default value of stack pointer (SP) register?
g) Write the structure of Program Status Word (PSW) of 8051.
h) What are the functions of 8051 microcontroller pins P3.4 and P3.5?
i) What is the significance of GATE bit with reference to timer/counter programming

8051 microcontroller?
[CO-5] [L-3]
j) If the crystal frequency is $22 \mathrm{MH}_{\mathrm{z}}$, what will be the baud rate if:
i) $\mathrm{TH} 1=-3$
ii) $\mathrm{TH} 1=-12$ with $\mathrm{SMOD}=0$ and $\mathrm{SMOD}=1$ ?
[CO-5] [L-3] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) With respect to the block diagram of 8085, explain the working of the following:
i) General purpose register.
ii) Interrupt control unit.
iii) Timing and Control unit.
[CO-1] [L-2] 10
b) What is the significance of each of the following PINs of 8085 microprocessor?
i) HOLD
ii) ALE
iii) READY
iv) INTA
v) S0, S1
Q. 3 a) Explain various categories of interrupts available in 8086.
b) How does the 8086 processor access a word from an odd memory location?
Q. 4 a) Explain memory read operation in minimum mode of 8086 with the help of a timing diagram.
[CO-2] [L-2] 10
b) Explain the usage of the following assembler directives with suitable example:
i) EQU
ii) SEGMENT
iii) ASSUME
[CO-4] [L-2] 6
c) Find the physical address of the destination operands referred in the following instructions, if $\mathrm{DS}=0223 \mathrm{H}, \mathrm{DI}=0 \mathrm{CCCH}$ and $\mathrm{SI}=1234 \mathrm{H}$
i) MOV [DI], AL
ii) MOV [SI][56H], BL
[CO-4] [L-3] 4

## PART-B

Q. 5 a) Describe internal data memory organization of 8051 microcontroller. [CO-2] [L-2] $\mathbf{1 0}$
b) Develop a program to transfer block of 10 numbers from memory location 7000

8000 H stored in internal memory.
[CO-4] [L-6] 10
Q. 6 a) Assuming crystal oscillator frequency of 11.0592 MHz , write a program to generate
a pulse train of 2 second period on pin P2.0. Use timer 1 in mode 1. [CO-5] [L-6] 10
b) Find the values of TMOD to operate as timers in the following modes:
i) Mode 1 Timer 1
ii) Mode 2 Timer 0, Mode 2 Timer 1
iii) Mode 0 Timer 1
[CO-5] [L-3] 10
Q. 7 a) Design a code to transfer the letter "A" serially at 9600 baud rate continuously. Use
8 bit data and 1 stop bit. Use Timer 1.
[CO-5] [L-6] 10
b) Sketch interfacing diagram of 4Kbyte EPROM and 4Kbyte of RAM to 8051 .

Draw
the
memory map.
[CO-3] [L-6] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Fourth Semester <br> ANALOG CIRCUIT (BEC-DS-402) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Define 'Load line'.
[CO-1] [L-1]
b) Draw h - parameter model of transistor.
[CO-2] [L-2]
c) Justify following values - 3dB up and 3 dB down. [CO-1] [L-2]
d) Describe role of mixer and sampler in feedback amplifier. [CO-3] [L-2]
e) Derive the expression for gain of positive feedback amplifier.
[CO-4] [L-3]
f) Draw circuit diagram of voltage follower. [CO-2] [L-2]
g) Define 'cross over distortion'.
[CO-2] [L-1]
h) Derive expression for full power bandwidth of operational amplifier.
[CO-5] [L-3]
i) State Barkhausen criteria of oscillation.
[CO-4] [L-1]
j) Sketch the output waveform if $\mathrm{V}_{\text {in }}=10 \operatorname{Sin} 2 \pi \times 10^{3} \mathrm{t}$ is applied to the inverting configuration of op-Amp 741. Given $R_{1}=1 \mathrm{~K} \Omega$ and $\mathrm{R}_{\mathrm{f}}=10 \mathrm{~K} \Omega$.

## PART-A

Q. 2 Derive expression for gain at mid, low and high frequency of two stage RCcoupled amplifier.
[CO-1] [L-4] 20
Q. 3 a) Evaluate characteristics parameter for pi-model of transistor. [CO-2] [L-5] $\mathbf{1 0}$
b) Evaluate efficiency of class - A power amplifier with suitable explanation.
[CO-2] [L-5] 10
Q. 4 a) State advantage of negative feedback amplifier with suitable derivation.
[CO-3] [L-4] 10
b) Derive expression of input and output impedance for voltage series feedback amplifier.
[CO-3] [L-5] 10

## PART-B

Q. 5 a) Derive expression for resonance frequency of Hartley oscillator.
[CO-4] [L-5] 10
b) Give reason of using 3-RC network in RC phase shift oscillator. The frequency sensitive arm of the Wein bridge oscillator uses $\mathrm{C}_{1}=\mathrm{C}_{2}=0.001 \mu \mathrm{~F}$ and $\mathrm{R}_{1}=4 \mathrm{~K} \Omega$ while $R_{2}$ is kept variable. The frequency is to be varied from 20 KHz to 50 MHz , by ranging $\mathrm{R}_{2}$. Calculate minimum and maximum value of $\mathrm{R}_{2}$.[CO-4] [L-4, 5, 6] $\mathbf{1 0}$
Q. 6 a) Reanalyze ac analysis of dual input balanced output differential amplifier configuration.
[CO-5] [L-2] 10
b) Draw block diagram of operational amplifier and describe ideal characteristics of it.
[CO-5] [L-3] 10
Q. 7 a) Explain operational amplifier as integrator.
[CO-5] [L-3] 10
b) Explain super diode for full wave configuration with suitable derivation.

# End Semester Examination, Dec. 2022 

B. Tech. - Third Semester

DIGITAL ELECTRONICS AND CIRCUITS (BEC-DS-322)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) What are analog and digital signals? Give its example.
b) Compute the Decimal (1344) ${ }_{10}$ into octal, binary and hexadecimal representation.
c) Differentiate between decoder and de-multiplexer.
d) Differentiate between latch and Flip-Flop.
e) Define race around condition.
f) Explain Bidirectional shift register.
g) Define modulus of a counter.
h) List out how many flip-flops are required to design mod-10 counter?
i) Define linearity of $D / A$ converter.
j) What is the difference between unipolar and bipolar logic families?

## PART-A

Q. 2 a) Report the seven-bit hamming code received as 0010001 . Assume that even parity has been used, check whether it is correct or not. If not, find the correct code.
[CO-1] [L-2] 10
b) Express following decimal numbers in binary, octal and hexadecimal codes:
i) 83
ii) 59
iii) 98
[CO-1] [L-2] 10
Q. 3 a) Construct the logic circuit by minimizing the following function using Karnaugh map method:
[CO-2] [L-5] 10
$F(A, B, C, D)=\sum m(0,2,4,5,6,7,10,13,14,15$
b) Examine $B C D$ to seven segment decoder with its applications.
[CO-2] [L-3] 10
Q. 4 a) Compute the following flip flop conversion:
[CO-3] [L-2] 10
i) SR to JK
b) Differentiate between Combinational $\mathrm{v} / \mathrm{s}$ Sequential Circuits.
[CO-3] [L-4] 10

## PART-B

Q. 5 Design and draw Mod-10 asynchronous counter with the help of timing diagram.
[CO-4] [L-5] 20
Q. 6 Explain the working of R-2R ladder D/A converter with the help of circuit diagram.
[CO-5] [L-2] 20
Q. 7 Explain the basic ECL OR/NOR gate with a neat circuit diagram. Why does ECL family have the lowest propagation delay among all logic families? [CO-6] [L-2] 20

# End Semester Examination, Dec. 2022 

## B. Tech. - Third Semester

## DIGITAL ELECTRONICS AND CIRCUITS (BEC-DS-322)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Compare Combinational and sequential circuits.
[CO-3] [L-1]
b) State Demorgan's theorem.
c) Convert:-
i) $(11110.11)_{2}=()_{8}$
ii) $(35)_{8}=()_{2}$
iii) $(1 \mathrm{BF})_{16}=()_{2}$
iv) $(234)_{8}=()_{16}$
d) Draw XOR gate by using only four NAND gates.
[CO-2] [L-2]
e) Design 2:4 decoder using gates.
f) Design half subtractor circuit using PAL.
g) Differentiate between latch and Flip-Flop.
h) Define resolution for DAC.
i) Convert the following into minterms:
i) $A^{\prime}+C D$
ii) $A B C+C^{\prime} D$
j) How many Flip flops are required to design MOD-12 counter.
[CO-3] [L-3] 2x10

## PART-A

Q. 2 a) Perform the following subtraction using 2's complement:
[CO-2] [L-3] 6
i) $(25)_{10}-(13)_{10}$
ii) $(18)_{10}-(24)_{10}$
b) Draw all logic gates by using i) Only NAND gates ii) Only NOR gates. [CO-2] [L-2] 8
c) Write the Excess $-3, \mathrm{BCD}$ and Gray code for the following decimal numbers:
i) 32
ii) 26
[CO-2] [L-3] 6
Q. 3 a) Minimize the following function using K-map \& QM method:
[CO-2] [L-4] 10
$F(A, B, C, D)=\sum m(1,2,6,8,9,12)$
b) Design full adder using i) ROM ii) PAL iii) PLA.
[CO-2] [L-6] 10
Q. 4 a) Design 16:1 multiplexer using 8:1 Multiplexer.
[CO-2] [L-6] 10
b) Design octal to binary encoder using gates? Mention its applications. [CO2] [L6] 10

## PART-B

Q. 5 a) Design the following Asynchronous counter:
[CO-3] [L-6] 10
i) MOD-5
ii) MOD-10
b) Draw and explain the working of Ring counter with its timing diagram. [CO3] [L2] 4
c) Design and explain the working of 4 - bit PISO shift register.
[CO-3] [L-5] 6
Q. 6 a) Mention different specifications of A/D converter.
b) Design and explain the working of parallel comparator type analog to digital converter.
[CO-4] [L-6] 12
Q. 7 a) Why ECL is called Emitter coupled logic? Explain it's working as NOR/OR logic.
b) Design universal gates by using CMOS technology.
[CO-5] [L-6] 10

## End Semester Examination, Dec. 2022

## B. Tech. - Third Semester

ANALOG ELECTRONIC (BEC-DS-321)
Time: 3 hrs.

Max Marks: 100
No. of pages: 2

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) Derive expression for $I_{d c}$ of full wave rectifier.
[CO-1] [L-2]
b) Derive expression for stability factor of a transistor. [CO-1] [L-3]
c) Describe switching time of a PN junction diode. [CO-1] [L-1]
d) Draw h- parameters model of a transistor. [CO-2] [L-3]
e) The pinch off voltage for an - channel JFET is 10 V , when $\mathrm{VGS}=1 \mathrm{~V}$, the pinch - off occurs for VDS equal to $\qquad$ .
f) Tabulate difference between BJT and FET.
g) Define 'cross over distortion'.
h) Draw circuit diagram for Operational amplifier as voltage follower.
i) State various coupling techniques of an amplifier.
j) Derive expression for gain of non-inverting configuration of Op-Amp.

## PART-A

Q. 2 a) Calculate current through circuit shown in figure below if diode forward resistance is $0.50 \Omega$. Also calculate voltage across diode and load resistance, diode and load power and load line.
[CO-1] [L-5] 10

b) Derive PN diode current equation.
[CO-1] [L-5] 10
Q. 3 a) Describe Input and Output characteristics of common base configuration of BJT.
b) For the device characteristics and circuit shown in the figure (a) \& (b) calculate $V_{C C}, R_{B}$ and $R_{C}$ for the fixed bias circuit.
[CO-2] [L-4] 10

Q. 4 a) The device parameters for an n-Channel JFET are: Maximum current IDSS = 10 mA , Pinch off voltage, $\mathrm{Vp}=-4 \mathrm{~V}$ Calculate the drain current for (a) VGS $=$ 0 (b) VGS $=-1.0 \mathrm{v}$ (c) VGS $=-4 \mathrm{~V}$.
[CO-3] [L-4] 10
b) Tabulate difference between enhancement-mode-MOSFET and Depletion-mode-MOSFET.
[CO-3] [L-4] 10

## PART-B

Q. 5 a) Design and evaluate Zin, Zo and A for two stage RC coupled amplifier (where $\mathrm{Cb}=20 \mu \mathrm{~F}, \mathrm{R} 1=56 \mathrm{~K} \Omega, \mathrm{R} 2=5.6 \mathrm{~K} \Omega, \mathrm{Rc}=1 \mathrm{~K} \Omega, \mathrm{Re}=520 \Omega, \mathrm{Ce}=50 \mu \mathrm{~F}$, hie $=1.1 \mathrm{~K} \Omega$ and $\mathrm{hfe}=120$.
[CO-4] [L-6] 12
b) Reanalyze DC analysis of a dual input unbalanced output differential amplifier configuration.
Q. 6 a) Derive an expression for efficiency of class-B power amplifier.
[CO-4] [L-5] 10
b) Draw a block diagram of Operational Amplifier. Also state its ideal characteristics.
[CO-4] [L-5] 10
Q. 7 a) Draw input and output wave form for input function applied to operational amplifier as Integrator. (Given Vswing $= \pm 15 \mathrm{~V}$ )

$$
\text { Vin }=+20 \text { for } \quad 0 \leq t \leq T
$$

Vin=-20 for $\quad \mathrm{T} \leq \mathrm{t} \leq 2 \mathrm{~T}$
Assume time constant to be unity.
[CO-5] [L-5] 10
b) Explain comparator for inverting configuration of Op-Amp. Also write how it is different from a Schmitt Trigger.
[CO-5] [L-3] 10

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester <br> BASIC ELECTRONICS (BEC-DS-312) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1

## Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.

Q. 1 a) Justify reason of preferring Silicon over Germanium.
[CO1][L-2]
b) Evaluate $\mathrm{I}_{\mathrm{rms}}$ for full-wave rectifier.
[CO1][L-5]
c) Derive relation between $a \& \beta$.
[CO2][L-5]
d) Draw h parameter model of transistor.
[CO2][L-4]
e) Define CMRR of operational amplifier.
[CO3][L-5]
f) Draw circuit diagram of current to voltage converter Op-Amp.
[CO4][L-2]
g) Justify the use of 3-RC network in RC phase shift oscillator.
[CO6][L-3]
h) Draw block diagram of feedback amplifier.
[CO6][L-2]
i) Differentiation LED \& photodiode.
[CO5][L-3]
j) State virtual ground concept.
[CO5][L-3] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Explain V-I characteristics of PN junction diode.
[CO1][L-2] 10
OR
The current flowing in PN junction diode at room temperature is $5 \times 10^{-7} \mathrm{amp}$, when a large reverse biased voltage is applied. Evaluate the current flowing when 0.1 volt is applied. (Given $\mathrm{V}_{T}=26 \mathrm{mV}$ at room temperature).
[CO1][L-3] 10
b) Explain working of full wave rectifier. Also derive expression for ripple factor and efficiency of it.
[CO1][L2] 10
Q. 3 Describe input and output characteristics of common emitter configuration of BJT.
[CO 2][L2] 20
Q. 4 Draw equivalent circuit of two stage RC coupled amplifier circuit. Also, explain its frequency
response.
[CO3] [L-2] 20

## PART-B

Q. 5 Derive expression for resonance frequency of RC phase shift oscillator.
[CO4][L-3] 20
Q. 6 a) Explain advantage of negative feedback.
[CO4][L-3] 10
b) Explain ideal characteristics of operational amplifier.
[CO5][L-3] 10
Q. 7 a) Explain differential amplifier configuration for DC analysis.
[CO6][L-3] 8
b) Draw block diagram and pin configuration of operational amplifier. Also derive expression for closed loop gain for non-inverting configuration.
[CO6][L-2] 12

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester <br> SIGNALS AND SYSTEMS (BEC-DS-303A) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) Find the even and odd components of $x(t)=e^{j t}$.
b) Determine the signal energy and signal power for $f(t)=e^{-3|t|}$.
c) What are the properties of convolution in discrete-time system?
d) State Parseval's theorem for continuous-time Fourier series.
e) What is unit-ramp function? How can it be obtained from a unit-impulse function?
f) With regards to the Fourier series representation, justify the statement: Odd functions have only sine terms.
g) Find the exponential Fourier series coefficients for $x(t)=\sin \omega_{o} t$.
h) What is the condition for the existence of discrete-time Fourier transform?
i) What are the properties of Laplace Transform?
j) What is region of convergence?

## PART-A

Q. 2 a) Define 'LTI system'. Check the causality, time invariance and linearity of the $y(n)=x\left(n^{2}\right)$ system
[CO-1] [L-3] 10
b) Draw the graphical representation of unit step sequence $u(n)$ and shifted unitstep sequence $u(n-1)$ and sketch the signal.
[CO-1] [L-3] 5

$$
x(n)=u(n)-u(n-1)
$$

c) Describe the signals given in figure.
[CO-1] [L-2] 5

Q. 3 a) Consider an LTI system S and a signal $x(t)=2 e^{-3 t} u(t-1)$. If
$x(t) \rightarrow y(t)$ and $\frac{d x(t)}{d t} \rightarrow-3 y(t)+e^{-2 t} u(t)$
[CO-2] [L-2] 10
Then determine the impulse response $h(t)$ of S .
b) Determine the output response of the low-pass RC network due to an input $x(t)=t e^{-t / R C}$ by convolution.
[CO-2] [L-3] 5
c) Suppose that the unit impulse response of LTI system is a unit ramp.
$h(n)=r(n)=n u(n)$
[CO-2] [L-2] 5
Compute the response of this system to a unit step input $x(n)=u(n)$.
Q. 4 a) Show that a signal $x(t)$ that satisfies half-wave symmetry contains Fourier coefficients with odd harmonics only.
[CO-3] [L-5] 5
b) Obtain the Fourier Components of the periodic rectangular waveform shown in the figure below:

[CO-3] [L-3] 5
c) Obtain the trigonometric Fourier series of the triangular waveform shown in the figure below:

[CO-3] [L-3] 10

## PART-B

Q. 5 a) Find the average power of the signal:

$$
x(t)=2 \sin ^{2}(2500 \pi t) \cos (20000 \pi t)
$$

If this signal is transmitted through a telephone system which blocks dc and frequencies above 12 kHz , compute the ratio of received power to the transmitted power.
b) Find the Fourier transform of the Gaussian pulse $f(t)=e^{-a^{2} t^{2}} . \quad[C O-4][L-4] 5$
c) State and prove time convolution and time differentiation properties of Fourier transform.
Q. 6 a) Verify Parseval's theorem:

$$
\sum_{n=-\infty}^{\infty} x(n) x^{*}(n)=\frac{1}{2 \pi} \int_{-\pi}^{\pi} X\left(e^{j \omega}\right) X^{*}\left(e^{j \omega}\right) d \omega
$$

For the following sequence
$x(n)=\left(\frac{1}{2}\right)^{n} u(n)$
b) Find the DTFT of the following finite duration sequence of length L

$$
x(n)=\left\{\begin{array}{lr}
A, & \text { for } 0 \leq n \leq L-1  \tag{CO-4}\\
0, & \text { otherwise }
\end{array}\right.
$$

Also, find the inverse DTFT to verify $x(n)$ for $\mathrm{L}=3$ and $\mathrm{A}=1 \mathrm{~V}$. [CO-4] [L4] 10
Q. 7 a) Find the Laplace transform of the triangular pulse shown in the figure below:

[CO-3] [L-4] 10
b) An LTI system has a unit step response given by $s(t)=\left(1-e^{-t}-t e^{-t}\right) u(t)$. For a certain input $\mathrm{x}(\mathrm{t})$, the output is observed to be equal to $y(t)=(2-$ $\left.3 e^{t}+e^{3 t}\right) u(t)$. What is $\mathrm{x}(\mathrm{t})$ ?
[CO-3] [L-3] 10

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester <br> SIGNALS AND SYSTEMS (BEC-DS-303) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) Test periodicity of the signal, $x(t)=\sin 15 \pi t$
b) Find the energy and power of the signal $x(t)=\exp (-3|t|)$.
c) How would you check the linearity of the given system:

$$
\mathrm{y}(\mathrm{t})=\frac{d x(t)}{d t}+x(t)+4
$$

d) Define causal and non-causal systems.
e) Compute the Laplace transform of the given function:

$$
x(t)=10+5 t+t^{2}-4 t^{3}
$$

f) State Dirichlet's conditions.
g) Find the Fourier Transform of $\delta(\mathrm{t})$, an impulse of unit strength.
h) Derive Modulation property of DTFT.
i) A signal $m(t)$ is multiplied by a sinusoidal waveform $f_{c}$. The product signal is $f$ $(t)=m(t) \sin 2 \pi f_{c} t$. If the Fourier transform of $m(t)$ is $M(f)$, find the Fourier transform of $f(t)$.
j) State Parseval's energy Theorem.

## PART-A

Q. 2 a) What is the difference between continuous time signal and discrete time signal? Classify them. Give examples of each.
[CO-1] [L-2] 10
b) Plot the signal with respect to time:

$$
x(t)=u(t)-r(t-1)+2 r(t-2)-r(t-3)-u(t-4)-2 u(t-5)
$$

Find the even and odd part of this signal.
[CO-1] [L-3] 10
Q. 3 a) Define system. Explain the difference between the following systems:
i) Time invariant and Time variant system.
ii) Linear and non linear system.
iii) Stable and unstable system.
[CO-2] [L-2] 12
b) Determine whether the following is a LTI system.

$$
\begin{equation*}
y(n)=n \cos [x(n)] \tag{CO-2}
\end{equation*}
$$

Q. 4 a) Determine the laplace transform of $x(t)=\left(t^{2}-2 t\right) u(t-1)$.
b) Find the Inverse Laplace Transform of:
$X(s)=(s+4) /\left\{s(s-1)\left(s^{2}+4\right)\right\}$
[CO-4] [L-3] 7
c) State and prove Final Value theorem.

## PART-B

Q. 5 a) Prove the following property of the Fourier series:

If the periodic signal $g(t)$ is even ,then the Fourier coefficients, $c_{n}$, are purely real and even function of $n$.
b) Find the Fourier series expansion of the following signal:

Q. 6 a) Find Fourier transform of $\mathrm{x}(\mathrm{t})=\exp (-\mathrm{a}|t|)$.
[CO-3] [L-4] 10
b) State and prove following properties of Fourier Transform.
i) Convolution in Time domain.
ii) Difference in Time domain.
[CO-5] [L-2] 10
Q. 7 a) Find linear convolution between the following sequences:

$$
x(n)=\{4,1,1,2\} \quad \text { and } \quad h(n)=\{1,1,2\}
$$

[CO-5] [L-5] 12
b) Find DTFT of the discrete sequence $x(n)=(3)^{n} u(n-1)$.

# End Semester Examination, Dec. 2022 

## B. Tech. - Third Semester <br> DIGITAL ELECTRONICS (BEC-DS-302)

Time: 3 hrs.

Max Marks: $\mathbf{1 0 0}$
No. of pages: 2

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Differentiate between Counter and Register?
[CO-3] [L-2]
b) Compare Analog and Digital signals? [CO-1] [L-2]
c) Write the gray code and BCD code for (35) $)_{10}$
[CO-2] [L-1]
d) Convert the following hexadecimal number (A6.2F) ${ }_{16}$ into its equivalent: [CO-2] [L-1]
i) Binary
ii) Decimal
iii) Octal number
e) Discuss with an example showing positive and negative logic systems?
f) Design AND gate using NOR gate?
g) List the applications of Multiplexer.
[CO-2] [L-2]
h) Design half sub tractor circuit using ROM?
i) Define resolution (step size) and \% resolution of a D/A converter.
j) Convert the following into minterms:
i) $A^{\prime} B^{\prime} C+A^{\prime} B+B C D$
ii) $A B C+D^{\prime} C^{\prime}$

## PART-A

Q. 2 a) Simplify the following expression:
i) $\mathrm{B}(\mathrm{A}+\mathrm{C})+\mathrm{A} \overline{\mathrm{B}}+\mathrm{B} \overline{\mathrm{C}}+\mathrm{BC}$
ii) $\mathrm{ABC}+\overline{\mathrm{A}} \mathrm{BC}+\mathrm{A} \overline{\mathrm{B}} \mathrm{C}+\overline{\mathrm{A}} \overline{\mathrm{B}} \mathrm{C}+\mathrm{AB} \overline{\mathrm{C}}$
[CO-2][L-3] 8
b) The seven bit hamming code is received as 1011001. Assume that even parity has been used, check whether it is correct or not. If not, find the correct code?
[CO-2] [L-2] 5
c) Subtract the following decimal numbers using 1's complement?
i) 15 from 32
ii) 28 from 17
[CO-2] [L-3] 7
Q. 3 a) Minimize the following function using QM method:
[CO-2] [L-4] 10

$$
F(A, B, C, D)=\pi M(5,8,9,12,13,15)+d(3,10)
$$

b) Design full Adder using i) ROM ii) PLA.
[CO-2] [L-6] 10
Q. 4 a) Design the following using 4:1 Multiplexer:
$F(A, B, C, D)=\sum m(1,2,5,6,7)$
[CO-2] [L-6] 6
b) Design hexadecimal to binary encoder using gates. Mention its applications.
[CO-2] [L-6] 14

## PART-B

Q. 5 a) Convert the following flip flop conversion:
[CO-3] [L-4] 4
i) T to D
ii) SR to JK
b) Design Synchronous MOD -6 counter using:
i) D Flip Flop
ii) JK Flip Flop
c) Draw and explain the working of Ripple counter with its timing diagram.
[CO-3] [L-2] 10
Q. 6 a) Draw and explain the working of $R / 2 R$ ladder digital-to-analog (DAC) converter.
[CO-4] [L-5] 8
b) Design and explain the working of successive approximation type A/D converter.
[CO-4] [L-2] 12
Q. 7 a) How TTL can be configured in Totem-Pole output? Mention the advantages and limitations of this configuration.
[CO-5] [L-2] 10
b) Design EXOR and EXNOR gates by using i) PMOS ii) NMOS iii) CMOS technology.
[CO-5] [L-6] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Third Semester <br> ELECTRONIC DEVICES (BEC-DS-301/BEC-DS-301A) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) Describe switching time of PN diode. [CO-1] [L-2]
b) Why Silicon is preferred over Germanium.
[CO-1] [L-3]
c) Distinguish, transition and space charge capacitance of diode.
[CO-2] [L-4]
d) Define dark current in photodiode.
[CO-2] [L-2]
e) List advantages of bridge rectifier over centre tap rectifier.
[CO-3] [L-4]
f) One terminal of transistor is made common between input and output. Briefly explain.
[CO-4] [L-6]
g) Define $a$ and $\beta$ of a transistor and derive the relationship between them. [CO4] [L-2]
h) Differentiate between bipolar junction transistor and field effect transistor. [CO4][L3]
i) Why DC power supply in electronic circuits.
j) Draw the pin configuration for 3 terminal IC regulators.

## PART-A

Q. 2 a) For a given intrinsic semiconductor specimen, Describe two physical processes for increasing its conductivity. [CO-1] [L-4] 10
b) Explain statement: An electron and a hole recombine and disappear. [CO-1] [L-2] 10
Q. 3 a) The current flowing in PN junction diode at room temperature is $2 \times 10^{-7} \mathrm{amp}$, when a large reverse biased voltage equal to 0.1 Volt is applied. Evaluate the current flowing (Given $\mathrm{V}_{T}=26 \mathrm{mV}$ at room temperature)
[CO-2] [L-3] 10
b) Explain the terms: solar cell, LED
Q. 4 a) A full wave centre tapped rectifier uses diode 1 N4002 each having forward resistance of 25 ohm . The value of secondary value fed between centre tap to each end of secondary is 48 V and load resistance is 1 Kohm . Evaluate - dc output voltage, dc output power, rectifier efficiency and PIV. [CO-2] [L-5] 8
b) Draw output wave form for circuit shown in figure.1, if input voltage is square wave of amplitude 5 V . Assume ideal diode condition. Also, identify circuit.[CO-3] [L-5] 5


Figure:1
c) Analyze Inductor filter with full wave rectifier.

## PART-B

Q. 5 a) Describe input and output characteristics of common base configuration of BJT.
[CO-4] [L-2] 10
b) Figure. 2 shows that a silicon transistor with $\beta=100$ is biased by base resistor method. Draw the d.c. load line and determine the operating point. Also evaluate stability factor.


Figure. 2
Q. 6 a) Derive relation between transconductance, amplification factor and A.C drain resistance of JFET.
b) Tabulate difference between Enhancement mode MOSFET and Depletion mode MOSFET.
Q. 7 a) Design a regulated power supply using a full wave bridge rectifier of 10 diode $1 N 4007$, capacitor filter ( $\mathrm{Cin}=25 \mu \mathrm{~F}$ and Cout= $10 \mu \mathrm{~F}$ ) , IC regulator to provide an output of +12 V .
[CO-5] [L-6] 10
b) Draw circuit diagram of transistor series feedback voltage regulator.
[CO-5] [L-3] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Third Semester <br> ELECTRONIC DEVICES (BEC-DS-301/BEC-DS-301A) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) Describe switching time of PN diode. [CO-1] [L-2]
b) Why Silicon is preferred over Germanium.
[CO-1] [L-3]
c) Distinguish, transition and space charge capacitance of diode.
[CO-2] [L-4]
d) Define dark current in photodiode.
[CO-2] [L-2]
e) List advantages of bridge rectifier over centre tap rectifier.
[CO-3] [L-4]
f) One terminal of transistor is made common between input and output. Briefly explain.
[CO-4] [L-6]
g) Define $a$ and $\beta$ of a transistor and derive the relationship between them. [CO4] [L-2]
h) Differentiate between bipolar junction transistor and field effect transistor. [CO4][L3]
i) Why DC power supply in electronic circuits.
j) Draw the pin configuration for 3 terminal IC regulators.

## PART-A

Q. 2 a) For a given intrinsic semiconductor specimen, Describe two physical processes for increasing its conductivity. [CO-1] [L-4] $\mathbf{1 0}$
b) Explain statement: An electron and a hole recombine and disappear. [CO-1] [L-2] 10
Q. 3 a) The current flowing in PN junction diode at room temperature is $2 \times 10^{-7} \mathrm{amp}$, when a large reverse biased voltage equal to 0.1 Volt is applied. Evaluate the current flowing (Given $\mathrm{V}_{\mathrm{T}}=26 \mathrm{mV}$ at room temperature)
[CO-2] [L-3] 10
b) Explain the terms: solar cell, LED
Q. 4 a) A full wave centre tapped rectifier uses diode 1 N4002 each having forward resistance of 25 ohm . The value of secondary value fed between centre tap to each end of secondary is 48 V and load resistance is 1 Kohm . Evaluate - dc output voltage, dc output power, rectifier efficiency and PIV.
[CO-2] [L-5] 8
b) Draw output wave form for circuit shown in figure.1, if input voltage is square wave of amplitude 5 V . Assume ideal diode condition. Also, identify circuit.[CO-3] [L-5] 5


Figure:1
c) Analyze Inductor filter with full wave rectifier.

## PART-B

Q. 5 a) Describe input and output characteristics of common base configuration of BJT.
[CO-4] [L-2] 10
b) Figure. 2 shows that a silicon transistor with $\beta=100$ is biased by base resistor method. Draw the d.c. load line and determine the operating point. Also evaluate stability factor.


Figure. 2
Q. 6 a) Derive relation between transconductance, amplification factor and A.C drain resistance of JFET.
b) Tabulate difference between Enhancement mode MOSFET and Depletion mode MOSFET.
Q. 7 a) Design a regulated power supply using a full wave bridge rectifier of 10 diode $1 N 4007$, capacitor filter ( $\mathrm{Cin}=25 \mu \mathrm{~F}$ and Cout= $10 \mu \mathrm{~F}$ ) , IC regulator to provide an output of +12 V .
[CO-5] [L-6] 10
b) Draw circuit diagram of transistor series feedback voltage regulator.
[CO-5] [L-3] 10

# End Semester Examination, Dec. 2022 <br> B. Tech. - Second / Third Semester <br> IoT DESIGN WITH ARDUINO (BEC-DS-201) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) What is the use of setup( ) and loop( ) functions in an Arduino program? [CO2][L2]
b) Write a program to blink onboard LED of Arduino Uno board every 2.5 sec . [CO3][L3]
c) What is baud rate?
[CO-1] [L-1]
d) What is the significance of analogRead( ) function? [CO-2] [L-2]
e) What is I2C protocol? [CO-4] [L-3]
f) What is the advantage of using Servo motor over DC motor?
g) What is relay? How relay can be used to control AC appliance using Arduino board?
[CO-5] [L-3]
h) List various services that are being offered by a cloud in IoT system. [CO-3] [L-1]
i) Explain MQTT protocol in brief.
[CO-4] [L-2]
j) What are the applications of IoT in the industry?
[CO-1] [L-3] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Differentiate between Arduino Uno and Arduino Nano boards with respect to technical specifications.
[CO-1] [L-3] 10
b) What is a microcontroller? List various salient features of ATMEGA328p microcontroller that is used in Arduino Uno board.
[CO-1] [L-2] 10
Q. 3 a) What are sensors? Explain different types of sensors which are widely used in IoT system.
[CO-2] [L-2] 10
b) Explain different networking options which are available for implementing IoT system.
[CO-2] [L-2] 10
Q. 4 a) Write a program to compliment the state of pin 13 every time a data byte is received serially.
[CO-3] [L-3] 10
b) Write a program to control the brightness of LED connected to pin 9 as per the following situation:
If ' $A$ ' is received serially, then LED will glow with full brightness.
If ' $B$ ' is received serially, then LED will glow with mid brightness level. If 'C' is received serially, then LED will glow with very less brightness level.
[CO3][L4] 10

## PART-B

Q. 5 a) Explain various security challenges that are associated with the implementation of IoT system. [CO-4] [L-2]
b) Discuss the interfacing of a $16 \times 2$ LCD with Arduino Uno board and write a program to print message "MANAV RACHNA" on LCD.
[CO-3] [L-4] 10
Q. 6 a) Explain various salient features of Node MCU board.
[CO-4] [L-2] 10
b) Discuss the interfacing of DHT11 sensor with Arduino. How can ESP8266 be interfaced with Arduino to send the temperature and humidity data on cloud?
[CO-3] [L-4] 10
Q. 7 Write short notes on the following:
a) IoT in healthcare.
[CO-5] [L-3] 10
b) Home automation.

# End Semester Examination, Dec. 2022 OPEN ELECTIVE - COMMON FOR ALL BRANCHES CYBER SECURITY (BCS-OE-003) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) What is the difference between star and ring topology?
[CO-2] [L-1]
b) What are the various types of networks? [CO-3] [L-1]
c) Who are phishers? [CO-1] [L-1]
d) Define white hat and black hat hackers. [CO-1] [L-2]
e) What is denial of service attack? [CO-3] [L-5]
f) Discuss network utilities. [CO-3] [L-3]
g) List various malwares. [CO-3] [L-4]
h) Discuss secure browser settings. [CO-2] [L-3]
i) What is crisis management?
[CO-3] [L-5]
j) Explain forensics in cyber security.

## PART-A

Q. 2 a) Explain network architecture with the help of layered structure in open system interconnections. Define and explain each phase of BCM life cycle.[CO-1] [L-1]
b) What are the basic network utilities?
[CO-1] [L-2] 10
Q. 3 Write short notes on the following:
a) Session hijacking.
[CO-2] [L-4] 10
b) Viruses, worms and malware.
[CO-2] [L-3] 10
Q. 4 a) What do you understand by an investment fraud? Also, explain the technique of phishing.
[CO-3] [L-2] 10
b) Write a note on cyber stalking, and ways to resolve.
[CO-3] [L-3] 10

## PART-B

Q. 5 Explain the active and passive scanning techniques in detail.
[CO-4] [L-2,4] 20
Q. 6 a) Explain the procedure to recover system logs to find evidence.
[CO-5] [L-3] 10
b) Describe the document trail in detail.
[CO-5] [L-2] 10
Q. 7 a) What is the need of protection from cyber-crime?
[CO-6] [L-4] 10
b) What is the scope and coverage of cyber laws?
[CO-6] [L-5] 10

## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester PROGRAMMING LANGUAGE (BCS-ID-001)

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. $\mathbf{1}$ is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Explain the following line used under Java Program: public static void main (String args[ ])
b) What is dynamic method dispatch?
c) Given that thing is a class, how many objects and how many reference variables
are created by the following code?
thing item, stuff;
item = new Thing();
thing entity = new thing();
d) Differentiate between abstract classes and interface in java.
e) How is a vector different from an array?
f) Swing components are light weight. Justify.
g) How does java support type casting? Give example.
h) List checked exceptions of java.
i) Explain result set with a suitable example.
j) Explain the reason to implement a corba application with multi-threading?

## PART-A

Q. 2 a) Illustrate how packages are created and accessed in Java. Briefly explain the naming convention in packages?
[CO-1] [L-1] 10
b) Write a program using the concept of inheritance, to set, to get and compare the
features of different vehicles. Create different methods for each feature
[CO-1] [L-6] 10
Q. 3 a) Explain applets and describe the Applet life cycle. What are the requirements for
creating an Applet?
[CO-2] [L-2] 10
b) Write a Java code that generates custom exception if any value from its command
line arguments is negative.
[CO-2] [L-6] 10
Q. 4 a) Describe event and delegation event model with a suitable example. [CO-3] [L-1] 10
b) Explain in detail about JAR files. How can you create them? Where do we use them?
[CO-3] [L-2] 10

## PART-B

Q. 5 a) What is SOAP? How do users utilize the facilities provided by SOAP? Give example.
b) Differentiate between thread and a process. What are the two ways of implementing thread in java. Give suitable examples for both.
Q. 6 a) Write a java program to append second file content to first file, read two file names
as command line arguments.
[CO-5] [L-2] 10
b) Explain synchronization and write a program to solve producer-consumer problem using interthread communication.
Q. 7 a) Discuss JDBC and four types of database drivers of JDBC with suitable examples and syntax.
[CO-6] [L-2] 10
b) Explain stored procedure. What are the parameter types in stored procedure? Give
example.
[CO-6] [L-4] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Eighth Semester <br> IT BUSINESS CONTINUITY AND DISASTER RECOVERY (BCS-DS- <br> 801)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) Differentiate between business continuity and disaster recovery.
b) Describe business impact analysis.
c) Explain the three business enablers in the development of BCR and DR.
d) Discuss how can BCDR planning help us to recover from ransomware, malware, or other cyber attacks?
e) Show how should businesses approach budgeting and prioritizing for BCDR initiatives?
f) Discuss BCN/DR audit components.
g) Define BCM and DR teams, their roles and responsibilities.
h) How various system and network activities are tracked in case of BCM/DR?
i) Explain three tiers of disaster recovery in an organization.
j) Define IT disaster recovery.

## PART-A

Q. 2 Explain disaster in IT industry. What are the different types of disasters?
[CO-1] [L-1] 20
Q. 3 Define 'project'. Discuss the various project success elements in detail. [CO-2] [L-2] 20
Q. 4 What are the various types of risk mitigation strategies? How the risk mitigation strategy can be developed for people, buildings and infrastructures?
[CO-3] [L-4] 20

## PART-B

Q. 5 Explain the communication plan in BCM/DR.
[CO-4] [L-2] 20
Q. 6 Discuss the crisis management and their responsibilities in business operations.
[CO-5] [L-1] 20
Q. 7 Explain the BCM and DR project 'close out process' in detail with the help of a diagram.

# End Semester Examination, Dec. 2022 

# B. Tech. - Seventh Semester <br> IT NETWORK SECURITY (BCS-DS-733) 

Time: 3 hrs.

Max Marks: 100 No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) How hierarchical routing is better than other routing techniques? [CO-2][L-1]
b) Briefly explain the importance of penetration testing.
[CO-1][L-2]
c) Briefly explain the special features of net-view.
[CO-2][L-1]
d) Differentiate between table driven and on-demand routing protocols.
[CO-3][L-2]
e) Explain the different types of VPN.
[CO-4][L-3]
f) Differentiate between hot fixes, service packs and patches.
[CO-4][L-3]
g) What are the different characteristics of TCP and UDP Protocol with an example?
[CO-3][L-2]
h) What is the importance of NAT in Firewalls?
[CO-5][L-2]
i) Compare briefly OSI with TCP /IP.
[CO-2][L-1]
j) Briefly explain the special features of open view.

## PART-A

Q. 2 a) What functions are carried out by various layers of TCP/IP? Discuss with the help of a block diagram.
[CO-1][L-3] 10
b) Differentiate between the TCP header and UDP header with its applications.
[CO-1][L-2] 10
Q. 3 a) Differentiate between RIP, OSPF and BGP protocols.
[CO-2][L-1] 10
b) What are the major weakness of LAN manager authentication protocols?
[CO-2][L-3] 10
Q. 4 a) Explain the architecture of Firewalls with various Firewall technologies. [CO-3][L-2] $\mathbf{1 0}$
b) Explain the concept of protocols in network. How authentication protocols are used in network security.
[CO-3][L-4] 10

## PART-B

Q. 5 a) Describe the various WAN technologies in detail.
[CO-4][L-4] 10
b) What is RAID? Explain it with the architecture.
[CO-4][L-3] 10
Q. 6 Write short notes on the following:
a) Net manager.
[CO-5][L-2] 10
b) Open view.
[CO-5][L-2] 10
Q. 7 a) What are the different types and methods of Penetration Testing? [CO-6][L-4] $\mathbf{1 0}$
b) Explain the process of testing. Why and how the process of testing is done to enhance the security of a network?
[CO-6][L-3] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Seventh Semester <br> INTRODUCTION TO IOT (CC) (BCS-DS-731) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Discuss various security issues in IoT.
b) Illustrate the use of "Things" in Internet of Things?
c) Elaborate applications of sensor? Explain anyone.
d) Differentiate between TCP/IP and UDP.
e) Explain M2M service connection procedure based on TLS-PSK.
f) Explain the function of a router in a network.
g) What do you understand by wearable devices?
h) Enlist which protocol is used for online video calling?
i) Illustrate the statement 'Smart objects as building blocks of IoT.
j) Elaborate how MAC address is different from IP address?

## PART-A

Q. 2 a) Explain the process of IoT application development with suitable diagram.
[CO-3] [L-2] 10
b) Describe the basic building blocks of "Internet of Things" architecture? Explain each block in brief.
[CO-1] [L-2] 10
Q. 3 a) Compare and contrast the main characteristics of machine to machine and IoT technology.
[CO-2] [L-4] 10
b) Summarize Hardware and Software design components of IoT system with diagram.
[CO-2] [L-2] 10
Q. 4 a) Differentiate between ecosystem and value chain. Describe the functionality of major components of global value chain.
[CO-3] [L-1] 10
b) Compare and contrast between USIM card and SIM card.
[CO-3] [L-4] 10

## PART-B

Q. 5 a) Explain different software platforms available for M2M applications. [CO-4] [L-2] 10
b) Describe the static and dynamic IP address assignment techniques with examples.
[CO-3] [L-2] 10
Q. 6 a) Compare and contrast specifications of 3 G and 4G communication technologies.
[CO-5] [L-4] 10
b) Explain an application of IoT in the field of home automation. [CO-6] [L-2] 10
Q. 7 a) Write short notes on following:
i) M2M Communication.
ii) Internet Communication.
[CO-6] [L-1] 10
b) Identify various challenges faced in IoT connectivity. Discuss the ways to manage these challenges.
[CO-6] [L-3] 10

# End Semester Examination Dec, 2022 

# B. Teen. - seventh semester <br> BIG DATA AMALYTICS (BCS-DS-730) 

Tine: 3 hrs.
Mav Matks. 100
No of pages. 1
Note. Attempt FIVE questions in all, Q, 1 is comipulson. Attempt anv 1 Wo auestions. trom PART-A and TUO questions from PARTI B. Narks ave indicated against each question.

Q1. Answer the following guestions.
a) withich Apache system deals nith ingesting streaming data to thadoo. Also, discuss its functionality.
b) List out any tive characteris ties of streana processing language.
c) Explain the unportance of Rack Anareness.
d) Differentiate between 501 and 10501 Database.
e) vitiat is a courn oriented database and vihich colvinu oriented puns on top of 10 F ?
4. Nuhat is the purpose of 200 keeper in the vadoop ecos vstem?
g) vinat does cen miodias varduvare in the vadoop vyo rld vaea.
tr) Thu ustate the significanee of partition in vive.
i) List out any vour data analysis toovs used in Business ninetligenee.
D) Discuss the key aspect of 1 ARD
$2 \times 10$

## PART-A

Q.2. a) Discuss the vive vi that contribute to the erficiency of big Data Analytics. Also. discuss the various benefits and urawnacks of Big Date.

CCO-1 1 $12-2110$
b). Acknounledge the effectiveness of the big Data ife cy de in weather forecasting.
$160-1121-2110$
Q.3. a) ilustrate the finctiona ive of Map keduee. vive a progran to count the number of

b) Extend exandres to demonstrate the innowtance of HDFS and tes subsecuent componeyts in Big Date Anatytics.

160-3 $1,-3110$
 operators nelp in big dat a nanding
$100-41,2-2110$
b) Demonstrave the to es of vive and Pig. Create a program that performs stave wise temperature analysis to dernonstrate the difference between tive and pig.
$160-4121-4110$

## PART-B

Q. 5. as Emphasize the purpose of data anatysis and reporting in business and hovy ivise
 an vinowtany vole in date ana 15 sis and reporting.

1E0-5 $12-3110$

c0-51 Y $1-4 y 10$
Q.6. a) Strean operators cannot be deployed to an instance. diseuss novy processing Elements (PES) Overcome this linitation in this viev. Alse diseuss the stevs. require e for the streandrocessing varguage to work.
b) Sunaraize the inportance of Adaptory, vtitiv, and Relationat operaters in Streand Processing vanguage. Also, provide appropriate examples.
$150-6141.310$
Q.7. a) Denonstrate the unvonance of xnindowing, Mention the various po cies 5 sisumere

## End Semester Examination, Dec. 2022

## B. Tech. - Seventh Semester

ADVANCED GAME PROGRAMMING (BCS-DS-729)
Time: 3 hrs.

Max Marks: $\mathbf{1 0 0}$
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Discuss real time applications of Object oriented Programming Language. [CO.1] [L2]
b) Define function. What are its different types? Write and explain a C++ program to find factorial of a given number using function.
[CO.2][L6]
c) Define 'Constructor'. What are its characteristics?
[CO. 2][L5]
d) Define 'Rasterization'. Discuss different methods of rasterization with examples.

CO 2][L2]
e) Discuss in detail how is sepia filter different from luminance filter? [CO-4][L-2] 4×5

## PART-A

Q. 2 Discuss De-constructor. What are its characteristics? Write a C++ program to demonstrate the working of constructor.
[CO1][L3] 20
Q. 3 a) Explain various types of surface mappings.
[CO-3][L-2] 10
b) Why is game loop important in games? Discuss different types of game loop models.
Q. 4 a) What is game graphics? How it is different from computer graphics? Explain openGL graphics pipeline.
[CO-4][L-2] 10
b) What are hexadecimal values? Discuss their use in representation of colors. Break and convert the RGB components in \#68A3F8 into their respective decimal values.
[CO-5][L-2] 10

## PART-B

Q. 5 a) Explain in detail with the help of diagram the Architecture of Game Engine, also discuss the benefits and Drawback of Game Engine.
[CO4][L2]20
Q. 6 Illustrate the following terms of Unity Game programming:
a) Rigid Body Component.
b) Update and Fixed Update.
c) Adding force to rigid Body.
d) Moving Camera with the Game object.
[CO5][L2] 5x4
Q. 7 Discuss various transformations class in Unity and also explain various Rigid Body class methods in detail.
[CO6][L1] 20

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester <br> SOFT COMPUTING (BCS-DS-728)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Differentiate between 'hard computing' and 'soft computing'.
[CO-1] [L-2]
b) Discuss the main purpose of expert system.
[CO-2] [L-2]
c) Illustrate an example stating the concept of fuzzification.
[CO-3] [L-3]
d) Describe fuzzy propositions with an example.
[CO-3] [L-2]
e) Define 'fuzzy inference rule'.
[CO-2] [L-1]
f) Compare 'fuzzification' and 'defuzzification'.
[CO-3] [L-2]
g) List any five applications of ANN.
[CO-4] [L-2]
h) Explain the term bias in neural networks.
[CO-4] [L-2]
i) Describe fitness function in GA
[CO-5] [L-2]
j) Briefly explain mutation.
[CO-5] [L-2] 2× 10

## PART-A

Q. 2 a) Describe the knowledge representation and knowledge acquisition.
[CO-1] [L-2] 10
b) Describe the architecture of an expert system.
[CO-1] [L-2] 10
Q. 3 a) Compare crisp set and fuzzy set with a suitable examples.
[CO-2] [L-2] 10
b) Calculate different operations on Fuzzy Set:

$$
\begin{aligned}
& A=\{(x 1,0.6),(x 2,0.7),(x 3,3)\} \\
& B=\{(x 1,0.8),(x 2,0.2),(x 3,1)\}
\end{aligned}
$$

1. Union 2.Intersection 3. Complement 4.Difference [CO-2][L-3] 10
Q. 4 a) Illustrate centre of sum method of defuzzification along with a suitable example.
[CO-3] [L-4] 10
b) Classify the different fuzzy relation operation.
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Explain the architecture of Neuro-Fuzzy networks in detail.
[CO-3] [L-2] 10
b) Illustrate Mamdani Fuzzy Inference System with a suitable example. [CO-3] [L-4] 10
Q. 6 a) Illustrate unsupervised and reinforcement learning with a suitable example.
[CO-4] [L-4] 10
b) Explain in detail about artificial neuron model with its activation function.
[CO-4] [L-2] 10
Q. 7 a) Discuss the main function of crossover operation in GA.
[CO-5] [L-2] 10
b) Explain the basics concepts of Genetic Algorithm and steps involved in its algorithm.
[CO-5] [L-2] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Seventh Semester <br> SOFT COMPUTING (BCS-DS-728) 

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Differentiate between 'hard computing' and 'soft computing'.
[CO-1] [L-2]
b) Discuss the main purpose of expert system.
[CO-2] [L-2]
c) Illustrate an example stating the concept of fuzzification.
[CO-3] [L-3]
d) Describe fuzzy propositions with an example.
[CO-3] [L-2]
e) Define 'fuzzy inference rule'.
[CO-2] [L-1]
f) Compare 'fuzzification' and 'defuzzification'.
[CO-3] [L-2]
g) List any five applications of ANN.
[CO-4] [L-2]
h) Explain the term bias in neural networks.
[CO-4] [L-2]
i) Describe fitness function in GA
[CO-5] [L-2]
j) Briefly explain mutation.

## PART-A

Q. 2 a) Describe the knowledge representation and knowledge acquisition.
b) Describe the architecture of an expert system.
[CO-1] [L-2] 10
Q. 3 a) Compare crisp set and fuzzy set with a suitable examples.
[CO-2] [L-2] 10
b) Calculate different operations on Fuzzy Set:

$$
\begin{aligned}
& A=\{(x 1,0.6),(x 2,0.7),(x 3,3)\} \\
& B=\{(x 1,0.8),(x 2,0.2),(x 3,1)\}
\end{aligned}
$$

1. Union 2.Intersection 3. Complement 4.Difference [CO-2] [L-3] 10
Q. 4 a) Illustrate centre of sum method of defuzzification along with a suitable example.
[CO-3] [L-4] 10
b) Classify the different fuzzy relation operation.
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Explain the architecture of Neuro-Fuzzy networks in detail.
[CO-3] [L-2] 10
b) Illustrate Mamdani Fuzzy Inference System with a suitable example. [CO-3] [L-4] 10
Q. 6 a) Illustrate unsupervised and reinforcement learning with a suitable example.
[CO-4] [L-4] 10
b) Explain in detail about artificial neuron model with its activation function.
[CO-4] [L-2] 10
Q. 7 a) Discuss the main function of crossover operation in GA.
[CO-5] [L-2] 10
b) Explain the basics concepts of Genetic Algorithm and steps involved in its algorithm.

## End Semester Examination, Dec. 2022

## B. Tech. - Seventh Semester

DATA SCIENCE (BCS-DS-727)
Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 2
Note: Attempt FIVE questions in all; $\mathbf{Q} .1$ is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Differentiate between supervised and unsupervised learning.
[CO-1][L-2]
b) What is Confusion Matrix used for?
[CO-2][L-1]
c) Explain the need of Cluster Analysis.
[CO-3][L-2]
d) List the limitations of K-NN.
[CO-3][L-1]
e) Describe Predictive Modelling.
[CO-4][L-2]
f) Explain the role of matrices in linear algebra.
[CO-2][L-2]
g) Write command to create Data Frame in R.
[CO-1][L-1]
h) Determine the need of linear algebra in data science.
[CO-2][L-2]
i) What is hypothesis testing?
[CO-4][L-1]
j) Write down the components of optimization problem.

## PART-A

Q. 2 a) Discuss the features and applications of R programming language, Also explain various Data types in R.
b) Create a vector with some of your friend's names:
[CO-1][L-3] 10
i) Get the length of above vector.
ii) Get the first two friends from above vector.
iii) Get the 2nd and 3rd friends.
iv) Sort your friends by names using 2 methods.
Q. 3 a) Explain Linear Algebra operations on vectors and matrices.
[CO-2] [L-2] 10
b) Given the system of equations, find the Rank and determine the system of equations is solvable or not.
$x-3 y+6 z=21$
$3 x+2 y-5 z=-30$
$2 x-5 y+2 z=-6$
[CO-2] [L-3] 10
Q. 4 a) Describe constrained and unconstrained optimization problem. [CO- 3] [L- 2] $\mathbf{1 0}$
b) Apply multivariate optimization technique to find min and max. [CO-3] [L-3] $\mathbf{1 0}$
problem:
$\min x_{1}+2 x_{2}+4 x_{1}^{2}-x_{1} x_{2}+2 x_{2}^{2}$

## PART-B

Q. 5 a) Calculate the line of regression of $x$ and $y$ coefficients for the following data values:
$x: 12345678$
b) Describe the Parameters of Confusion Matrix. Also compute the Accuracy, Precision, Recall for the given Matrix.

|  | Predicted: <br> NO | Predicted: <br> YES |
| :---: | :---: | :---: |
| Actual: <br> NO | 50 | 10 |
| Actual: <br> YES | 5 | 100 |

Q. 6 Explain different metrics to assess the Logistic Regression Models. [CO-5] [L-2] 20
Q. 7 a) Compare and Contrast Euclidean distance and Manhattan distance in the K means Algorithm.
[CO-5] [L-3] 5
b) Explain the $k$-means clustering algorithm. Also write its code in R programming language.
[CO-5][L-3] 15

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester <br> DISTRIBUTED OPERATING SYSTEM (BCS-DS-726)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) State and explain the various properties of synchronization algorithm.
[CO-2] [L-2]
b) Discuss in brief the various parameters used to characterize the real time scheduling algorithm.
[CO-3] [L-2]
c) Which is more flexible NOS or DOS? Justify. [CO-1] [L-1]
d) Discuss atomicity meaning in group communication.
[CO-1] [L-2]
e) Discuss the concept of clock synchronisation in distributed environment of computation.

## PART-A

Q. 2 a) Illustrate the various issues related to group communication. Discuss closed $\mathrm{v} / \mathrm{s}$ open groups in group communication.
[CO-1] [L-3] 10
b) What do you meant by Remote Procedure Calls? Elaborate the working of Remote Procedure Calls in detail.
[CO-1] [L-4] 10
Q. 3 a) Discuss various algorithms used for implementing mutual exclusion in distributed systems.
[CO-2] [L-4] 10
b) Describe Lamport's algorithm for logical clock synchronization. [CO-2][L-2] 10
Q. 4 a) Discuss the Graph-theoretic deterministic model used for processor allocation.
b) Analyze the design issues for real time distributed systems.
[CO-3] [L-2] 10
[CO-3] [L-4] 10

## PART-B

Q. 5 Discuss distributed file system elaborating, its design principles and trends.
[CO-4] [L-5] 20
Q. 6 a) Discuss in detail the concept of distributed shared memory with suitable examples.
[CO-5] [L-3] 10
b) Discuss how cache consistency is maintained in distributed file system? Explain how write policy for cache management is implemented? [CO-5] [L-2] 10
Q. 7 a) Explain in details how message are send and received in MACH. Also, give the format for message description of MACH.
[CO-6] [L-2] 10
b) Discuss the architecture of MACH microkernel.
[CO-6] [L-2] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester <br> NETWORK SECURITY MANAGEMENT (BCS-DS-725)

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) Why is network security important?
b) Explain the advancements in SNMPv3.
c) Explain remote monitoring.
d) Explain email security with respect to PGP.
e) Define authentication and explain why it is required?
f) Write a short note on 'ATM'.
g) Describe different password management techniques.
h) Differentiate between worm and Trojan horse.
i) Explain the difference between public and private cryptography.
j) Discuss the role of the Pail-Fence technique in cryptography.

## PART-A

Q. 2 a) What do you understand by substitution cipher? Explain various types of substitution ciphers.
[CO1] [L2] 10
b) Discuss the concept of play-fair cipher. If the key used is "Monarchy" to encode them. What is the output of plaintext "Hello"?
[CO1] [L2] 10
Q. 3 a) Differentiate between stream cipher and blocks cipher. Explain the encryption and decryption of ECB mode.
[CO2] [L4] 10
b) Explain the structure of DES in detail.
[CO2] [L2] 10
Q. 4 a) Explain the process of firewall and compare its various types in detail.
[CO3] [L2] 10
b) Explain Intrusion Detection in detail with its types and how it safeguards the system.
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Distinguish between 'MDS' and 'SHA' algorithm.
[CO4] [L4] 10
b) Explain the Authentication system and elaborate on its functions and its requirements in detail.
Q. 6 a) Compare SSL and TLS in detail with its procedure.
[CO5] [L2] 10
b) Explain different kinds of data compression techniques in detail.
[CO5] [L2] 10
Q. 7 Write short notes on (any two):
a) Risk Management.
b) SNMP.
c) Infrastructure for Network Management.

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester SOCIAL, WEB AND MOBILE ANALYTICS (BCS-DS-705)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) List the features of email marketing.
[CO-6] [L-1]
b) Explain the impact of social media with at least two examples.
[CO-1] [L-1]
c) Elaborate the different challenges associated with data integration.
[CO-3] [L-1]
d) Compare Mobile Web Analytics with Mobile App Analytics. Which one is more beneficial?
e) Explain the term: Social Media Content Creation Process.

## PART-A

Q. 2 a) Explain the impacts of Social Media on business. List the different social media which are considered.
[CO-1] [L-1] 10
b) List the different leverages of Social Media required for better services.
[CO-1] [L-2] 10
Q. 3 a) Elaborate the tactics to find the best web and social media metrics. [CO2] [L-2] 10
b) Define a 'conversion'. How micro and macro conversion can be measured?
[CO-2][L-2] 10
Q. 4 a) Define a 'Dashboard'. How a Dashboard can be explored and evaluated?
[CO-3] [L-1] 10
b) Write short notes on:
i) Viewing Relationship.
ii) Sentiments and Sentiment Analysis.
[CO-3] [L-1] 5x2

## PART-B

Q. 5 a) How a mobile customer behavior can be analyzed? Explain with an example.
b) Discuss the following:
i) Explain the importance of WAP gateway.
ii) Determine the role of GGSN support.
[CO-4] [L-1] 5x2
Q. 6 a) Explain 'content categorization'. How is it done and also list down its few applications?
[CO-5] [L-1] 10
b) Explain a 'Session'. What are the different terms used to explain the functionality?
Q. 7 a) Facilitate the benefits of email marketing. List the features of email marketing tools.
[CO-6] [L-2] 10
b) Summarize the Data Recording and Archiving Timeframe in context with Social Media Analytics. Also explain how Page Views per visit helps in evaluating the visitor behavior.
[CO-6] [L-3] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Seventh Semester <br> 3D COMPLEXITY TECHNIQUES FOR GRAPHICS MODELING AND ANIMATION (GG) (BCS-DS-704) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.

Q 1 Answer the following questions briefly:
a) Define 'pixel in graphics'. Relate it with resolution.
b) Analyze how the current active object is identified in a keyframe of the current frame.
c) Is rigging more beneficial to the Animator than hand drawing? Justify.
d) Describe the term: 'lithography'. How it is implemented today?
e) Summarize Rule of Thirds with the help of an example.
f) Relate the term, ambient occlusion with simulation in blender.
g) Define 'miniature effect'. Consider a real-life example for this.
h) Summarize game texturing. Also relate it with 3D texturing.
i) Give an outline for loop cut operation.
j) Discuss how frame is related to DPI.
$2 \times 10$

## PART-A

Q 2 a) Discuss the rules of a good composition and explain with the help of examples.
[CO-1] [L- 2] 10
b) Demonstrate the use of all the elements and principles of art. Illustrate them using diagrams.
[CO-1] [L-3] 10
Q 3 a) Describe Gesalt principles of design. Explain all the six principles associated with it.
[CO-2] [L-2] 10
b) Write short notes on:
i) Visual Communication.
ii) Production Gates.
[CO-1] [L-1] 5x2
Q 4 a) Describe the twelve essential standards of animation produced by the 'old men' of Disney Studios.
[CO-3] [L-1] 10
b) Annotate about 3D animation. Define 'stop motion'. Explain diverse kinds of stop movement animation.
[CO-3] [L-1] 10

## PART-B

Q. 5 a) Explain about ghosting. How workspace is useful for an animator? Evaluate the basic workflow for a 3D animation.
[CO-5] [L-1] 10
b) Paraphrase Skeleton System/ joints in character rigging. Also classify joints and mention their use. Justify the role of forward and reverse kinematics in it.
Q. 6 a) Discuss about various deformer elements. Analyze different types of animation techniques.
b) Identify at least five elements of object physics in blender for animation. What effects they produce after rendering and compositing? Discuss in detail. [CO-5][L-1] 10
Q. 7 Write the steps for creating a character animation in blender. Consider context physics and texturing also. Mention a title for the presented case-study.
[CO-6][L-3] 20

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester ADVANCED COMPUTER GRAPHICS (BCS-DS-703A)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Discuss the advantages of Open GL.
[CO1] [L2]
b) Differentiate Centre of Projection and Vanishing Point.
[CO3] [L3]
c) Discuss the advantages of Homogeneous Coordinate Systems.
[CO 3] [L2]
d) Write the command to convert OpenGL Coordinates in to Screen coordinates in OpenGL.
[CO 6] [L2]
e) Discuss the use of gluOrtho2D with complete syntax in OpenGL.
[CO 3] [L2]
f) Discuss the use of Depth Buffer in detail with example.
[CO 4 ] [L2]
g) Discuss the use of control points in curve drawing.
[CO 3] [L2]
h) Differentiate window and View port.

## PART-A

Q. 2 a) Write an open GL Program to draw the Line, Line Strip, Line Loop. [CO1] [L3] 10
b) Scale the triangle represented by Vertices $A(1,4)$, $B(3,6)$ and $C(4,4) 2$ unit about $X$ axis and 3 unit about $Y$ axis by an arbitrary points $C$.
[CO1] [L3] 10
Q. 3 a) Discuss Cohen Sutherland Line clipping Algorithm in detail.
[CO 2] [L2] 10
b) Use the Cohen-Sutherland algorithm for clipping the following line:
i) $P 1(70,20)$ and $P 2(100,10)$
ii) P3 $(40,10)$ and P4(80,40)
against a window lower left hand corner $(50,10)$ and upper right hand corner $(80,40)$.
[CO 2] [L3] 10
Q. 4 a) Explain the two basic projection methods with the help of suitable diagram and matrix-representation.
[CO1] [L3] 10
b) Discuss Cohen Sutherland Line clipping Algorithm in detail with suitable example.
[CO 3] [L3] 10

## PART-B

Q. 5 a) Discuss the characteristics of Bezier curve and also state the differences between Beziercurve and B -spline curve.
[CO 4] [L5] 10
b) Construct enough points on the B-Spline curve whose control points are PO
$(4,2)$,

$$
\text { P1 }(8,8) \text {, P2 }(16,4) \text { to draw an accurate sketch. }
$$

[CO 4] [L6]10
Q. 6 a) Discuss the image Pipeline in detail with all components.
[CO 5] [L2 ] 10
b) Discuss any Five Pixel Transfer Operations.
[CO 5] [L1] 10
Q. 7 a) Write an open GL Program to draw the Circle of Radius 200, Centered at $(150,150)$ of Blue Color
[CO 6] [L 3] 15
b) Discuss the following in detail.
i) Phong Shading.
ii) Flat Shading.
[CO 6] [L 2] 5

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester

 ADVANCED COMPUTER GRAPHICS (GG) (BCS-DS-703)Time: 3 hrs.
Max Marks: 100
No. of pages:' 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) Differentiate between plasma panel display and thin film electroluminescent display.
b) Summarize translation and transformation in graphics handling.
c) List the merits of Electrostatic Plotters.
d) Differentiate between parallel projections from perspective projection.
e) Mention various properties which describe the characteristics of light.
f) Quote about Hermite Curve and its limitations.
g) Explain working of Photon Mapping.
h) Differentiate between isotropic and anisotropic diffusion.
i) Define 'graphical data structure'. Also, justify, why graphs are used in data structure?
j) What are voxels and cells? Describe the method to write a parametric representation.

## PART-A

Q. 2 a) A point has coordinates in the $x, y, z$ direction i.e., $(5,6,7)$. The translation is done in the $x$-direction by 3 coordinates and in direction by 3 coordinates and in the z- direction by 2 coordinates. Shift the object and find coordinates of the new position.
[CO-1] [L-4] 10
b) Discuss illumination model. Summarize about various types of illumination. Mention the factors on which lightning effect depends.
[CO-1] [L-2] 10
Q. 3 a) Quote about the steps in the rasterization graphics pipeline. Also discuss the stages of Rendering Pipeline with respect to Open GL.
[CO-2] [L-1] 10
b) Write polygon clipping algorithm in computer graphics. Exemplify it. Also discuss Line Drawing algorithm.
[CO-2] [L-1] 10
Q. 4 a) Differentiate 2D and 3D in computer graphics. Discuss in detail the threedimensional display techniques. [CO-2][L-2] 10
b) Define projection. Discuss all types of projections and exemplify them. [CO2][L1] 10

## PART-B

Q. 5 a) Three control points are given on the xy-plane ( $-1,0$ ), ( 0,1 ) and ( 2,0 ). Find Bézier curve equation and expand to its equivalent conventional form. For three control points, there will be three Bézier coefficients express their equations and sketch the graphs.
b) Write a short note on 'B-Spline curve'. List the attributes and properties of this curve separately.
[CO-3] [L-1] 10
Q. 6 a) Describe environment mapping in computer graphics. What are the tasks of texture mapping in computer graphics? Also explain about specular texture.[CO-4] [L-1]
b) Explain volume rendering. Discuss volumetric data and all grid types in it. Also express indirect volume rendering algorithm.
Q. 7 a) Quote about rendering pipeline in computer graphics. Differentiate between global and local illumination.
[CO-5] [L-2] 10
b) What is global illumination in VRAY? Is global illumination better than Ray Tracing? Explain in detail the working of Ray Maching.

# End Semester Examination, Dec. 2022 <br> <br> B. Tech. - Seventh Semester <br> <br> B. Tech. - Seventh Semester <br> <br> SECURITY IN CLOUD (BCS-DS-701) 

 <br> <br> SECURITY IN CLOUD (BCS-DS-701)}

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Differentiate between encryption and decryption with example.
[CO6] [L4]
b) What do you mean by System Threats?
[CO1] [L1]
c) Who uses SSL? Explain in brief.
[CO5] [L2]
d) List out the authorization requirements.
[CO3] [L1]
e) Define 'Non Repudiation'.
[CO5] [L1]
f) Discuss the responsibility of application layer to secure user data.
[CO4] [L2]
g) Discuss Security Risks with an example.
[CO5] [L2]
h) Differentiate between PGP and X.509.
[CO5] [L 4]
i) Define 'Trojan Horse'.
[CO1] [L1]
j) Describe Virtualization.
[CO3] [L2] 2x10

## PART-A

Q. 2 a) Explain the issues and solution for cloud security concerns in detail. [CO1] [L2] 10
b) Explain the computer security classification with suitable example. [CO2] [L2] 10
Q. 3 a) Discuss the major vulnerabilities in core cloud computing technologies.
[CO1][L2] 10
b) Cloud software Infrastructure and environment offers abstraction level for basic IT resources that are accessible to Compute, Storage and Network. Discuss each vulnerability on each service Compute, storage and network. [CO1][L2] 10
Q. 4 a) Explain the core components of AAA in cloud infrastructure with the help of diagram.
[CO3][L2] 15
b) Discuss, how would you ensure that cloud networks and connections are secure? Explain.
[CO2][L2] 5

## PART-B

Q. 5 a) Discuss how Public key signature provides authentication and Data integrity.
[CO4][L2] 5
b) Discuss IAM tools and IAM transformation in detail.
[CO4][L2] 15
Q. 6 a) How is digital Signature different from digital certificate? Give any four reasons.
[CO5][L4] 10
b) Define 'Cryptography'. How does cryptography work in detail?
[CO5][L1] 10
Q. 7 a) Explain Secure Socket Layer Crypto Algorithm with its working and security technology.
[CO6][L2] 15
b) Write a short note on 'Message Digest'.

# End Semester Examination, Dec. 2022 

B. Tech. - Sixth Semester

DIGITAL IMAGE PROCESSING (BCS-DS-631)
Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Describe the various types of connectivity between pixels. Give examples.
b) Give the relation for degradation model for continuous function.
c) Describe about contrast stretching in spatial domain.
d) How Fourier descriptor helps in object recognition?
e) What is smoothing? Explain averaging filter.
f) Explain Gaussian noise with PDF (probability distribution function).
g) What is region growing?
h) Differentiate pseudo color image processing and full color image processing.
i) Discuss and differentiate lossy and loss less image compression methods.
j) What are the applications of image segmentation?

## PART-A

Q. 2 a) Differentiate between linear and nonlinear spatial filters.
b) Explain the components of IP systems.
Q. 3 a) What is the need of smoothing in image processing? Explain different image smoothing filters.
[CO-2] [L-1] 10
b) Discuss 'convolution and correlation'. How convolution is related to correlation?

Determine the circular correlation between the two matrices (By matrix method).

$$
\mathrm{X} 1[\mathrm{~m}, \mathrm{n}]=\left[\begin{array}{ll}
1 & 5  \tag{CO-2}\\
2 & 4
\end{array}\right], \mathrm{X} 2[\mathrm{~m}, \mathrm{n}]=\left[\begin{array}{ll}
3 & 2 \\
4 & 1
\end{array}\right]
$$

Q. 4 a) Draw the block diagram for image restoration and also discuss its need in brief.
[CO-3] [L-5] 10
b) Explain edge detection techniques using first order derivatives.
[CO-3] [L-2] 10

## PART-B

Q. 5 Explain chain-code in detail with a suitable example. And also discuss the following region descriptors:
a) Euler numbers.
b) Eccentricity.
c) Elongatedness.
d) Rectangularity.
[CO-4] [L-2,4] $\mathbf{5 \times 4}$
Q. 6 a) Explain the concept of LZW compression and decompression techniques
[CO-5] [L-2] 10
b) Discuss run-length encoding with suitable examples. How does it remove interpixel
redundancy?
[CO-5] [L-5] 10
Q. 7 a) Differentiate between region and boundary. Describe regional descriptor in detail.
[CO-6] [L-6]10
b) Write short notes on the following:
i) Noise Models.
ii) Image restoration.
iii) Denoising filters.
iv) Inverse filtering.

# End Semester Examination, Dec. 2022 

B. Tech. - Sixth Semester

INFORMATION SECURITY AUDIT AND MONITORING (BCS-DS-
629)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Write industry best practices in BISA.
b) Explain the steps of risk assessment.
c) Discuss security in healthcare sector.
d) Explain briefly how auditing related with security.
e) Define GRC with a suitable example.

## PART-A

Q. 2 a) Draw information security framework and discuss why it is required. [CO-1] [L-2] $\mathbf{1 0}$
b) Explain BISA and discuss the use of scorecards in BISA.
[CO-1] [L-2] 10
Q. 3 Discuss the following control objective of ISO in details:
a) Management direction for information security.
b) ISO27001:2013 requirements.
[CO-2] [L-1] 20
Q. 4 a) Discuss the requirement "Protect all system against malware and regulatory update
anti-virus software or program" in detail.
[CO-3] [L-1] 10
b) Explain the implementation process of PCI-DSS standard in detail.
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Describe UASL agreement in security in telecom sector.
[CO-4] [L-2] 10
b) Describe IT Act of India and advantages of cyber law.
[CO-4] [L-2] 10
Q. 6 Explain business skills, communication skills and interpersonal skills for auditors.

Discuss each in detail with the help of example.
[CO-5] [L-2] 20
Q. 7 Write a short note on
a) Identification of third party
b) Identification of business units
[CO-6] [L-2] 20

# End Semester Examination, Dec. 2022 <br> B. Tech. - Sixth Semester <br> BA AS SERVICE (CLOUD) (BCS-DS-627) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Describe the impact of virtualization.
b) Differentiate between simulation and emulation.
c) Explain Type-1 hypervisor.
d) "Security and Privacy are the major concerns in cloud". Comment.
e) Define 'hybrid cloud'.
f) Determine the type of servers that will retain as physical servers in the organization who is planning to move to virtualization.
g) List down the advantages of private cloud over public cloud.
h) Write down the different transition tools for virtualization.
i) Identify the role of analytics in marketing.
j) Give some of the examples of SaaS.

## PART-A

Q. 2 a) Compare traditional IT infrastructures with virtualized infrastructures.[CO-1] [L-4] 10
b) Classify virtualization on the basis of technology.
[CO-1] [L-4] 10
Q. 3 a) Define Virtual private network (VPN). Diagrammatically explain the working of VPN.
b) Explain application virtualization infrastructure and architecture.
Q. 4 a) Classify cloud deployment models. Explain them briefly.
[CO-3] [L-4] 10
b) Explain the major components of cloud.
[CO-5] [L-2] 10

## PART-B

Q. 5 a) A company wants to build a test environment to test software updates and new solutions. The environment should mirror the production environment and be secure and in accessible from outside the company network. The company does not want to invest in infrastructure that may be idle for a significant amount of time. Recommend the cloud computing model suitable for the above. Also explain the parameters for choosing it. [CO-3] [L-5] 12
b) A cloud provider offers an environment for building applications that will run from the customer's environment. Determine cloud computing delivery model suitable for it. Write the characteristics of the above model.
Q. 6 a) "An organization switching its current infrastructure from physical to virtualized infrastructure". What are the parameters for server selection?[CO-6] [L-2] 10
b) Determine the workloads that are suitable for private cloud, also write down the advantages offered by private cloud for those workloads.
[CO-4] [L-3] 10
Q. 7 a) Explain with the help of diagram how cloud computing can help the organizations to address key analytical challenges.
[CO-5] [L-2] 10
b) Describe the approach that is suitable for an organization to drive superior business outcomes.

# End Semester Examination, Dec. 2022 

# B. Tech. - Sixth Semester <br> MANAGING THE CLOUD (BCS-DS-626) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer all the questions:
a) Define 'ARIMA'.
[CO-1] [L-1]
b) Differentiate between cloud users and cloud operators.
[CO-1] [L-4]
c) Define the role of VMWare approvers in cloud provisioning.
[CO-1] [L-1]
d) Define 'load range'.
[CO-1] [L-1]
e) Differentiate between Customized maintenance and enhancement maintenance.
[CO-1] [L-4]
f) Discuss the role of DevOps engineer.
g) Define 'data cluttering'.
[CO-2] [L-1]
h) Differentiate between in-place swap and in-place update in patch management.
[CO-2] [L-4]
i) Define cookbook and recipe in terms of configuration management. [CO-3] [L-1]
j) Differentiate between Brownfield and Greenfield in terms of service catalog.
[CO-5] [L-4] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Difference between polling agent and monitoring agent.
[CO-1] [L-4] 10
b) Discuss smart metering with its architecture and use cases.
[CO-1] [L-2] 10
Q. 3 a) Discuss the role of system administration.
[CO-2] [L-2] 10
b) Discuss the reasons that slow down the computer.
[CO-2] [L-2] 10
Q. 4 a) Discuss the five aspects of design that need to be considered for service design process.
[CO-3] [L-2] 10
b) State the principles and benefits of configuration management illustrating any one tool of it as an example.
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Differentiate between pure aggregation model and white label model in application hosting in cloud.
[CO-4] [L-4] 10
b) Discuss the terms high availability and interoperability in context with cloud computing.
[CO-4] [L-2] 10
Q. 6 a) Discuss the role of service catalog in governance and compliance. [CO-5] [L-2] $\mathbf{1 0}$
b) State the common integration points or challenges that make communication between the solution and the systems much easier by enabling integration with the existing systems.
[CO-5] [L-2] 10
Q. 7 a) State the security and privacy issues in public cloud.
b) State the security practices for private cloud.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Sixth Semester <br> COMPILER DESIGN (BCS-DS-624) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Describe features of a good programming language.
b) What is ambiguity? Elaborate using example.
c) What do you understand by implicit and explicit sequence controls?
d) List the five phases of compiler.
e) State the use of handle pruning in bottom up parsing.
f) Differentiate syntax tree and parse tree.
g) Determine the FOLLOW in given grammar:
$Z \rightarrow d, Y \rightarrow \varepsilon, X \rightarrow Y, Z \rightarrow X Y Z, Y \rightarrow c, X \rightarrow a$.
h) List the issues to be considered during code generation.
i) What is left factoring? Give example.
j) Explain synthesized and inherited attributes.

## PART-A

Q. 2 a) What are elementary data types? Discuss in details about the specification and
implementation of elementary data types.
[CO-2] [L-1] 10
b) What is the requirement of sequence control? List the various sequence control
techniques used.
Q. 3 a) Construct an NFA for the regular expression:
$(00+11) 0 * 101$ and convert it into its equivalent DFA.
[CO-1] [L-6] 12
b) Discuss the concept of input buffering scheme for scanning the source program.
[CO-1] [L-2] 8
Q. 4 a) Construct the Predictive parsing table for the grammar:
$\mathrm{E}-\mathrm{E}+\mathrm{T} / \mathrm{T}$
T->T*F/F
F->(E)/id
[CO-3] [L-6] 10
b) Calculate operator precedence relation for the grammar:
$\mathrm{E} \rightarrow \mathrm{E}+\mathrm{E} / \mathrm{E}-\mathrm{E} / \mathrm{E} * \mathrm{E} /(\mathrm{E}) /-\mathrm{E} / \mathrm{id}$
and apply it to parse the string
$\mathrm{w}=\mathrm{id}+\mathrm{id}$ * id Using grammar
[CO-3] [L-3] 10

## PART-B

Q. 5 a) Discuss intermediate code scheme. Explain the different types of intermediate codes forms and use it to represent the following statement in different forms:
$W=(A+B)-(C+D)+(A+B+C)$
[CO-4] [L-5] 10
b) Differentiate between a parse tree and a syntax tree. Construct the parse tree
and
syntax tree for the string.
Q. 6 a) List the contents of a symbol table. Explain in detail the symbol table organization
for block-structured languages.
[CO-6] [L-1] 10
b) What are semantic phase errors? Explain error recovery techniques in detail.
[CO-6] [L-2] 10
Q. 7 a) What is the purpose of code optimization? Explain in detail loop optimization with
the help of an example.
[CO-5] [L-2] 15
b) Explain the use of DAG. Represent the following equation using the DAG:
" $a=b^{*}-c+b^{*}-c^{\prime}$
[CO-5] [L-3] 5

# End Semester Examination, Dec. 2022 <br> B. Tech. - Sixth Semester <br> ADVANCED DATABASE MANAGEMENT SYSTEMS (BCS-DS-622A) 

Time: 3 hrs.
Max Marks: $1 \mathbf{0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) Differentiate between weak and strong entity set.
b) Describe the concept of full functional dependency.
c) Define 'tuple calculus'.
d) Enlist the advantages of normalizing database.
e) Explain the technique of hashing.
f) Explain the advantages of DBMS over traditional file system.
g) Differentiate between where and having clause.
h) Define object oriented databases.
i) Define terminology used in relational database.
j) Explain ACID properties of transaction.

## PART-A

Q. 2 a) Draw symbols for following in ER diagram:
i) Weak entity.
ii) Derived attribute.
iii) Relationship.
iv) Multivalued attribute.
[CO-2] [L-1] 5
b) Draw a detailed E-R diagram for employee management system. Also, convert it in the form of database tables.
[CO-2] [L-2] 15
Q. 3 Explain query execution algorithms with example.
Q. 4 a) Discuss about various types of failures. What steps should be taken for failure recovery?
[CO-3] [L- 2] $\mathbf{1 0}$
b) Explain various locking mechanisms used during concurrency control.
[CO-3] [L-2] 10

## PART-B

Q. 5 Explain client server architecture with its models in details.
[CO-3] [L-2] 20
Q. 6 Write short notes on following:
a) Distributed database design.
b) Distributed algorithms for data management.
Q. 7 Explain deductive database systems and deductive object oriented database systems.

# End Semester Examination, Dec. 2022 

## B. Tech. - Fourth Semester <br> INTRODUCTION TO GAME PROGRAMMING (BCS-DS-607)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Explain your answer:
a) Explain the important components of unity 3D.
b) Recall the four pillars of an object oriented language.
c) Explain how to create unity game objects?
d) Argue on your understanding of shadows in Unity.
e) Can two game objects, each with only an sphere collider, both set as trigger and raise on trigger events?

## PART-A

Q. 2 a) What are various kind of memory in the java heap segment? How does garbage collection works?
[CO-1] [L-4] 10
b) Discuss diamond inheritance problem. How does C++ handle this problem?
[CO-4] [L-3] 10
Q. 3 a) Explain the important components of unity 3D.
[CO-2 [L-2] 10
b) Identify key characteristics of victory conditions. Name at least five conditions for victory that games use.
[CO-3][L-1] 10
Q. 4 a) What are the key principles used for game design and development?
[CO-2][L-3] 10
b) Differentiate between unity3D and Unreal. List and Analyse any three gaming engines that are popular other that Unity3D and unreal.
[CO-4] [L-2] 10

## PART-B

Q. 5 a) Give the steps to import assets and create material in Unity3D. [CO-5] [L-3] 10
b) What are various transforms? Explain the use of these transforms in detail.
[CO-2] [L-4] 10
Q. 6 a) Explain whytime delta time should be used to make things that depend on time operate correctly?
[CO-5][L-3] 10
b) Draw a neat flowchart for scripting in unity.
[CO-4][L-2] 10
Q. 7 a) What is the significance to timelines with respect to Animation? Discuss in detail.
b) Write a short note on Animation state machine.
[CO- 2] [L-3] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Sixth Semester

## COMPUTER ANIMATION ALGORITHM AND TECHNIQUES (BCS-DS606)

Time: 3 hrs.

Max Marks: $\mathbf{1 0 0}$
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from Part-A and TWO questions from Part-B. Each question carries equal marks.
Q. 1 a) Name the two concepts that are used as explanations for the illusions of motion.
[CO-1] [L-1]
b) Give two differences between flicker and blur?
[CO-1] [L-2]
c) Who invented the first GUI and also name the program invented?
[CO-2] [L-1]
d) Name two applications of visualization.
e) Name two action units associated with orbicular is or is.
[CO-4] [L-1]
f) Explain two types of parameters associated with Parke Model.
g) List two approaches to construct facial models.
h) List two application areas of motion capture technologies.
i) Give two reasons why it is difficult to model human beings.
j) How many degrees of freedom is associated with arm modeling?

## PART-A

Q. 2 a) Explain the steps followed in computer aided animation production. Comprehend what will be the future of computer aided animation industry.[CO-1] [L-2] 10
b) List the fundamental principles in film making that are essential for understanding animation.
[CO-1] [L-1] 10
Q. 3 a) Demonstrate the steps involved in hierarchical animation. Also describe the various tools used for hierarchical animation.
[CO-2] [L-3] 10
b) Explain procedural animation in detail.
[CO-2] [L-2] 10
Q. 4 a) Summarize the steps that are taken for including glyphs in images. [CO-3] [L-5] 5
b) Describe various data representation techniques. Explain the best way to represent such data?
[CO-3] [L-2] 15

## PART-B

Q. 5 a) Explain key-frame animation along with its applications, advantages and disadvantages.
[CO-4] [L-2] 12
b) What do you mean by flocking? Explain the three rules that control the flocking behavior.
[CO-4] [L-2] 8
Q. 6 a) Evaluate different techniques for capturing of motion data.
b) Justify why hair animation is difficult. Summarize the steps used to perform hair animation.
Q. 7 a) Differentiate between polygonal and patch representations for representing virtual humans. Illustrate different types of coverings that humans have on their person.
[CO-6] [L-4] 10
b) Explain deformable bodies along with different types of techniques of deformations.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third / Sixth Semester <br> INTERNET OF THINGS (BCS-DS-603) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) What do you mean by internet of things?
[CO-1] [L-1]
b) Discuss two applications of M2M communication. [CO-2] [L-2]
c) Discuss two applications of IoT. [CO-2] [L-2]
d) Differentiate between 'industry' and 'consumer'.
e) Mention two specifications of Zigbee.
[CO-1] [L-4]
f) What is Botnet?
g) Explain the generic block diagram of an IoT device.
h) Define types of IoT platforms.
[CO-1] [L-1]
i) Differentiate between 'edge' and 'fog computing'.
j) Explain the reasons to select MQTT over CoAP.

## PART-A

Q. 2 a) Sketch the schematics of MQTT, CoAP.
[CO-2] [L-3] 10
b) Explain in detail the various connectivity technologies of IoT.
[CO-3] [L-3] 10
Q. 3 a) List down the various points of difference between machine to machine communication and internet of things.
[CO-1] [L-2] 10
b) Describe in detail the various components of a sensor node.
[CO-3] [L-2] 10
Q. 4 a) Discuss various IoT enabling technologies.
[CO-2] [L-2] 10
b) Elaborate the architecture of a wireless sensor node and its role in IoT.
[CO-2] [L-3] 10

## PART-B

Q. 5 a) Draw architecture of Fog computing including its requirement and architecture.
[CO-4] [L-4] 10
b) Explain Hardware components in IoT application development.
[CO-4] [L-2] 10
Q. 6 Discuss various principles of IoT security framework.
[CO-5] [L-3] 20
Q. 7 Demonstrate IoT applications/case studies on the topic tagging and tracking for Healthcare applications and connected vehicles.
[CO-6] [L-3] 20

# End Semester Examination, Dec. 2022 <br> B. Tech. - Sixth Semester <br> INTERNET OF THINGS (BCS-DS-603) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO
questions from PART A and TWO questions from PART B. Each question carries equal marks.
Q. 1 Answer the following questions:
a) What do you mean by Internet of things?
[CO1][L1]
b) Discuss two applications of M2M communication.
[CO2][L2]
c) Discuss two applications of IoT.
[CO2][L2]
d) Differentiate between industry and consumer.
[CO1][L4]
e) Mention two specifications of Zigbee.
[CO2][L2]
f) What is Botnet?
[CO5][L1]
g) Explain the generic block diagram of an IoT device.
[CO1][L1]
h) Define types of IoT Platforms.
[CO4][L1]
i) Write differences between edge and fog computing.
[CO5][L4]
j) Explain the reasons to select MQTT over CoAP.
[CO4][L2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Sketch the schematics of $M Q T$, CoAP.
[CO2][L3] 10
b) Explain in detail the various connectivity technologies of IoT.
[CO3][L3] 10
Q. 3 a) List down the various points of difference between machine to machine communication and internet of things.
[CO1][L2] 10
b) Describe in detail the various components of a sensor node.
[CO3][L2] 10
Q. 4 a) Discuss various IoT enabling technologies.
[CO2][L2] 10
b) Elaborate the architecture of a wireless sensor node and its role in IoT.[CO2][L3] 10

## PART-B

Q. 5 a) Draw architecture of Fog computing including its requirement and architecture.
[CO4][L4] 10
b) Explain hardware components in IoT application development. [CO4][L2] 10
Q. 6 Discuss various principles of IoT security framework.
[CO5][L3] 20
Q. 7 Demonstrate IoT applications/ case studies on the topic tagging and tracking for healthcare applications and connected vehicles.
[CO6][L3] 20

# End Semester Examination, Dec. 2022 

## B. Tech. - Sixth Semester <br> MACHINE LEARNING (BCS-DS-602)

Time: 3 hrs.

Max Marks: 100 No. of pages: 2

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) List out any four applications of machine learning.
b) What are the requirements of clustering algorithms?
c) Compare concept and variable.
d) Give the example of cognitive modeling.
e) Explain the various methods to perform cross validation.
f) Explain entropy of a decision tree.
g) When do we use supervised learning techniques?
h) What is cost of misclassification in SVM?
i) Why Weights and Bias are required?
j) Define 'Principle component analysis'.

## PART-A

Q. 2 a) A patient takes a lab test and the result comes back positive. It is known that the test returns a correct positive result in only $98 \%$ of the cases and a correct negative result in only $97 \%$ of the cases. Furthermore, only 0.008 of the entire population has this disease.
i) What is the probability that this patient has cancer?
ii) What is the probability that he does not have cancer?
iii) What is the diagnosis?
b) Discuss various types of measurement with the help of example.
Q. 3 a) What is Machine Learning? Explain different perspectives and issues in machine learning.
[CO-1] [L-1] 10
b) Explain feature selection and feature extraction method for dimensionality reduction.
[CO-1] [L-2] 10
Q. 4 a) Discuss the random forest model in detail. What are the features of random forest?
[CO-3] [L-1] 8
b) What is the probability of playing tennis given, it is raining? Solve using naïve Bayes classifier.

|  | outlook | temp | humidity | windy | play |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 0 | sunny | hot | high | False | no |
| 1 | sunny | hot | high | True | no |
| 2 | overcast | hot | high | False | Yes |
| 3 | rainy | mild | high | False | Yes |
| 4 | rainy | cool | normal | False | Yes |


| 5 | rainy | cool | normal | True | No |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 6 | overcast | cool | normal | True | Yes |
| 7 | sunny | mild | high | False | No |
| 8 | sunny | cool | normal | False | Yes |
| 9 | rainy | mild | normal | False | Yes |
| 10 | sunny | mild | normal | True | Yes |
| 11 | overcast | mild | high | True | Yes |
| 12 | overcast | hot | normal | False | Yes |
| 13 | rainy | mild | high | True | No |

[CO-3] [L-4] 12

## PART-B

Q. 5 a) Find the three clusters for the following eight examples using the $k$-means algorithm and Euclidean distance $\mathrm{A} 1=(2,10), \mathrm{A} 2=(2,5), \mathrm{A} 3=(8,4), \mathrm{A} 4=(5,8)$, $A 5=(7,5), A 6=(6,4), A 7=(1,2), A 8=(4,9)$. Suppose that the initial seeds (centers of each cluster) are A1, A4 and A7.
[CO-4] [L-3] 12
b) Define 'clustering'. What are the different types of clustering explain in detail?
[CO-4] [L-1] 8
Q. 6 a) What are the steps in the backpropagation algorithm? Why a multi-layer neural network is required?
[CO-5] [L-1] 10
b) What is artificial neural network (ANN)? Explain some of the salient highlights in the different architectural options for ANN.
[CO-5] [L-2] 10
Q. 7 a) Discuss the approaches to model human cognition. Define cognitive architecture.
[CO-6] [L-1] 10
b) Write short notes on:
i) Graph-Based Learning.
ii) Generative Methods.

# End Semester Examination, Dec. 2022 

# B. Tech. - Sixth Semester <br> MACHINE LEARNING (BCS-DS-602) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Compare independent and dependent variable.
b) A coin is tossed four times. What is the probability of obtaining two or more heads?
c) List issues of machine learning.
d) What are the requirements of clustering algorithms?
e) Identify the suitable learning method in case of grouping people in a social network and explain it.
f) What are the different methods for measuring classifier performance?
g) Why do we need weights and bias?
h) Explain $k$-fold cross validation method.
i) Differentiate deep learning with machine learning.
j) Discuss application areas of cognitive learning.

## PART-A

Q. 2 a) Discuss various types of measurement with the help of example. [CO-1] [L-2] 8
b) Calculate the median for following distribution:

| Marks | No. of students | Marks | No. of students |
| :---: | :---: | :---: | :---: |
| Less than 10 | $\mathbf{1 5}$ | Less than $\mathbf{5 0}$ | 106 |
| Less than $\mathbf{2 0}$ | $\mathbf{3 5}$ | Less than 60 | 120 |
| Less than 30 | 60 | Less than 70 | 125 |
| Less than $\mathbf{4 0}$ | 84 |  |  |

[CO-1] [L-3] 12
Q. 3 a) Use principle component analysis (PCA) to arrive at the transformed matrix for the given matrix A.

| F1 | F2 |
| :--- | :--- |
| 4 | 11 |
| 8 | 4 |
| 13 | 5 |
| 7 | 14 |

[CO-2] [L-3] 12
b) Distinguish supervised learning technique with reinforcement technique. Illustrate with the help of example.
Q. 4 a) Suppose 10000 patients get tested for flu; out of them, 9000 are actually healthy and 1000 are actually sick. For the sick people, a test was positive for 620 and negative for 380 . For the healthy people, the same test was positive
for 180 and negative for 8820 . Construct a confusion matrix for the data and compute the precision and recall for the data.
b) Calculate probability of car theft (red, SUV, domestic) using naïve Bayes classifier.

| Example No. | Color | Type | Origin | Stolen? |
| :---: | :---: | :---: | :---: | :---: |
| 1 | Red | Sports | Dommestic | Yes |
| 2 | Red | Sprorts | Dommestic | Na |
| 3 | Red | Sprorts | Dommestic | Yes |
| 4 | Yellow | Sports | Dommestic | No |
| 5 | Yellow | Sprorts | Inmported | Yes |
| 6 | Yellow | SUV | Innported | No |
| 7 | Yellow | SUV | Innported | Yes |
| 8 | Yellow | SUTV | Dommestic | No |
| 9 | Red | SUV | Innported | No |
| 10 | Red | Sports | Innported | Yes |

[CO-3] [L-4] 15

## PART-B

Q. 5 a) Calculate the dissimilarity between two data points $\times 1(2,3,4)$ and $\times 2(4,3,5)$ using
i) Euclidian distance
ii) Manhattan distance
[CO-4] [L-3] 5
b) Distinguish k means clustering with hierarchical agglomeration on the basis of their working, application area and the performance.
[CO-4] [L-4] 15
Q. 6 a) Describe artificial neural network. Explain biological learning system.
[CO-5] [L-2] 10
b) Describe the characteristics and working of back propagation algorithm.
[CO-5] [L-2] 10
Q. 7 a) Describe SVM kernel architecture, its types and working with the help of example.
[CO-6] [L-1] 10
b) Discuss the approaches to model human cognition. Define cognitive architecture.
[CO-6] [L-1] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Sixth Semester

BACKUP AND DISASTER RECOVERY (BCS-DS-601)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions
from PART-A and TWO questions from PART-B. Marks are indicated against
each question.
Q. 1 Answer the following in brief:
a) Differentiate between Hot plug and Hot swap.
b) Define 'Virtualization'.
c) Discuss the advantages and dis-advantages RAID 5.
d) Define 'disaster recovery'.
e) What is the meaning of Backup?
f) Discuss the advantage and disadvantage of RAID 3.
g) List the topologies of a network.
h) Differentiate between RPO and RTO.
i) Define the important parameters of remote replication.
j) Compare the Hot site and Cold site.

## PART-A

Q. 2 a) Explain the process of data recovery in case of a drive failure in RAID5.
b) Describe the high availability on virtual machines.
Q. 3 a) Describe the high availability clustering.

## 10

b) Discuss the benefits of using raid 3 in backup applications.
Q. 4 a) Discuss the importance of disaster recovery.

10
b) Illustrate the terminologies of networking and communication.

## PART-B

Q. 5 a) Illustrate the terminologies of availability. $\mathbf{1 0}$
b) Compare the business continuity and disaster recovery.
Q. 6 a) Describe the remote replication in various operations. $\mathbf{1 0}$
b) Construct the disaster recover tree.
Q. 7 a) Describe the local replica in various operations. $\mathbf{1 0}$
b) Differentiate between 'consolidation' and 'cascade topology'.

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester

IT MOBILE SECURITY (CF) (BCS-DS-532)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Define mobile security landscape.
b) List the benefits of a hacker from a hacked device.
c) Mention the five pillars of security.
d) Discuss about brute-force attacks with the help of examples.
e) Justify the integrity of digital signatures on the basis of security key concept.
f) Describe VPN and VPN gateway in short.
g) Summarize the protection mechanisms for a lost or stolen device.
h) Differentiate between spoofing and phishing in context to mobile secity.
i) Explain in detail about ransomware attacks.
j) "File system sandboxing supports in security implementation of mobile OS", justify the statement.

## PART-A

Q. 2 a) Discuss about Android sensors and its framework. Also mentions the measures taken for threat protection on Android.
[CO-1] [L-1] 10
b) Elaborate the term Google play protect. Also describe Google play instant apps and State of mobile security in 2019.
[CO-1] [L-2] 10
Q. 3 a) Write the steps to create a backdoor. Discuss Full Disk Encryption (FDE) in Android and IOS device.
[CO-2] [L-2] 10
b) What is trusted execution environment? Mention your understanding about tamper resistant hardware, Verified booting and device integrity. [CO-2] [L-1] 10
Q. 4 a) List the challenges faced on securing mobile devices. Comment on insecurity on
un-trusted inputs, broken cryptography and session handling vulnerabilities.
[CO-3] [L-1] 10
b) Analyze MAC spoofing attack and man-in-the-middle attack in detail. [CO-3] [L-4] 10

## PART-B

Q. 5 Write short notes on:
a) Architecture of RDBMS.
b) Types of symmetric algorithm.
Q. 6 a) What is Server certificate? Explain how HTTP and HTTPS Protocol supports during attacks on secure HTTP connections?
b) List the solutions for secure mobile communication and data management. Also discuss IPSec framework.
[CO-5] [L-2] 10
Q. 7 a) Discuss features of Duo, finding and lock windows phone, enabling security features on different mobile devices and tablets.
[CO-6] [L-3] 10
b) Introduce about passphrase and passwords. Write the function of password managers.

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester WEB PROGRAMMING FOR GRAPHICS AND GAMING (HTML 5 AND WEB GL) (BCS-DS-530)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Write the steps required to scale an isosceles triangle in WebGL.
[CO-5] [L-1]
b) Explain the few new elements in HTML 5 along with their syntax.
[L-1]
c) Discuss GPU in brief.
[L-2]
d) Describe briefly translation in WebGL with a suitable example.
[CO-5] [L-2]
e) Compare different types of projections in WebGL.
[CO-6] [L-2] 4x5

## PART-A

Q. 2 a) Explain the significance of each attribute used in table tag in HTML. [CO1][L-2] 10
b) Co-relate the tags used for embedding multimedia (like audio and video) in HTML. Write the complete code to justify and also include attributes for the tags used.
[CO-1][L-
2] 10
Q. 3 a) Compare the priority level of different style sheets used in HTML 5.0 with the help of examples.
[CO2][L-2] 10
b) Design a form for student feedback for this semester including different formcontrols in HTML. Write the complete code for the above form. [CO-2][L4] 10
Q. 4 a) How to display Geometry in WebGL? Explain the vertices and indices also.
[CO-4][L-1] 10
b) Analyze the various techniques to draw text on canvas.
[CO4][L-1] 10

## PART-B

Q. 5 a) Explain with the help of an example how a mobile customer behavior can be analyzed?
[CO-4] [L-1] 10
b) Explain the need of mobile analytics? Also discuss the basics of mobile computing.
Q. 6 a) Discuss steps to animal the cube in WebGL.
[CO-5][L-2] 15
b) Write the matrix representation for translation in WebGL. [CO-5][L-2] 5
Q. 7 a) Explain how Lighting and shading is implemented in WebGL? [CO-6][L-2] 10
b) Compare Parallel Projection and Perspective Projection. [CO-6][L-2] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Fifth Semester IT APPLICATION SECURITY (BCS-DS-529) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Discuss Buffer Overflow?
b) What do you understand by NYN flood attack?
c) Explain briefly why the word "password", a bad password?
d) What are luring attacks?
e) What is grey-box testing?
f) How would you perform a security test on a web application in a scenario like "unauthenticated tests on login page"?
g) Write steps for session management process.
h) What are the features of Asymmetric key cryptographic algorithm?
i) Differentiate between encryption, encoding and hashing.
j) What is a dictionary attack?

## PART-A

Q. 2 a) How can you differentiate among SQL injection and XSS attack? Describe canonicalization and sensitivity of information in detail. [CO-1] [L-2] 10
b) What is Network Eavesdropping? How to determine that network eavesdropping attack has occurred? Which techniques can be used for its prevention?
[CO1] [L-1] 10
Q. 3 a) How to prevent a cookie replay attack and Network sniffing? [CO-2] [L-2] 10
b) What do you mean by credentials? Discuss credential theft attack.
[CO-2] [L-2] 10
Q. 4 a) Explain session hijacking and Man-in-the-middle attack. What are configuration stores? How they can be prevented?
[CO-3] [L-3] 10
b) "Over privileged accounts are harmful for an organization". Elaborate this statement.
[CO-3] [L-2] 10

## PART-B

Q. 5 a) How poor key generation can affect the security of system? Explain form field manipulation.
[CO-4] [L-2] 10
b) Discuss about Cookies. Also, write the steps to protect from Cookie Manipulations?
Q. 6 a) Explain Log Tampering. What are the countermeasures adopted in system and application level auditing?
[CO-5] [L-2] 10
b) How to prevent DOS attack against slow hashing functions? How does captcha mitigate DDos attack?

## [CO-5] [L-2] 10

Q. 7 a) Discuss web services explorer on IBM Rational App Scan tool. [CO-6] [L-2] 10
b) Explain session Hijacking in detail and also list all the attributes of security testing and describe in detail Session Hijacking.
[CO-6] [L-2] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Fifth Semester <br> BUSINESS STRATEGY AND ANALYTICS (BCS-DS-528) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TwO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Define the term: 'corporate strategy'.
b) Discuss the benefits of strategic management.
c) Differentiate between department mission and vision.
d) Give an example of a good strategic objective.
e) How to perform an internal audit in the business and discuss its purpose?
f) Differentiate between liquidation and divestment.
g) Illustrate the need of good balanced scorecard for an organization.
h) What are the different KPI's inputs?
i) Diagrammatically explain analytics metrics lifecycle.
j) Write the characteristics of a well-designed dashboard.

## PART-A

Q. 2 a) Explain the strategic management framework with the help of a diagram.
[CO1][L2] 10
b) Design a SWOT matrix by taking a suitable business example and discuss it thoroughly.
[CO1][L5] 10
Q. 3 a) Determine the need of cross functional collaboration planning.
[CO2][L2] 8
b) Explain the key elements of a strategic business plan.
[CO2][L2] 12
Q. 4 a) Explain the life cycle of KPI with the help of diagram.
[CO3][L2] 8
b) Determine the need of performance measures. Explain the common ways of selecting performance measures.
[CO4][L2] 12

## PART-B

Q. 5 a) Categorize the reports required for monitoring of KPIs by taking suitable examples.
b) Explain the steps in identification of KPIs.
[CO4][L2] 10
[CO4][L2] 10
Q. 6 a) Define 'a metrics'. Explain all the guidelines for choosing metrics.
[CO4][L2] 6
b) Explain the balance score card strategy implementation with the help of diagram and suitable example.
[CO5][L4] 14
Q. 7 a) Explain different types of dashboards with suitable examples.
b) Discuss the rules for designing a dashboard.

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester CLOUD COMPUTING ARCHITECTURE AND DEPLOYMENT MODEL (BCS-DS-527)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Differentiate between Self Configuration and self optimization in terms of autonomic computing.
[CO-1] [L-4]
b) Give some example of PAAS vendor.
[CO-2] [L-1]
c) Illustrate an example why an organization is moving towards a cloud.
[CO-1] [L-3]
d) Differentiate between distributed computing and parallel computing in terms of cloud.
[CO-1] [L-4]
e) Differentiate between integrated lifecycle platform and anchored lifecycle platform.
f) State and Justify: Is Google drive is an example of SAAS or PAAS.
g) Differentiate between the Windows OS and Linux OS. Can an openstack be installed on Windows OS?
h) Name any two virtual machine monitor platforms.
i) Discuss the role of CMDB (Configuration Management Database) in anatomy of Cloud.
j) Discuss Multi-tenancy in terms of cloud computing environment.

## PART-A

Q. 2 a) Discuss the scenario, If an organization is planning to transform their infrastructure to cloud through three stages of evolution.
b) Discuss the cloud delivery service model of cloud computing.
[CO-1] [L-2] 10
Q. 3 a) Differentiate between the characteristics of IAAS and PAAS services. [CO-2] [L-4] $\mathbf{1 0}$
b) Discuss the IAAS architecture in cloud computing environment.
[CO-2] [L-2] 10
Q. 4 a) Differentiate between CCRA and CCRA2.0, as a cloud computing architecture.
b) Explain the following scenario:


## PART-B

Q. 5 a) Compare the advantages and disadvantages of public cloud and private cloud.
[CO-5] [L-4] 14
b) Discuss the role of SLA between cloud provider and cloud consumer. [CO-5] [L-2] 6
Q. 6 a) Discuss the journey into Hybrid cloud implementation.
b) Discuss the challenges faced while implementing Hybrid cloud.
[CO-6] [L-2] 10
[CO-6] [L-2] 10
Q. 7 a) Discuss the openstack architecture in detail.
[CO-4] [L-2] 14
b) Differentiate between openstack and devstack in terms of cloud implementation.
[CO-4] [L-4] 6

## End Semester Examination, Dec. 2022

B. Tech. - Fifth Semester

CLOUD COMPUTING ARCHITECTURE AND DEPLOYMENT MODEL (BCS-DS-527)

Time: 3 hrs.
Max Marks: 100

No. of pages: 2
Note: Attempt FIVE questions in all. Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer briefly:
a) Differentiate between the Cloud Auditor and Cloud Carrier.
[CO3][L4]
b) Differentiate between web1.0 and web 2.0.
[CO1][L4]
c) Define 'Autonomic Computing'.
[CO1][L1]
d) Define 'Mashup'.
[CO1][L1]
e) Differentiate between 'IAAS' and 'PAAS'. [CO2][L4]
f) Discuss the challenges of cloud computing.
[CO4][L2]
g) List few common cloud vendors in market.
[CO4][L1]
h) Elaborate the challenges in hybrid cloud implementation.
[CO5][L2]
i) Explain the automate phase in cloud transition.
[CO4][L2]
j) Discuss 'key features of OpenStack'.
[CO6][L1] 2x10

## PART-A

Q. 2 a) Explain in detail the key characteristics of Cloud Computing.
[CO1][L2] 5
b) Discuss the purpose of CMDB (Configuration Management Database) and Cloud Lifecycle Management Layer in the Anatomy of a Cloud.
[CO1][L2] 5
c) Discuss the various deployment models with their advantages and disadvantages.
[CO1] [L2] 10
Q. 3 a) Is Microsoft one Drive is SaaS or PaaS? Justify with appropriate explanation.
b) Discuss the properties and characteristics of IAAS Cloud Computing service.
[CO2][L2] 10
c) Differentiate between Integrated lifecycle platform and anchored lifecycle platform in terms of PAAS.
[CO2][L4] 5
Q. 4 Explain the following scenario:
[CO3,L2] 10
a)


- SLA between cloud consumer and cloud provider
- SLA between cloud provider and cloud carrier
b) Cloud Consumer Cloud Broker Cloud Provider 1


## PART-B

Q. 5 a) Discuss any four challenges faced in implementing Cloud Computing in an organization.
[CO5][L2] 10
b) Differentiate between the Public and Private Cloud in terms of following business factors:
i) Available Budget.
ii) Compliance and Security.
iii) Performance requirement.
iv) Scalability Requirement.
[CO5][L4] 10
Q. 6 a) Discuss the need of Hybrid Cloud by illustrating an example. [CO6][L2] 10
b) Discuss and justify the statement whether the following example illustrates hybrid cloud: "A retail company has online commerce support, provided through private cloud/internal data center. To provide good customer service and fast response during peak loads the company may leverage public cloud service." [CO6][L2] 10
Q. 7 a) Describe the architecture of Openstack with a suitable diagram.
[CO4][L2] 10
b) Differentiate between AWS and Openstack.
c) Discuss some benefits of Openstack in a Cloud Environment.

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester SOFTWARE DEVELOPMENT PROCESSES (BCS-DS-522)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Explain inheritance using UML notation.
[CO-2] [L-2]
b) Why decision box is used in activity diagram.
[CO-4] [L-2]
c) What do you mean by package relationship?
[CO-2] [L-1]
d) Differentiate between static and dynamic behavior.
[CO-4] [L-2]
e) What are the benefits of iterative planning process?
[CO-6] [L-1]
f) Why is a large number of simple classes better than a small number of complex classes?
g) How is the use case model useful in every phase of software development?
h) Differentiate between coupling with cohesion.
i) How relationships are created in rational rose?
j) Define aggregation and generalization.

## PART-A

Q. 2 a) Describe briefly encapsulation and inheritence.
[CO-2] [L-2] 5
b) Create three classes linked by associations to represent a student taking courses in a school. Specify appropriate multiplicity as well as labels for the association. If there is more than one reasonable alternative, explain the advantages and disadvantages of each.
[CO-2] [L-3] 15
Q. 3 a) Compare and contrast between structured design and object oriented design methodology?
[CO-2, 1] [L-2] 10
b) Explain use-case driven approach in object oriented system development with the payroll system as a case study.
[CO-2] [L-2] 10
Q. 4 a) Explain "multiplicity indicators" with the help of examples.
[CO-2] [L-2] 5
b) Develop class diagrams and activity diagrams for the following use case of the banking system: identify all the classes, responsibilities and collaborators processes for the objects. i) deposit in saving account ii) withdrawal from saving account (both acceptance and denial) iii) balance checking. [CO-2] [L-3] 15

## PART-B

Q. 5 a) Draw sequence diagram and corresponding collaboration diagram for student registration system.
b) Explain different types of interaction diagrams with example. [CO-4] [L-2] 10
Q. 6 a) Elaborate on the consistency checking in "Model refinement". [CO-5] [L-2] $\mathbf{1 0}$
b) Explain in detail logical and component view.
Q. 7 a) What are the goals of iteration planning process? Also, explain iteration planning process in detail.
[CO-6] [L-2] 10
b) Explain "Designing attributes and operations" in iteration planning process.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Fifth Semester <br> COMPUTER GRAPHICS (BCS-DS-521) 

Time: 3 hrs.
Max Marks: 100

No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Define the terms window and windowing transformation in the context of 2 D viewing.
[CO2][L2]
b) Discuss Ellipse generating algorithm.
[CO5][L1]
c) A mouse is picked up and placed in another position. Whether the position of the mouse pointer change. Justify your answer.
[CO1][L3]
d) How the cyclic overlaps of surfaces are eliminated in scan line algorithm?
[CO4][L2]
e) Discuss the role of histogram equalization in a digital image.
[CO3][L1]
f) Explain the concept of vanishing point.
[CO4][L2]
g) Describe the importance of removal of Hidden surface.
[CO5][L2]
h) Define the terms: i) Centre of projection ii) Principal vanishing point [CO2][L2]
i) Consider a raster system with a resolution of $2560 \times 2048$. Determine the frame buffer size (in bytes) needed for the system to store 12 -bits per pixel. How much storage is required if 24-bits per pixel are to be stored?
[CO6][L4]
j) Explain the concept text clipping.
[CO3][L3] 2x10

## PART-A

Q. 2 a) Explain Midpoint circle drawing algorithm. Also derive the expression for next $x$ and next $y$ for the curve having angle between 90 degree to 5 degree. Plot a circle whose radius is 10 units.
[CO1] [L2] 10
b) Explain DDA line drawing algorithm with derivation. What are its advantages and disadvantages? Execute Bresenhams straight line algorithm to produce a line from $(0,0)$ to $(17,12)$.
Q. 3 a) What are 2D transformations? Explain all its types and write the formulas and matrixes of all kinds and also draw suitable diagrams to explain the concept.
[CO2][L1] 10
b) Consider the square $A B C D A(0,0), B(0,4) C(4,4)$ and $D(4,0)$. Find the coordinates of the square after rotating it by 45 degree about the point $(1,0)$. [CO2][L5] 10
Q. 4 a) Use the Cohen Sutherland algorithm to clip the line joining points P1 $(70,20)$ and P2 $(100,10)$ against a window lower left hand corner $(50,10)$ and upper right hand corner $(80,40)$.
[CO3] [L3] 10
b) Write the steps required to convert world coordinate to view port system. Write all the equation and matrix representation.
[CO3] [L2] 10

## PART-B

Q. 5 a) Given a 3D triangle with points ( $0,0,0$ ), ( $1,1,2$ ) and ( $1,1,3$ ). Apply shear parameter 2 on X axis, 2 on Y axis and 3 on Z axis and find out the new coordinates of the object.
b) Explain 3d transformation matrix representation.
Q. 6 a) Explain Bezier curve algorithm with its properties.
[CO5] [L2] 10
b) Discuss B-Spline curves with a suitable example.
[CO5] [L2] 10
Q. 7 a) Explain the Z-buffer algorithm with a suitable example.
[CO6] [L2] 10
b) Discuss any two basic Illumination models.
[CO6] [L1] 10


# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester PHYSICAL SECURITY (BCS-DS-505)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Explain in steps to improve physical security.
[CO-1] [L-2]
b) Define the risk management.
[CO-2] [L-2]
c) Differentiate between 'Class A' and 'Class C'.
d) Define the security assessment.
[CO-3] [L-2]
e) Discuss the operating system hardening.
f) Define the physical security audit.
g) Define the stages of fire.
h) Explain the UI standard 217.
i) Define 'vulnerability scanning'.
j) Explain the CCTV biometrics characteristics access control.

## PART-A

Q. 2 a) Discuss the influence of physical design.
[CO-1] [L-1] 10
b) Explain the physical security and their importance.
[CO-1] [L-2] 10
Q. 3 a) Discuss the different types of threats and vulnerabilities.
[CO-2] [L-2] 10
b) Explain the laws of operations security.
[CO-2] [L-2] 10
Q. 4 a) Explain the characteristics of exterior physical security.
[CO-3] [L-2] 10
b) Discuss the techniques of fire suppression in detail.

## PART-B

Q. 5 a) Discuss the levels of physical security.
[CO-4] [L-2] 10
b) Discuss the various mechanisms of light.
Q. 6 Explain the following:
a) Access control roasters.
b) Various Alarm Systems.
Q. 7 a) Discuss the hazard assessment and also its common structure.
b) Explain the fire safety inspection.

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester <br> PHYSICAL SECURITY (BCS-DS-505)

Time: 3 hrs.
Max Marks: 100

No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) What is Risk Assessment?
[CO-2] [L-1]
b) Appraise with "Vandals Who Damage for Fun".
[CO-1] [L-2]
c) Give the working of Bullet-Resistant Glazing for a secure workplace.
[CO-2] [L-2]
d) Identify the nine points of security concern.
e) What are top ten security threats?
f) Interpret the statement "Duress Code".
g) Explain sprinkler system inspection phase.
h) Give an insight into "Ul-Rated Combination Locks".
i) Define "Cyber Security".
j) List the number and function of guards.

## PART-A

Q. 2 a) Give an analysis of how to provide security for random incidents. [CO1] [L4] $\mathbf{1 0}$
b) Analyze the statement "Crime Prevention through environmental design".
[CO1] [L4] 10
Q. 3 a) Explain risk management and the vulnerability assessment. [CO2] [L2] $\mathbf{1 0}$
b) Give an analysis of statistics and quantitative analysis of vulnerability assessment.
[CO2] [L1]
10
Q. 4 a) Appraise the best time to conduct a survey. Explain the significance of conducting a security review.
[CO3][L2] 10
b) Give an overview of exterior physical characteristics based on perimeter grounds. Explain fire safety inspection for bullet-resistant doors.
[CO3][L2] 10

## PART-B

Q. 5 a) Give an analysis of relocking devices, locking dials, lockable handles. Also discuss the safe burglaries.
[CO4] [L2] 10
b) Explain alarm certificate services its definitions and standards. Give an overview of significance of fire extinguishers.
Q. 6 a) Give an insight into card/badge specifications, sign/countersign and code word.
[CO5] [L2] 10
b) Explain the security controls of packages. What are security planning of fence standards?
[CO5][L2] 10
Q. 7 a) Explain all the phases of fire safety inspection.
[CO6] [L2] 10
b) Write a short note on: 'Hazard Assessment'. [CO6] [L2] 10

# End Semester Examination, Dec. 2022 <br> B. Tech. - Fifth Semester <br> BUSINESS INTELLIGENCE (BCS-DS-504) 

Time: 3 hrs.
Max Marks: 100

No. of pages: 1
Note: Attempt FIVE questions in all. Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) What are the advantages of making decision using business intelligence over making decision without business intelligence?
b) What are the factors that may affect the degree of success of decision support systems (DSS)?
c) How data is affected by noise in business intelligence?
d) Describe the capabilities of knowledge management system (KMS).
e) Explain the decision processes in revenue management.

## PART-A

Q. 2 a) What is Business Intelligence (BI)? Draw a neat diagram to represent engineering stages and development steps in BI and explain it briefly.[CO-1] [L-2] 10
b) What will be the future applications of Business Intelligence analytics in Big Data database systems?
[CO-1] [L-2]10
Q. 3 a) What is OLAP? Explain the various guidelines for implementation of OLAP.
[CO-4] [L-1] 10
b) Explain the role of Business intelligence in any one of following domain: Fraud Detection, Market Segmentation, Retail industry, and Telecommunications industry. Also explain how data mining can be helpful in any of these cases.
[CO-3] [L-2] 10
Q. 4 a) Explain the importance of security, while creating Business Intelligence reports. Also, discuss the different types of securities in reporting. [CO-4] [L-2] 10
b) Explain in detail about scorecards and dashboards.
[CO-2] [L-2] 10

## PART-B

Q. 5 a) What are the various risks that may be faced during business Intelligence? Also discuss various risk mitigation techniques.
b) With a neat diagram explain database design activities.
Q. 6 a) Discuss the importance of writing reports in Business Intelligence along with its main components and types.
[CO-5] [L-2] 10
b) Explain any four operations that can be applied on reports with the help of suitable example.
[CO-5] [L-2] 10
Q. 7 a) Explain classification and prediction. Also, list out Issues regarding Classification and prediction. [CO-5] [L-2] 10
b) Differentiate between centralized and decentralized architecture of Business Intelligence.
[CO-6] [L-2] 10

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third / Fifth Semester <br> ARTIFICIAL INTELLIGENCE (BCS-DS-503) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer in brief:
a) Explain the characteristics of AI problems.
b) List the issues in Knowledge representation.
c) State any three real-world problems of AI.
d) Differentiate between simple and steepest-ascent hill climbing techniques.
e) What are the different components of an Expert System?
f) State the significance of certainty factor.
g) What is fuzzy logic?
h) What are the various methods of statistical reasoning?
i) What is commutative production system?
j) Differentiate between 'forward' and 'backward' reasoning.

## PART-A

Q. 2 a) What are the various problem characteristics which are used to identify the type
production system to be deployed for solving an AI problem?
[CO-2] [L-2] 10
b) Explain the program structure of Prolog.
[CO-1] [L-1] 10
Q. 3 Consider the following blocks problem where start and the goal states are given. Take local and global heuristics to solve this problem using hill climbing.


## Blocks World

Q. 4 a) What are semantic Nets? How are they different from frames? Draw the semantic
network for the statement: John went to Shimla with Mary by car. [CO-4][L-4] 10
b) Illustrate the difference between inheritable and inferential knowledge using suitable example.
[CO-4][L-4] 10

## PART-B

Q. 5 a) Consider an incandescent bulb manufacturing unit. Here machines M1, M2 and
make $30 \%, 40 \%$ and $30 \%$ of the total bulbs. Of their output, let's assume
$3 \%$, and $4 \%$ are defective. A bulb is drawn at random and is found defective. Find
the probability that is made by machines M1 or M2 or M3?
[CO-5][L-6] 10
b) Explain the concept of reasoning under certainty factors.
Q. 6 a) Explain the general model of Learning Agent. What are the different forms of learning?
[CO-4][L-2] 10
b) The inference mechanism can use both forward reasoning and backward reasoning.

Demonstrate with the help of an example where it will use backward reasoning and why?
[CO-5][L-3] 10
Q. 7 a) Design min-max search tree and explain alpha beta cutoff with suitable example.
[CO-5][L-5] 10
b) List various components of natural language understanding process. Describe syntactic analysis and semantic analysis in brief.
[CO-4][L-1] 10

## End Semester Examination, Dec. 2022

## B. Tech. - Fifth Semester

ARTIFICIAL INTELLIGENCE (BCS-DS-503)
Time: 3 hrs.
Max Marks: 100

No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) Explain the characteristics of Abductive reasoning.
b) What do you mean by intelligent behavior of a machine?
c) State any three real-world problems of Al.
d) Define 'Agents'.
e) What are the different components of an Expert System?
f) Differentiate between is-a and instance relationship.
g) Explain the importance of heuristics.
h) What do you understand by Aquisitional Efficiency?
i) Discuss the concept of Fuzzy Logic in AI.
j) Define the term Pragmatic Analysis.

## PART-A

Q. 2 a) Explain the significance of AI in today's world. Discuss in brief the Al techniques with suitable examples
b) What are the various AI programming languages used? Discuss in detail the prominent features of LISP and Prolog.
[CO-2] [L-1] 10
Q. 3 a) What is a State space? Illustrate its importance using a suitable example.
[CO-2] [L-1] 10
b) Compare and contrast the features of Depth-first, breath-first and Best-first search techniques.
[CO-2][L-2] 10
Q. 4 a) What are Semantic Nets? How are they different from Frames? Draw the semantic network for the statement: John went to Shimla with Marry by car.
[CO-4][L-4] 10
b) Write short notes on:
i) Conceptual Dependency
ii) Scripts
[CO-4][L-1] 5x2

## PART-B

Q. 5 a) Examine the applicability of Baye's theorem in handling Uncertain Information. Given that $\mathrm{P}(\mathrm{A})=0.2, \mathrm{P}(\mathrm{B})=0.4, \mathrm{P}(\mathrm{B} \mid \mathrm{A})=0.5$. Find $\mathrm{P}(\mathrm{A} \mid \mathrm{B})$.
[CO-6][L-4] 10
b) A problem solving search can proceed either with forward chaining or backward chaining. State what factors determines that it should move in forward or backward chaining. Illustrate with examples.
[CO-5][L-2] 10
Q. 6 a) What is a Decision Tree? How do we access the performance of a learning algorithm?[CO-4][L-2] $\mathbf{1}$
b) Differentiate between Monotonic and Non-Monotonic Reasoning systems.
[CO-5][L-2] 10
Q. 7 a) Explain the various steps used for Natural Language Processing.
[CO-6][L-2] 10
b) What is an expert system? Discuss its architecture stating the importance of each module.
[CO-6][L-2] 10

# End Semester Examination, Dec. 2022 <br> B. Tech. - Fifth Semester / Third Semester ARTIFICIAL INTELIGENCE (BCS-DS-503) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) Difference between uninformed and informed searches.
b) Explain the limitations of monotonic system.
c) Discuss the Turing test of artificial intelligence.
d) Differentiate between is-a and instance relationship.
e) Explain the importance of heuristics.
f) Compare human expert and an expert system.
g) Given that $P(A)=0.5, P(B)=0.45, P(B \mid A)=0.55$. Find $P(A \mid B)$.
h) Briefly discuss the concept of an intelligent agent.
[CO-2] [L-2]
i) List various applications of AI? [CO-4] [L-2]
[CO-1] [L-2]
j) List the four categories of production systems.

PART-A
Q. 2 a) Design the solution of the eight-puzzle problem using DFS and BFS. Which one is better and

[CO-1] [L-6] 10
b) List the production rules for water jug problem considering two jugs of 4lt and 3lt capacity. Take $(0,0)$ as the initial state and $(2,0)$ as the final state. [CO-2][L-3] 6
c) Discuss the characteristics of a good control strategy.
[CO-1][L-2] 4
Q. 3 a) What is constraint satisfaction? Solve the following crypt arithmetic problem using constraint satisfaction algorithm. SEND + MORE=MONEY. Assign decimal digit to each of the letters in such a way that the answer to the problem is correct. If the same letter occurs more than once, it must be assigned the same digit each time and same digit cannot be assigned to two different letters.
[CO-1][L-5] 10
b) Solve the given graph problem using A* algorithm.

Q. 4 a) Define 'knowledge'. How a semantic network is used to represent knowledge? Draw the semantic network for the statement: Every person in the town infected with Covid19.
b) Create a family tree keeping in consideration of a family data and relationship.
i) Declare male and female members of the family.
ii) Declare parent relationship in the family.

Question: Based on these relationships write down rules for the following:
Spouse(X,Y), Father(X,Y), Mother(X,Y), Sister(X,Y), Brother(X,Y),
Cousion(X,Y)
[CO-3][L-3] 10

## PART-B

Q. 5 a) Differentiate between monotonic and non-monotonic reasoning systems by taking appropriate examples.
[CO-4] [L-2] 6
b) What is uncertainty? Explain the sources of uncertainty. List various methods of dealing with uncertainty.
c) Differentiate between inductive and deductive reasoning by taking appropriate examples.
[CO-4][L-3] 6
Q. 6 a) What is PEAS? Explain in detail the PEAS environment of taxi driver agent.
[CO-6] [L-3] 8
b) Define an expert system. Illustrate the architecture of an expert system. Construct a backward chaining inference mechanism using the following information: Facts: A, B \& D, Rules: Rule 1:A \& C $->$ E, Rule 2: D \& C $->$ F, Rule 3: B \& E -> F, Rule 4: B -> C, Rule 5: F -> G. Goal: G. [CO-5] [L-6] 12
Q. 7 a) What is alpha beta pruning? How Alpha beta pruning is used to reduce the search space in a game tree? Which of the values from the following trees can be pruned? Here $\Delta$ is for max move and $\nabla$ is for min move.

[CO-6] [L-6] 15
b) Explain the key components of a robot. Discuss how information is processed by a robot?

## End Semester Examination, Dec. 2022

# B. Tech. - Fifth Semester <br> FORMAL LANGUAGE AND AUTOMATA THEORY (BCS-DS-502) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) Design a finite automata which accept set of strings over $\Sigma=\{a, b\}$ ending with 'aab'. [CO1 L3]
b) Compare Melay machine with Moore machine.
[CO2 L1]
c) Find a regular expression for subsets of $\{\mathrm{a} . \mathrm{b}\}$ all strings containing at most 2a's.
[CO3 L4]
d) If G is the grammar $S \rightarrow S b S / a$, show that G is ambiguous.
[CO3 L3]
e) Convert the grammar $\mathrm{S} \rightarrow \mathrm{aSb} / \mathrm{A}, \mathrm{A} \rightarrow \mathrm{bSa} / \mathrm{S} / \Lambda$ to a pda that accepts the same language by empty stack.
[CO4 L3] 5x4

## PARTA

Q. 2 a) Let $L$ be the set of all palindromes over $\{\mathrm{a} . \mathrm{b}\}$. Construct a grammar $G$ generating $L$.
[CO 1, L3] 10
b) Write not on Chomsky classification of formal languages with its corresponding automata.
[CO 1, L2] 10
Q. 3 a) Construct a minimum state automaton equivalent to the DFA described by following figure.
[CO 2, L3] 10

b) Construct a Moore machine equivalent to the Mealy machine $M$ defined by following Table.
[CO 1, L3] 10

| Present state |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Next state |  |  |  |
|  | state | $a=0$ |  | $a=1$ |
|  | $q_{1}$ | 1 | $q_{2}$ | 0 |
| $q_{2}$ | $q_{4}$ | 1 | $q_{4}$ | 0 |
| $q_{3}$ | $q_{2}$ | 1 | $q_{3}$ | 1 |
| $q_{4}$ | $q_{3}$ | 0 | $q_{1}$ | 1 |

Q. 4 a) Consider the transition system given in the following figure Prove that the strings recognized is $(a+a(b+a a) * b) * a(b+a a) * a$ instead of $(a+a(b+a a) * b) * b) * a r b+a a) * a$
[CO-3, L5] 10

b) Give the statement for pumping lemma of regular expression. Also, show that $L=\left\{O^{i} I^{i} \mid i>1\right\}$ is not regular.
[CO-3, L5] 10

## PART-B

Q. 5 a) Reduce the grammars to Greibach normal form:
[CO-4, L4] 10
$S \rightarrow 0 S 0|1 S 1| A, \quad A \rightarrow 2 B 3, \quad B \rightarrow 2 B 3 \mid 3$
b) Design a PDA for $L=a^{n} b^{n+3} \mid n>0$.
[CO-4, L4] 10
Q. 6 a) Design a Turing machine for language $\mathrm{L}=\mathrm{wcw}^{\top} \mid \mathrm{w}=\{\mathrm{a}, \mathrm{b}\}^{*}$. [CO-5, L 3$] \mathbf{1 0}$
b) Design a Turing Machine for language $\left\{L=a^{n} b^{2 n} \mid n>0\right\}$
[CO-5, L3] 10
Q. 7 a) State PCP does the PCP with $\mathrm{X}=\left(\mathrm{b}^{3}, a b^{2}\right)$ and $\mathrm{Y}=\left(\mathrm{b}^{3}\right.$, bab $\left.{ }^{3}\right)$ have a solution?
[CO-6, L4] 10
b) Show that if language L1 and L2 both are recursive then their intersection L 1 LL 2 is also recursive.
[CO-6, L3] 10

# End Semester Examination, Dec. 2022 

B. Tech. - Fifth Semester

FORMAL LANGUAGE AND AUTOMATA THEORY (BCS-DS-502)
Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Generate the regular expression over the alphabet $\sum=\{0,1\}$ for the string which starts and ends with same symbol.
b) Distinguish between NFA and DFA with examples.
c) Write tuples of context free grammar with example.
d) Remove null productions from the following automata by applying null removal method:

e) Define 'decidability'.
f) Check whether the grammar $S \rightarrow->a|a b S b| a A b, A \rightarrow b S \mid a A A b$ is ambiguous or not.
g) State pumping lemma for CFG.
h) Draw block diagram of push down automata.
i) Write any five identities of regular expression.
j) Find the context free languages for the following grammars.
$\mathrm{S} \rightarrow \mathrm{aSb} \mid \mathrm{ab}$
$2 \times 10$

## PART-A

Q. 2 a) Explain Chomsky classification of languages. Also explain, how these languages are accepted by automata?
[CO- 1] [L-1] 8
b) Design grammar for the language $L=\left\{a^{j} b^{n} c^{n} \mid n>=1, j>=0\right\}$.
[CO- 1] [L-
6]
c) Find the language generated by the following grammar:

S->0A|OS|0|1
A-> 1A|1S|1
Q. 3 a) Construct minimum state automaton equivalent to given finite automata:

| State | $\underline{\mathrm{I}} / \mathrm{p}=a$ | $\mathrm{I} / \mathrm{p}=b$ |
| :---: | :---: | :---: |
| $\rightarrow q_{0}$ | $q_{1}$ | $q_{2}$ |
| $q_{1}$ | $q_{4}$ | $q_{3}$ |
| $q_{2}$ | $q_{4}$ | $q_{3}$ |
| $q_{3}$ | $q_{5}$ | $q_{6}$ |


| $q_{4}$ | $q_{7}$ | $q_{6}$ |
| :--- | :--- | :--- |
| $q_{5}$ | $q_{3}$ | $q_{6}$ |
| $q_{6}$ | $q_{6}$ | $q_{6}$ |
| $q_{7}$ | $q_{4}$ | $q_{6}$ |

b) Construct a Moore machine equivalent to the Mealy machine $M$ defined by:

| Present | $a=0$ |  | $a=1$ |  |
| :---: | :---: | :---: | :---: | :---: |
| State | Next | $0 / \mathrm{p}$ | Next <br> State | $0 / \mathrm{p}$ |
| $\rightarrow q_{1}$ | State | $q_{1}$ | 1 | $q_{2}$ |

[CO-2] [L-
6] 6
c) Draw the block diagram of finite automata and also explain all its tuples. [CO2][L1] 4
Q. 4 a) Construct minimized finite automata for the regular expression:
$(0+1) 011^{*}+(00+11)$
[CO-3] [L-6] 8
b) Find the regular expression corresponding to the given automata:

[CO-3] [L-5] 8
c) Show that the set $L=\left\{a^{p} \mid p\right.$ is a prime $\}$ is not regular.
[CO-3] [L-2] 4

## PART-B

Q. 5 a) Construct the PDA accepting the language $L=\left\{a^{2 n} b^{n} \mid n>=1\right\}$ accepted by final state.
[CO-4] [L-6] 8
b) Convert the following grammar into an equivalent one with no unit productions and no useless symbols:
$\mathrm{S} \rightarrow \mathrm{ABA}$
$A \rightarrow a A A|a B C| b B$
$B \rightarrow A|b B| C b$
$\mathrm{C} \rightarrow \mathrm{CC} \mid \mathrm{Cc}$
[CO-4][L-5] 6
c) Convert the following grammar into CNF:
$S \rightarrow A B C \mid B a B$
$\mathrm{A} \rightarrow \mathrm{aA}|\mathrm{BaC}| \mathrm{aaa}$
$\mathrm{B} \rightarrow \mathrm{bBb} \mid \mathrm{a}$
[CO-4] [L-5] 6
Q. 6 a) Design a Turing machine for the language $L(G)=\left\{X^{n} Y^{n}\right.$, where $\left.n>1\right\}$. Also, show the processing of string $x^{3} y^{3}$.
[CO-5] [L-5] 14
b) Define 'Turing machine' with its tuples. Also, explain the variations of Turing machine.
Q. 7 a) State and prove halting problem of Turing machine.
[CO-6] [L-1] 8
b) Does the PCP with two lists $X=\left(b, \mathrm{bab}^{3}, \mathrm{ba}\right)$ and $\mathrm{Y}=\left(\mathrm{b}^{3}, \mathrm{ba}, \mathrm{b}\right)$ has a solution?
[CO-6] [L-1] 4
c) Explain the properties of recursive and recursive enumerable language. [CO6][L-1] 8

## End Semester Examination, Dec. 2022

B. Tech. - Fifth Semester

DESIGN AND ANALYSIS OF ALGORITHMS (BCS-DS-501)
Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Differentiate between 'iterative' and 'recursive' algorithms.
b) Pen down the pseudo-code for Brute Force min-max algorithm.
c) Compare branch and bound with backtracking and explain how it is efficient.
[CO4][L2]
d) Explain with pseudo-code how you will solve the MST problem using Prim's approach.

e) Summarize the concept of $P$ and NP hard-Problems to justify the difference.
[CO2][L1] 5x4

## PART-A

Q. 2 a) Solve the following recurrence relation using recursion tree and find the complexity. Also, cross-verify the obtained value with help of Master Theorem method:

$$
\begin{equation*}
T(n)=2 T(n / 2)+2 n \tag{CO1}
\end{equation*}
$$

b) Write down the algorithm for insertion sort and compare it's time and space complexity with other sorting algorithms in detail.
Q. 3 a) A networking company uses a compression technique to encode the message before transmitting over the network. Suppose the message contains the following characters with their frequency:

| Character | Frequency |
| :--- | :--- |
| a | 5 |
| b | 9 |
| c | 12 |
| d | 13 |
| e | 16 |
| f | 45 |

Note that each character in input message takes 1 byte. If the compression technique used is Huffman Coding, how many bits will be saved in the message?
[CO-2] [L-
3] 10
b) Explain the matrix-chain multiplication algorithm and find an optimal parenthesization for the sequence of dimensions is $\langle 5,10,3,12,5,50,6\rangle$.
Q. 4 a) Evaluate the given data for $0 / 1$ Knapsack problem using branch and bound method: $\mathrm{W}=10, \mathrm{P}=\{40,50,100,95,30\}, \mathrm{w}=\{2,3,14,1,98.5 .3\}$. [CO-3][L-5] 10
b) Explain the term backtracking. Describe the algorithm of sum of subset problem with the help of an example, illustrate how it helps in reaching optimal solution where $\quad M=30, \quad W=\{5,10,12,13,15,18\}$. [CO2][L3] 10

## PART-B

Q. 5 a) Using a suitable example explain breadth first search and depth first search algorithm.
[CO-4]
[L2] 10
b) Solve the given graph for all pair shortest path problem using greedy method:


3] 10
[CO-2] [L-
Q. 6 a) Quote and explain the KMP pseudo-code with support of proper example.
[CO1][L2] 8
b) Build the Finite Automata for string matching which will help in detecting the pattern "ABBAAB" in the Text "AABBAAABBAABBAABA". Also write down its algorithm.
Q. 7 a) State randomized algorithms alongwith applications. Write a program to generate integer from 1 to 7 with equal probability to justify randomized algorithms.
b) Write the Class of problems beyond NP - P SPACE and justify it with the help of an example.

# End Semester Examination, Dec. 2022 

## B. Tech. - Fourth Semester <br> BLOCKCHAIN TECHNOLOGY (BCS-DS-428)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) What is Blockchain? How it is different from Bitcoin?
b) Explain the use of consensus algorithms? Give examples of 2 consensus algorithm used in blockchain.
c) Explain nonce. Also explain its use in blockchain technology.
d) What are smart contract? How are they effecting the life of people.
e) Explain the difference between the bitcoin and Ethereum.
f) Derive RSA protocol.
g) List any four hyperledger frameworks and their uses.
h) Explain Merkel tree with diagram.
i) What is the name of the first block in the block chain? What information does it store?
j) Explain hashing technique. Also discuss its uses.

## PART-A

Q. 2 a) Explain the blockchain architecture and the working of blockchain with the help
Q. 3 a) Explain different types of smart contracts? Create smart contract for e-voting using
b) What is double spending problem? How it can be prevented?
Q. 4 a) Explain PBFT protocol with the help of neat diagram. What is its use? Why it can't be
b) Discuss any two of the following terms:
i) Solidity-smart contracts.
ii) Web3.
iii) Ethereum virtual machine.

## PART-B

Q. 5 a) What is Hyperledger composer tool? Explain in detail.
[CO-2] [L-3] 10
b) Discuss chain code and its implementation in hyper-ledger framework.
[CO-2] [L-3] 10
Q. 6 a) Explain Diffie Hellman-key-exchange protocol with the help of a suitable exam.
[CO-2] [L-3] 10
b) Discuss blockchain in trade and supply chain. What do you understand by provenance of goods, trade/supply chain finance?
[CO-5][L-1] 10
Q. 7 Discuss the following terms (any two):
a) Digital identity.
b) Public distribution system.
c) Social welfare system.
d) Land records keeping between government entities.

## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester <br> PYTHON - I (BCS-DS-427A)

Time: 3 hrs.

Max Marks: $\mathbf{1 0 0}$
No. of pages: 2

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Discuss briefly lists and tuples. What is the key difference between the two?
[CO-1][L-2]
b) If a math expression adds a float to an int, what will the data type of the result be?
[CO-1] [L-2]
c) Explain runtime error with example.
d) What are local and global variables in python?
[CO-1] [L-2]
e) How to reshape arrays and what does it mean?
f) What is the purpose of ' $r$ ' as prefix in the given statement? $\mathrm{f}=\mathrm{open}(\mathrm{r}$, "d:|color|flower.txt")
g) What is an abstract class in Python?
h) Explain pickling and how import pickle works.
i) What are the uses of file object?
[CO-4] [L-2]
j) Discuss why Python is called as dynamic and strongly typed language.

## PART-A

Q. 2 a) Write a program to prompt for a score between 0.0 and 1.0 . If the score is out of range print an error. If the score is between 0.0 and 1.0, print a grade using the
following table:
Score Grade
$>=0.9 \mathrm{~A}$
$>=0.8 \mathrm{~B}$
$>=0.7 \mathrm{C}$
$>=0.6 \mathrm{D}$
$<0.6 \mathrm{~F}$
[CO-1] [L-4] 10
b) How the decision controls are to be used during programming using Python? How
many conditions can be specified in an IF block?
[CO-1] [L-3] 10
Q. 3 a) Find the area and perimeter of a circle using functions. Prompt the user for input.
[CO-3] [L-3] 10
b) Write a Python program using functions to find the value of nPr and nCr without using inbuilt factorial() function.
[CO-3] [L-3] 10
Q. 4 a) Write a function which receives a variable number of strings as arguments. Find unique characters in each string.
[CO-3] [L-3] 10
b) Write Python program to sort words in a sentence in decreasing order of their length. Display the sorted words along with their length.
[CO-3] [L-3] 10

## PART-B

Q. 5 a) Write Pythonic code that implements and returns the functionality of histogram
using dictionaries. Also, write the function print_hist to print the keys and their
values in alphabetical order from the values returned by the histogram function.
[CO-4] [L-3] 10

## b) Write Pythonic code to create a function called most frequent that takes a string <br> and prints the letters in decreasing order of frequency. Use dictionaries.

[CO-4] [L-3] 10
Q. 6 a) Consider a file called "workfile". Write python program to read and print each byte
in the binary file.
[CO-5] [L-4] 10
b) Write python program to count the occurrences of each word and also count the
number of words in a "quotes.txt" file.
[CO-5] [L-3] 10
Q. 7 a) Program to demonstrate the overriding of the base class method in the derived
class.
[CO-2] [L-3] 10
b) Write python program to demonstrate multiple inheritance.

# End Semester Examination, Dec. 2022 <br> <br> B. Tech. - Third Semester <br> <br> B. Tech. - Third Semester <br> <br> IT DATA SECURITY (BCS-DS-409) 

 <br> <br> IT DATA SECURITY (BCS-DS-409)}

Time: 3 hrs.
Max Marks: 100
No. of pages: 1

> Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from Part-A and TWO questions from Part-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Define 'Denial of Service Attack'. [CO1/L1]
b) Discuss SQL injection.
[CO2/L2]
c) Cite Physical Security threats to any organization
[CO3/L1]
d) How is a company benefitted once Data Security is properly implemented? [CO1/L2]
e) Discuss any one threat technique with proper steps. [CO2/L2]
f) Differentiate between Malware and Phishing? [CO6/L2]
g) Pen down the steps for Social Engineering attacks.
[CO6/L2]
h) Compare Denial of Service and Distributed denial of service. [CO4/L2]
i) What do you mean by security of data in IT?
[CO4/L2]
j) Discuss in brief most popular threats faced by an organization.
[CO4/L2] 2x10

## PART-A

Q. 2 a) Discuss the ways in which phishing attack can be done. Suggest the mitigation of such attacks.
b) Analyze features of any 4 types of Malware
Q. 3 a) Explain the threats to networked devices.
b) Differentiate between Active and Passive capturing.
Q. 4 a) Assess the hardware based mechanism for protecting data.
b) Review the social engineering attacks and its prevention.

## PART-B

Q. 5 a) Compare the Data Erasure and Data Masking.
[CO4] [L2] 10
b) Examine the various types of SQL injection
Q. 6 a) Write the steps for penetration testing.
[CO5] [L2] 10
b) Examine the various types of database security.
[CO5] [L2] 10
Q. 7 a) Describe the process of data Backups.
[CO6] [L2] 10
b) Discuss the importance of rainbow table, how it is useful in password cracking.
[CO6] [L2] 10

## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester <br> COMPUTER NETWORKS (BCS-DS-405)

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) What are the applications of the computer networks?
b) List the advantages and disadvantages of Ring Topology.
c) Differentiate between LAN, WAN and MAN.
d) Compare pure and slotted ALOHA protocols.
e) Explain the term FRAMING in brief.
f) Explain the term subnetting in brief.
g) Differentiate between the forwarding and unicase routing protocols.
h) Explain term De-multiplexing in detail.
i) What do you mean by domain system? Discuss.
j) Explain the frame relay in brief.

## PART-A

Q. 2 Summarize a note on ISO-OSI reference model.
[CO-1] [L-2] 20
Q. 3 a) Compare and contrast a random access protocol with a controlled access protocol.
[CO-2] [L-2] 10
b) Analyze the common standard Ethernet implementations.
Q. 4 a) Mention and explain the four SONET layers.
[CO-3] [L-2] 10
b) What is the relationship between TPs. VPs and VCs?
c) Why no sequence numbers are there in frame relax'?

## PART-B

Q. 5 a) What is the purpose of RIP? What are the functions of a RIP message?
[CO-4] [L-] 10
b) What is the difference between connection-less and connection-oriented services? Which type of service is provided by IPv4 and IPv6?
[CO-4] [L-] 10
Q. 6 a) Write short notes on:
i) SMTP
ii) Voice over IP (VoIP)
iii) DNS
[CO-5] [L-] 15
b) Why do we need POP3 or IMAP4 for electronic mail?
Q. 7 a) What is V-LAN? Explain its architecture.
b) Write in brief about IPSec.
[CO-6] [L-] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Fourth Semester <br> COMPUTER NETWORKS (BCS-DS-405) 

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) What are the three criterion necessary for an effective and efficient network?
b) Group the OSI layers by function.
c) What are the features provided by layering?
d) What are the two interfaces provided by protocols?
e) What is LAN?
f) What is flow control?
g) Define error detection and correction.
h) What are the issues in data link layer?
i) What are the responsibilities of data link layer?
j) Mention the types of errors.

## PART-A

Q. 2 Distinguish between TCP/IP and OSI reference model. Which model is more popular and why?
Q. 3 What do you mean by switching? Explain circuit switching and packet switching techniques with suitable diagram
[CO-2] [L-4] 20
Q. 4 Explain the stop and wait protocol. A channel has a bit rate 4 kbps and a propagation delay of 20 m sec for what range of frame sizes does stop and wait give an efficiency of at least $50 \%$ ?
[CO-3] [L-3] 20

## PART-B

Q. 5 a) A pure ALOHA network transmits 400 -bit frames on a shared channel of 400 kbps.

What is the throughput if the system (all stations together) produces 1000 frames
per second?
[CO-4] [L-4] 10
b) Discuss the Unicast routing protocols available at network layer.
[CO-4] [L-4] 10
Q. 6 What are the three frame types supported by HDLC, describe each? Draw and explain control field associated with each type of frame.
[CO-3] [L-5] 20
Q. 7 Draw a 7 bit hamming code structure. If the hamming code word received by a receiver is 1011011. Assuming the even parity state whether the received code word is correct or wrong if wrong locate the bit in error.
[CO-3] [L-5] 20

# End Semester Examination, Dec. 2022 

# B. Tech. - Fourth Semester <br> DATABASE MANAGEMENT SYSTEM (BCS-DS-404) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Discuss advantages of database systems over file processing systems.
b) How DDL, DML and DCL commands are used in database systems?
c) Define 'schema'.
d) What are integrity constraints?
e) What is lossless dependency?
f) How tuple calculus is different from domain calculus?
g) Why file organization is important?
h) What are spatial databases?
i) State 'Thomas' Write Rule' in time stamp based protocol.
j) What is intrusion detection?

## PART-A

Q. 2 a) Discuss 3-tier architecture with a labeled diagram. Also explain data independence.
[CO-1] [L-2] 10
b) Compare network, hierarchical and relational model on the basis of storage
and redundancy.
[CO-2] [L-4] $\mathbf{1 0}$
Q. 3 a) Explain the difference between BCNF and 3NF. Which one is stricter? Why?
[CO-5] [L-5] 10
b) Consider the following relations with key underlined

Customer (C\#, Cname, Address)
Item (I\#, Iname, Price, Weight)
Order (O\#, C\#, I\#, Quantity)
Write SQL queries for the following:
i) List the names of customers who have ordered items weighing more than 1000 and only those.
ii) List the names of customers who have ordered atleast one item priced over Rs. 500.
iii) Create a view called "orders" that has the total cost of every order.
[CO-4] [L-5] 10
Q. 4 a) What do you mean by indexing? Explain multilevel indexes in detail. [CO-3] [L-2] 10
b) Discuss the way storage is done in B and $\mathrm{B}+$ trees.
[CO-3] [L-3] 10

## PART-B

Q. 5 a) What is a transaction? What are the properties of a transaction? What are the different transaction states?
[CO-2] [L-2] 10
b) Explain how concurrent execution of transactions lead to the problem of inconsistency? What preventive measures should be taken to keep the data consistent?
[CO-2] [L-3] 10
Q. 6 a) What is an SQL injection attack? How it can be prevented?
b) Discuss the authorization and authentication access control.
Q. 7 a) What are object relational databases? How object oriented databases are different than object relational databases?
b) Explain the various steps involved in Data Mining.

## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester

DATABASE MANAGEMENT SYSTEMS (BCS-DS-404)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; $\mathbf{Q} .1$ is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) Describe database schema. Write the roles and responsibilities of database designer.
[CO1 L1]
b) Differentiate between full functional dependency and partial dependency. [CO2 L2]
c) Why joins are better than Cartesian product? Explain with example.
[CO1 L1]
d) Explain the term domain with example.
[CO2 L1]
e) Optimize the query (find the names of all the instructors in the CSE dept who have taught a course in 2009, along with the tiles of courses that they have taught) [CO4 L1] $\sigma_{\text {dept_name }}={ }^{"} \mathrm{CSE}$ " $\left(\sigma_{\text {year }}=2009\right.$ (instructor $\bowtie$ teaches $\left.)\right)$

## PART-A

Q. 2 a) Draw and explain three level architecture of DBMS. What do you understand by logical and physical data independence?
[CO1 L2] 10
b) Outline the importance of normalization. Differentiate among INF, 2NF, 3NF and BCNF with example.
[CO5 L4] 10
Q. 3 Design a detailed E-R diagram for student management system assuming the entities and relationships. Convert it into appropriate database tables for the same.
[CO2 L6] 20
Q. 4 a) Consider the following relations:

Student(ssn, name, address, major)
Course (code, title)
Registered(ssn, code)
Write queries in relational algebra with above schema:
i) List the codes of courses in which at least one student is registered.
ii) List the titles of registered courses.
iii) List the codes of courses for which no student is registered.
iv) Name of students and titles of courses they registered to.
v) List of all courses in which all students are registered.
[CO4 L2] 10
b) Compare Dense index file and sparse index file with suitable diagram for both types.
[CO6 L5] 10

## PART-B

Q. 5 a) Explain 2-phase locking protocol. What benefits do strict two-phase locking protocol provides? Discuss its disadvantages.
[CO3 L2] 10
b) Define "Deadlock". Mention the mechanism for deadlock detection and recovery.
[CO3 L1] 10
Q. 6 Summarize authentication, authorization and access control mechanisms for database security.
Q. 7 Write short notes on:
a) Data mining and its applications.
b) Object oriented and object relational databases.

# End Semester Examination, Dec. 2022 

# B. Tech. - Fourth Semester DATABASE MANAGEMENT SYSTEMS (BCS-DS-404) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
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c) Why joins are better than Cartesian product? Explain with example.
[CO1 L1]
d) Explain the term domain with example.
[CO2 L1]
e) Optimize the query (find the names of all the instructors in the CSE dept who have taught a course in 2009, along with the tiles of courses that they have taught)
[CO4 L1]
$\sigma_{\text {dept_name }}={ }^{"}$ CSE $^{"}\left(\sigma_{\text {year }}=2009(\right.$ instructor $\bowtie$ teaches $\left.)\right)$

## PART-A

Q. 2 a) Draw and explain three level architecture of DBMS. What do you understand by logical and physical data independence?
[CO1 L2] 10
b) Outline the importance of normalization. Differentiate among INF, 2NF, 3NF and BCNF with example.
[CO5 L4] 10
Q. 3 Design a detailed E-R diagram for student management system assuming the entities and relationships. Convert it into appropriate database tables for the same.
[CO2 L6] 20
Q. 4 a) Consider the following relations:

Student(ssn, name, address, major)
Course (code, title)
Registered(ssn, code)
Write queries in relational algebra with above schema:
i) List the codes of courses in which at least one student is registered.
ii) List the titles of registered courses.
iii) List the codes of courses for which no student is registered.
iv) Name of students and titles of courses they registered to.
v) List of all courses in which all students are registered.
[CO4 L2] 10
b) Compare Dense index file and sparse index file with suitable diagram for both types.
[CO6 L5] 10

## PART-B

Q. 5 a) Explain 2-phase locking protocol. What benefits do strict two-phase locking protocol provides? Discuss its disadvantages.
[CO3 L2] 10
b) Define "Deadlock". Mention the mechanism for deadlock detection and recovery.
[CO3 L1] 10
Q. 6 Summarize authentication, authorization and access control mechanisms for database security.
Q. 7 Write short notes on:
a) Data mining and its applications.
b) Object oriented and object relational databases.

## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester

## DATABASE MANAGEMENT SYSTEM (BCS-DS-404)

Time: 3 hrs.

Max Marks: $\mathbf{1 0 0}$
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Define 'DDL and DML'.
b) Give some disadvantages of file processing system.
c) Define 'instances'.
d) What is total participation?
e) Explain referential integrity.
f) Define the term 'domain'.
g) What is PROJECT operation?
h) What are the two types of indices?
i) What do you mean by collision?
j) What is a cascade-less schedule?

## PART-A

Q. 2 a) Explain DBMS architecture in detail along with different level mappings.
[CO-1] [L-1] 10
b) Explain the concept of DBMS in detail. Also explain 3-tier architecture of DBMS.
[CO1] [L1] 10
Q. 3 a) Given the following relations:
vehicle (reg_no, make, colour)
Person (eno, name, address)
Owner (eno, reg_no)
Write expressions in relational algebra to answer the following queries:
i) List the names of persons who do not own any car.
ii) List the names of persons who own only Maruti Cars.
[CO-4] [L-5] 10
b) Explain various types of anomalies in database. How can they be removed from
database?
[CO3] [L-3] 10
Q. 4 a) What do you mean by indexing? Explain ordered indexing and hashed indexing with
their types in detail.
[CO-3] [L-2] 10
b) Differentiate between dynamic and static hashing on the basis of storage allocation.
[CO-3] [L-3] 10

## PART-B

Q. 5 a) What do you understand by deadlock? What are the causes that may lead to deadlock state? How deadlock can be recovered?
[CO-2] [L-2] 10
b) Discuss how concurrent execution of transactions takes place such that conflicts avoided to maintain the consistency of the database?
[CO-2] [L-2] 10
Q. 6 a) Discuss how DBA ensures database security.
[CO-5] [L-1] 10
b) What are DAC, MAC and RBAC model in data security?
Q. 7 a) What are distributed databases? Why distributed databases are more secure than
the simple relational databases?
[CO-6] [L-2] 10
b) What is data warehouse? How data warehouses are different from the databases? Also, explain the technique to use that data.

## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester OPERATING SYSTEM (BCS-DS-403)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) State the difference between process and a program.
b) What is a file? What are its attributes?
c) Differentiate between internal and external fragmentation.
d) State the significance of a wait-for-graph.
f) Discuss the significance of buffer cache.
g) State the various functions of operating system.
h) Write two advantages of virtual memory.
i) Differentiate between application software and system software.
j) Discuss the significance of Short term scheduler.
k) What do you mean by an I/O-bound process?

## PART-A

Q. 2 a) Define 'operating system'. Explain the operating system architecture in details and also mention the services offered by an operating system.
b) Define the terms:
i) Multitasking.
ii) Multiuser.
iii) Multithreading.
iv) Multiprocessing.
[CO-1] [L-1] 10
Q. 3 a) What are schedulers? Explain the different types of schedulers stating their function and scheduling criteria.
[CO-3] [L-2] 10
b) Consider the following set of processes, their arrival time and burst time. A larger
priority number has a higher priority.

| Process | Arrival time | Burst time | Priority |
| :---: | :---: | :---: | :---: |
| P1 | 0 | 6 | 4 |
| P2 | 3 | 5 | 2 |
| P3 | 3 | 3 | 6 |
| P4 | 5 | 5 | 3 |

Draw the Ganntt chart and find out average waiting time and turnaround time using:
i) FCFS.
ii) Priority scheduling.
[CO-3] [L-4] 10
Q. 4 a) What is race condition? Explain various algorithm based solution for critical section
problem.
[CO-4] [L-2] 10
b) State and explain the Peterson's Solution for 2 - process problem.

## PART-B

Q. 5 Consider the following snapshot of a system. Where $A, B, C$ are different types of resources:

| Process | Allocation |  |  |  | Max |  |  |  | Available |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | A | B | C | A | B | C | A | B | C |  |  |
| P0 | 0 | 0 | 2 | 0 | 0 | 4 | 1 | 0 | 2 |  |  |
| P1 | 1 | 0 | 0 | 2 | 0 | 1 |  |  |  |  |  |
| P2 | 1 | 3 | 5 | 1 | 3 | 7 |  |  |  |  |  |
| P3 | 6 | 3 | 2 | 8 | 4 | 2 |  |  |  |  |  |
| P4 | 1 | 4 | 3 | 1 | 5 | 7 |  |  |  |  |  |

i) What is the content of Matrix need?
ii) Is the system in safe state? If yes, find the safe sequence.
iii) If a request from P2 (002) arrives, can it be granted immediately? [CO-4] [L-5] 20
Q. 6 a) Consider the following page reference string: $1,2,3,4,2,1,5,6,2,1,2,3$, 7, 6,
$2,1,2,3,6$ Find the number of page faults with
i) FIFO.
ii) Optimal page replacement.
iii) LRU page replacement.

Algorithms where four free frames are available initially. Which algorithm gives
minimum no of page faults?
b) How demand paging works? Explain in detail.
Q. 7 a) Explain the indexed allocation of disk space.
b) Suppose that a disk drive has 5000 cylinders ( 0 to 4999 ) the drive is currently serving a request at cylinder 143 and previous request was at 125 the queue of
pending request in FIFO order is: 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130
Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for the following disk scheduling algorithms?
i) FCFS.
ii) SCAN.
iii) C-LOOK.

## End Semester Examination, Dec. 2022

## B. Tech. - Third Semester

## COMPUTER ORGANISATION AND ARCHITECTURE (BCS-DS-402)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. $\mathbf{1}$ is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Simplify the following Boolean expressions to a minimum number of literals: $x y+x y^{\prime}$
[CO-1] [L-1]
b) Design the block diagram of the hardware that implements the following register transfer statement:
$Y^{\prime} T^{\prime}$ : R3<-R2, R2<-R3
[CO-2] [L-6]
C) Create the sequence of register transfer corresponding to instruction fetch.
[CO-2] [L-6]
d) Describe the functionality of arithmetic unit in CPU. [CO-3] [L-2]
e) What is need of micro-program sequencer in micro-programmed control unit?
[CO-4] [L-1]
f) Which type of addressing mode is used in an instruction of the form SUB $X, Y$ ?
[CO-4] [L-1]
g) Describe stored program concept used in computer system.
[CO-3] [L-1]
h) Suppose $2.5 \%$ of a program is sequential and remaining part is ideally parallel. Find out the maximum speed up that could be achieved according to Amdahl's law, by assuming program is run on a computer having very large number of processors.
[CO-6] [L-6]
i) Describe different types of semi-conductor memory used as the main memory in a computer.
j) Describe n-dimensional hypercube.

## PART-A

Q. 2 a) Differentiate the working of Multiplexer and De-Multiplexer with the help of block diagram and truth table.
[CO-1] [L-3] 10
b) Obtain the truth table of the following functions and express each function in sum of minterms and product of maxterms:
i) $(b+c d)(c+b d)$
ii) $\left(c d+b ' c+b d^{\prime}\right)(b+d)$
iii) $\left(c^{\prime}+d\right)\left(b+c^{\prime}\right)$
iv) $b d^{\prime}+a c d^{\prime}+a b^{\prime} c+a^{\prime} c^{\prime}$
[CO-1] [L-2] 10
Q. 3 a) Design the timing diagram by assuming that SC is cleared to 0 at time T 4 if the control signal C6 is active.
C6T4:SC<-0
C7 is activated with the positive clock transition associated with T1. [CO-2] [L-6] 10
b) Differentiate between direct and an indirect address instruction. Also explain how many references to memory are needed for each type of instruction to bring an operand into the processor register.
Q. 4 A general register bus organization has 16 registers with 32 bits in each, an ALU and a destination decoder.
a) How many multiplexers are there in th $A$ bus \& what is the size of each multiplexer?
b) How many selection inputs bare needed for MUX A \& MUX B?
c) How many inputs and outputs are there in the decoder?
d) How many inputs and outputs are there in ALU for data including input and output carries?
e) Formulate a control word for the following instruction $\mathrm{R} 1<-\mathrm{R} 2+\mathrm{R} 3$. [CO-3] [L-2] $\mathbf{4 \times 5}$

## PART-B

Q. 5 a) Differentiate between micro-processor and micro-program. Also explain the difference between hardwired control and micro-programmed control. Is it possible to have hardwired control associated with a control memory?[CO-4] [L-2] 16
b) Using the mapping procedure give the first micro-instruction address for the following operation code:
i) 1111
ii) 0011
[CO-4] [L-3] 4
Q. 6 a) What is the need for memory hierarchy? Draw and explain the block diagram of memory hierarchy in computer system.
b) Explain in details different types of cache mapping organizations.
Q. 7 a) Formulate a four-segment instruction pipeline for a computer. Specify the operations to be performed in each segment.
[CO-6] [L-2]
b) A non-pipeline system takes 50 ns to process a task. The same task can be processed in a six-segment pipeline with a clock cycle of 10 ns . Determine the speedup ratio of the pipeline for 100 tasks. What is the maximum speed up that can be achieved?
[CO-6] [L-2] 10

## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester <br> COMPUTER ORGANIZATION AND ARCHITECTURE (BCS-DS-402)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Differentiate between computer architecture and organization.
[CO-1] [L-1]
b) Explain ROM organization with the help of chip diagram. [CO-6] [L-2]
c) What is D3T4: $\mathrm{SC}<=0$ in timing and control unit? [CO-2] [L-1]
d) Draw the block diagram of decoder.
[CO-2] [L-1]
e) Explain peripheral devices and their characteristics?
[CO-6] [L-1]
f) Give an example of one-address instruction.
g) What is micro-architecture?
[CO-3] [L-1]
h) Differentiate between privileged and non-privileged instructions.
i) Define throughput and speedup in pipelining.
[CO-5] [L-1]
j) Design the control word for $R_{1} \neg R_{6}+R_{7}$ for general register organization.
[CO-2] [L-1] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Draw block diagram of a computer architecture explaining all its concepts.
[CO-1] [L-2] 10
b) Explain common bus system design (using tri-state buffers).
[CO-1] [L-2] 10
Q. 3 a) Compare RISC with CISC.
[CO-2] [L-4] 10
b) What do you understand by instruction formats? Explain in detail.
[CO-2] [L-1] 10
Q. 4 a) Differentiate between hardwired and micro programmed control memory.
[CO-3] [L-4] 10
b) Sketch the block diagram of 8086 microprocessor's architecture in detail along
with
its functional blocks.
[CO-3] [L-3] 10

## PART-B

Q. 5 a) Signify the role of interrupts in process state transitions.
[CO-4] [L-2] 10
b) Explain microinstruction sequencing of control memory in detail.
[CO-4] [L-2] 10
Q. 6 a) Explain pipelining in detail with the help of an example.
[CO-5] [L-2] 10
b) Combine all necessary steps for concurrent access to memory and cache.
[CO-5] [L-6] 10
Q. 7 a) What is the need of memory hierarchy? Also, explain locality of reference principle.
[CO-6] [L-1] 10
b) Write about different replacement algorithms and write policies.
[CO-6] [L-2] 10

## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester <br> COMPUTER ORGANIZATION AND ARCHITECTURE (BCS-DS-402)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Differentiate between computer architecture and organization.
[CO-1] [L-1]
b) Explain ROM organization with the help of chip diagram. [CO-6] [L-2]
c) What is D3T4: $\mathrm{SC}<=0$ in timing and control unit?
[CO-2] [L-1]
d) Draw the block diagram of decoder.
[CO-2] [L-1]
e) Explain peripheral devices and their characteristics?
[CO-6] [L-1]
f) Give an example of one-address instruction.
g) What is micro-architecture?
[CO-3] [L-1]
h) Differentiate between privileged and non-privileged instructions.
i) Define throughput and speedup in pipelining.
[CO-5] [L-1]
j) Design the control word for $R_{1} \neg R_{6}+R_{7}$ for general register organization.
[CO-2] [L-1] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Draw block diagram of a computer architecture explaining all its concepts.
b) Explain common bus system design (using tri-state buffers). $\begin{array}{ll}{[C O-1][\mathrm{L}-2] 10} \\ {[C O-1][\mathrm{L}-2] \mathbf{1 0}}\end{array}$
Q. 3 a) Compare RISC with CISC.
[CO-2] [L-4] 10
b) What do you understand by instruction formats? Explain in detail.
[CO-2] [L-1] 10
Q. 4 a) Differentiate between hardwired and micro programmed control memory.
[CO-3] [L-4] 10
b) Sketch the block diagram of 8086 microprocessor's architecture in detail along
with
its functional blocks.
[CO-3] [L-3] 10

## PART-B

Q. 5 a) Signify the role of interrupts in process state transitions.
[CO-4] [L-2] 10
b) Explain microinstruction sequencing of control memory in detail.
[CO-4] [L-2] 10
Q. 6 a) Explain pipelining in detail with the help of an example.
[CO-5] [L-2] 10
b) Combine all necessary steps for concurrent access to memory and cache.
[CO-5] [L-6] 10
Q. 7 a) What is the need of memory hierarchy? Also, explain locality of reference principle.
[CO-6] [L-1] 10
b) Write about different replacement algorithms and write policies.
[CO-6] [L-2] 10

## End Semester Examination, Dec. 2022

## B. Tech. - Third Semester

COMPUTER ARCHITECTURE AND ORGANIZATION (BCS-DS-402)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) What do you understand by computer organization?
b) Distinguish between computer architecture and organization.
c) Discuss the role of fetch and decode instruction during execution.
d) What is stored program concept?
e) Define 'Memory organization'.
f) Explain RTL interpretation of instruction formats.
g) Define instruction execution cycle format.
h) Define 'concept of pipelining'.
i) Explain peripheral devices and their characteristics.
j) Define 'replacement algorithms in memory organization'.

## PART-A

Q. 2 a) Draw explains 4 X 1 de-multiplexer with the help of block diagram. Also differentiate between de-multiplexer \& decoder.
b) Explain in detail instruction set architecture of a CPU.
Q. 3 a) Explain different types of addressing modes in detail.
[CO-2] [L-2] 10
b) What do you understand by instruction formats? Explain in detail. [CO-2] [L-2] 10
Q. 4 a) Explain the Fetch-Decode-Execute cycle with the help of diagram. [CO-3] [L-2] 10
b) Sketch the block diagram of 8086 microprocessor's architecture in detail alongwith its functional blocks.
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Describe peripheral devices and their characteristics: input-output subsystems, I/O device interface.
[CO-4] [L-2] 10
b) Describe different I/O device interfaces.
[CO-4] [L-2] 10
Q. 6 a) Explain three major difficulties occurred in instruction pipeline and also explain how will these difficulties be handled by computers?
b) Explain different types of interrupts in details.
[CO-5] [L-2] 10
Q. 7 a) Explain different types of control memory.
[CO-6] [L-2] 10
b) Explain different types of mapping techniques used in cache memory.
[CO-6] [L-2] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Fourth Semester <br> DISCRETE MATHEMATICS (BCS-DS-401) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions.
a) Explain the Involution Law.
b) Let $A=\{4,5,6\}$ and $R=\{(4,4),(5,5),(6,6)$. Then what type of relation is this.
c) In how many ways can a group of 10 girls appear for a photograph in a row, if the leader of the group is to occupy the chair at the centre?
d) Particular solution of the equation is:
$a_{r}-2 a_{r-1}+4 a_{r-2}=7$
e) Let ring $Z_{30}=\{0,1,2,3 \ldots \ldots 2\}$ of integer modulo 30 . Then $7^{-1}$ will be.
f) A vertex which is having zero degree is called as.......... Explain it with the help of suitable diagram.
g) A graph with all their vertexes are connected to each other is called as........Explain it with the help of suitable diagram.
h) A commutative ring $R$ is an............ if $R$ has no zero divisors.
i) Explain group in detail and its properties with the help of suitable examples.
j) Explain biconditional statement with the help of suitable examples.

## PART-A

Q. 2 a) Explain Partial order relation and let $A=\{1,2,3,4\}$ then show whether the relation ( $x, y$ ) belongs to $R$, if $x>=y$ defined on the sets of positive integers is a partial order relation.
b) Define Multiset. Discuss various operations that can be performed on Multisets. How a Multiset can be different from normal set. Explain with examples.
Q. 3 a) Explain all types of compound statement in detail with the help of suitable examples and by truth table show that $p \wedge(q \vee r) \equiv(p \wedge q) \vee(p \wedge r)$.
b) Explain Tautologies and Contradictions in detail and also explain their difference with the help of suitable examples in detail.
Q. 4 a) How many permutations can be made out of the letter of word "COMPUTER"? How many of these
i) Begin with C
ii) End with R
iii) Begin with $C$ and end with $R$
b) A committee of 6 is to be selected from 4 teachers, 5 boys and 6 girls. Find the number of ways in which this can be done, so that at least one boy and at least one girl are in the committee.

## PART-B

Q. 5 a) Solve the following recurrence relation for $r>=2$ $a_{r}-a_{r-1}-6 a_{r-2}=-30, a_{0}=20, a_{1}=-5$.
b) Find the particular solution of
$a_{r}-2 a_{r-1}+a_{r-2}=4$
Q. 6 a) Let Ring $Z_{10}=\{0,1,2,3 \ldots ., 9\}$ of integer modulo 10. Then find.
i) Find units of $Z_{10}$
ii) find $-3,-8$
iii) Find inverse of 3 and 9
iv) find roots of the eq: $2 x^{2}+4 x+4$
b) Explain and compare monoid and sub-monoid in detail and its properties with the help of suitable examples.

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Q. 7 a) Explain Dijkstra's algorithm and find the shortest path between a and $z$ using Dijkstra's algorithm for the following graph.

b) Find the minimum spanning tree using Kruskal's algorithm for the following graph.


# End Semester Examination, Dec. 2022 <br> B. Tech. - Third / Fourth Semester <br> EMERGING TRENDS IN GAME DEVELOPMENT (BCS-DS-327) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) Differentiate difference between 'digital' and 'physical games'.
[CO-1] [L-1]
b) What is superscalar architecture? [CO-2] [L-2]
c) Give examples of 2D and 3D games. [CO-1] [L-1]
d) What is gaming genre? [CO-3] [L-1]
e) What are the benefits of cloud computing? [CO-5] [L-2]
f) Differentiate between 'SaaS' and 'IaaS'.
g) What is vertex buffer?
h) Explain the usage of Materials, Textures, and Lights in respect of WebGL.
[CO-4][L-1]
i) Describe simulation games with examples.
[CO-6] [L-2]
j) Give the significance of CUDA architecture.
[CO-2] [L-1] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) What is Gaming engine? Explain the need of Gaming Engine and illustrate various gaming engines available in the market.
[CO-1] [L-2] 10
b) Explain various programming languages available for developing the games along with the advantages and disadvantages of each language. [CO-1] [L-3] 10
Q. 3 a) Give an introduction to Javascript. Explain why it is useful in developing games?
[CO-2][L-2] 10
b) What is WebGL? Explain the properties of WebGl.
[CO-2] [L-3] 10
Q. 4 a) Explain uniform and attribute variables in Shader language.
[CO-3] [L-1] 10
b) What is Inter Shader Communication?
[CO-3] [L-2] 10

## PART-B

Q. 5 Explain GPU. Differentiate between GPU and CPU in terms of performance with the help of diagram.
[CO-4] [L-4] 20
Q. 6 a) What is cloud computing? Explain various deployment models in Cloud.
[CO-5][L-3] 10
b) Compare public and private cloud, in respect of applications and usages of the clouds.
[CO-5] [L-4] 10
Q. 7 a) What is Vulkan development environment? Explain generation of mip maps in cloud computing.
[CO-6] [L-3] 10
b) What is topology and Geometry? Explain why "polygon needs be convex".

# End Semester Examination, Dec. 2022 <br> <br> B. Tech. - Third Semester <br> <br> B. Tech. - Third Semester CYBER SECURITY CONCEPTS (BCS-DS-326) 

 CYBER SECURITY CONCEPTS (BCS-DS-326)}

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Mention challenges and constraints of internet Governance.
[CO-1] [L-2]
b) Differentiate between threats and vulnerability.
[CO-1] [L-3]
c) Describe 'Ethical hacking'.
[CO-2] [L-2]
d) Define 'Malwares and their working'.
[CO-3] [L-1]
e) Compare between authentication and authorization.
[CO-3] [L-2] 4x5

## PART-A

Q. 2 a) Define 'threats and its types' with the help of suitable examples.
[CO-1] [L-1] 10
b) Explain the need for a comprehensive cyber security policy.
[CO-1] [L-2] 10
Q. 3 a) Describe 'Weak Authentication'. How one organization strengthen it?
[CO-2] [L-3] 10
b) Why an organization required Cyber Security Safeguards? Explain any two with the help of some examples.
[CO-2] [L-2] 10
Q. 4 a) Give brief introduction to basic security for HTTP Applications and Services.
[CO-3] [L-3] 10
b) Write down various security considerations and challenges.
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Explain 'intrusion detection' and its prevention techniques in detail. [CO-3] [L-1] $\mathbf{1 0}$
b) Describe the importance of session analysis and types of information one can find for a session.
[CO-4] [L-2] 10
Q. 6 a) What you mean by cryptography? Also describe symmetric key and asymmetric key cryptography and their applications.
[CO-4] [L-2] 10
b) Explain how Packet Filtering is different from Stateful Packet Inspection Firewall.
[CO-4] [L-3] 10
Q. 7 Write short notes on following:
a) Security at Network Layer-IPsec.
b) Digital Signature.
c) Threat Management.
d) Denial of Service.
[CO-2] [L-2] 5x4

## End Semester Examination, Dec. 2022

## B. Tech. - Third Semester

## INTRODUCTION TO COMPUTER ANIMATION ALGORITHM, TOOLS AND TECHNIQUES (GG) (BCS-DS-307)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) Discuss the use of color wheel.
[CO-3] [L-1]
b) Discuss the features of blender graphics tools.
[CO-6] [L-2]
c) Differentiate back end verses Front End with example. [CO-3] [L-2]
d) Discuss the use of frame buffering detail.
[CO-1] [L-1]
e) Discuss the minimum system requirement of GIMPS graphics tool.
[CO-5] [L-1]
f) Differentiate Interactive and non interactive graphics.
g) Discuss the history of typography.
h) Discuss the use of rotation command in blender.
[CO-4] [L-2] 2½×8

## PART-A

Q. 2 a) Differentiate raster scan and random scan system display in detail. [CO-1] [L-2] 10
b) Explain in detail the Major application areas of Computer Graphics. [CO-1] [L-1] 10
Q. 3 a) Illustrate in detail the anatomy of a Typeface and explain the Typeface classifications
[CO-2] [L-2] 10
b) Design a web page using the following style.
i) Heading 2 text should be Time new Roman and centre align,
ii) Paragraph must be center aligned and text family must be Arial and size should be 160\%.
iii) Paragraph must be left aligned and text family must be veranda and color should red.
[CO-2] [L-6] 10
Q. 4 The triangle position is $A(1,1), B(3,5)$ and $C(2,2)$; Translate the triangle by 2 unit about $X$ axis and 3 unit about $Y$ axis and draw the outcome.
[CO-3] [L-3] 20

## PART-B

Q. 5 a) What do you understand by keyframe animation? Define 'facial animation'. Explain various methods by which the facial movements are done. [CO-4] [L-2] 10
b) Compare bender with other open source graphics tools. How blender is better than other software justify.
[CO-4] [L-2] 10
Q. 6 Discuss the following terms of graphics and animation.
[CO-5] [L-2]
a) Physical based animation.
b) Flocking.
c) Tensor visualization.
d) Vector visualization.
Q. 7 a) Describe various data representation technique. Explain the best way to represent data.
b) Define 'animation production'. Explain various principles of animation in detail.

## End Semester Examination, Dec. 2022

B. Tech. - Third Semester

INFORMATION SECURITY FUNDAMENTALS (CF) (BCS-DS-305)
Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) Differentiate between 'virus and worm'.
b) Define 'physical security'.
c) What is role of SSL in security?
d) Describe sue of RAID.
e) What is denial of service attack?
f) What is the difference between data in rest and data in use?
g) Compare and contrast trojan and spyware.
h) What do you mean by private key and public key in cryptography?
i) What is compliance in information security?
J) Discuss in detail DoS attack?

## PART-A

Q. 2 a) Discuss in detail concept of information security. What are issues associated with it?
[CO-1] [L-2] 10
b) What is CIA triad and why is it important?

10
Q. 3 a) What do you mean by digital certificate? How is it used?
[CO-2] [L-1] 10
b) Discuss Operations Security. Explain operations security process.
[CO-2] [L-1] 10
Q. 4 a) Explain in detail the physical threat faced while dealing with physical security.
[CO-3] [L-3] 10
b) What are various methods to protect networks and network resources against the
array of threats?
[CO-3] [L-3] 10

## PART-B

Q. 5 a) Discuss methods by which we can mitigate the various threats and vulnerabilities for operating system security.
b) What is a vector for malware propagation? Explain Email, instant messaging, and
removable media for malware propagation.
[CO-4] [L-3] 10
Q. 6 a) Discuss the functions and importance of various information security models.
[CO-5] [L-2] 10
b) Discuss various auditing standards in information security audit. [CO-5] [L-2] 10
Q. 7 a) Define 'GRC'. What are the various pillars of GRC?
b) What are the various approaches of information security audit? Explain information
audit process.

# End Semester Examination, Dec. 2022 

## B. Tech. - Third Semester

## INFORMATION SECURITY FUNDAMENTALS (BCS-DS-305)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) Discuss the Data in Motion.
(CO2/L1)
b) Differentiate Data at Rest and Data in use.
(C02/L1)
c) Define 'Authorization'.
(C02/L1)
d) Describe the Internal Audit.
(CO1/L1)
e) Discuss SAS 70 Audits.
f) Discuss in brief vulnerability scanning.
g) Differentiate virus and worms.
h) Define 'Tailgating'.
i) Discuss the Sarbanes -Oxley.
j) Define 'Database security'.

## PART-A

Q. 2 a) Define 'information security'. What are issues associated to it? Discuss Demming Cycle.
[CO-1] [L-1] 10
b) Define 'operation security'. Discuss the process of operation security.
[CO-1] [L-1] 10
Q. 3 a) Discuss how to develop information security for an IT organization. What are different types of information security?
[CO-2] [L-5] 10
b) Differentiate between vulnerabilities, threats and risk analysis. Also, give countermeasures to mitigate the risk.
[CO-2] [L-3] 10
Q. 4 a) Explain the different types of threats and vulnerabilities.
[CO-3] [L-2] 10
b) Discuss the controls for physical security along with their categories. Also explain Physical Security threats.
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Discuss the need of operating system protection control. Also, explain how to harden the operating system.
[CO-4] [L-5] 10
b) Discuss the vulnerabilities associated with database. Also suggest data base security techniques.
[CO-5] [L-1] 10
Q. 6 a) Describe Information Security Audit. Which are audit drivers? Give benefits of Information Security Audit.
b) Discuss the challenges affecting log management.
Q. 7 a) Define GRC. Discuss its pillars. Discuss the significance of GRC to business? How it can benefit an organization?
b) Explain the Addressing Multiple Regulations for Information Security Technical Frameworks for IT Audits.
[CO-6] [L-2] 10

## End Semester Examination, Dec. 2022

## B. Tech. - Third Semester <br> INTRODUCTION TO IT INFRASTRUCTURE LANDSCAPE (BCS-DS303)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) Give the syntax to declare, open, fetch and close a cursor.
b) Define pits and lands in storage?
c) Relate data mining with data warehouse.
d) Define 'virtual machine'.
e) Differentiate between data warehouse and data mart.
f) Mention the various types of DBMS.
g) In which device the MAC table is maintained?
h) Which tool is used for the remote management of the server manager?
i) Compare between switches and routers.
j) What is an Application server?

## PART-A

Q. 2 a) What is a sub-query? How it is implemented using from clause? Write the syntax.
b) Explain the difference between an inner join and outer join using an example.
c) What is JDBC? State the steps to connect to the database in java.
Q. 3 a) Discuss Storage Network technology. Differentiate between SAN and NAS. $\mathbf{1 0}$
b) Write notes on:
i) Switched Fabric.
ii) Storage virtualization.
Q. 4 a) Describe virtualization. Justify how it is beneficial? Discuss in detail about Hypervisors.
b) Discuss the steps carried out for server deployment and server management.

## PART-B

Q. 5 a) Draw and explain the architecture of LDAP protocol in detail. How LDAP inheritance works?
a) What is LDIF? Create directory entries using LDIF.
Q. 6 a) Write notes on:
$5 \times 2$
b) Define 'routing'. How different types of routing methods are useful in networking?
Q. 7 a) Define MQ SERIES and its applications. Is this a Middlewar? Discuss. What products does MQ SERIES contains.
b) Explain briefly OLAP. Justify all its operations with the help of an example.

# End Semester Examination, Dec. 2022 

## B. Tech. - Third Semester <br> OBJECT ORIENTED PROGRAMMING SYSTEM (BCS-DS-302/CS304A)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) Discuss how a pointer can be initialized.
[CO-1] [L-2]
b) List any two object based languages.
[CO-1] [L-1]
c) Define reference variable. Give its syntax.
[CO-2] [L-2]
d) Differentiate between a bug and an error with examples.
[CO-6] [L-2]
e) Describe data members and member functions?
[CO-1] [L-2]
f) Define the term: 'object' with an example.
[CO-1] [L-1]
g) List any four applications of Object oriented programming.
[CO-1] [L-1]
h) Name the operators that cannot be overloaded.
[CO-3] [L-1]
i) Differentiate between 'Constructor' and 'Destructor' with syntax.
[CO-2] [L-2]
j) Compare Object oriented language and Object based language. [CO-1] [L-4] $\mathbf{2 x 1 0}$

## PART-A

Q. 2 a) Which operator is used for dynamic memory allocation and de-allocation in C++? Discuss each of these operators.
[CO-2] [L-2] 10
b) Define a class Employee. Declare Private data members (Employee_name, department, emp_id, age, salary). Explain how private data can be accessed in main function.
[CO-1] [L-2] 10
Q. 3 Create two classes DM and DB which store the value of distances. DM stores distances in meters and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results maybe a DM object or DB objects, depending on the units in which the results are required. The display should be in the format of feet and inches or meters and centimeters depending on the object on display. Implement the program in $\mathrm{C}++$.
[CO-2] [L-3] 20
Q. 4 a) Explain the concept of passing objects as arguments to a function with the help of suitable example.
[CO-1] [L-2] 10
b) Demonstrate the concept of overloading of binary operators using friend function.
[CO-3] [L-3] 10

## PART-B

Q. 5 Create a class named 'Engineering' with suitable members. Derive two classes namely 'Computer_Engg' and 'Mechanical_Engg' from the base class. Assume suitable members in these sub classes. Implement the concept of inheritance considering public mode of inheritance.
[CO-4] [L-3] 20
Q. 6 a) Design a program to open a file and read a paragraph from it. $\quad[\mathrm{CO}-5][\mathrm{L}-4] \mathbf{1 0}$
b) Apply file handling to count the number of lines, spaces and tabs in a file.
[CO-5] [L-3] 10
Q. 7 a) Compare class template and function template. Write a program to swap two integers and floats using with the templates.
[CO-6] [L-5] 10
b) Differentiate between error and exception. Explain the use of try, catch and throw for exception handling in $\mathrm{C}++$ with the help of an example. [CO-6] [L-3] $\mathbf{1 0}$

# End Semester Examination, Dec. 2022 

# B. Tech. - Third Semester <br> OBJECT ORIENTED PROGRAMMING (BCS-DS-302A) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) List applications of Object oriented programming.
[CO1][L1]
b) List any two Object based languages.
[CO1][L1]
c) Define reference variable. Give its syntax. [CO2][L2]
d) Differentiate between an error and an exception with example.
[CO6][L4]
e) Describe data members and member functions?
f) Define 'class' with example.
[CO1][L1]
g) Name the operators that cannot be overloaded.
h) Differentiate between 'Copy Constructor' and 'Default constructor' with syntax.
i) Compare Object oriented language and Object based language.
[CO1][L4]
j) Discuss how a pointer can be declared and initialized.
[CO1][L2] 2x10

## PART-A

Q. 2 a) Define a class Bank_Account. Declare Private data members (Holder_name, age, account_no, address, type_of_account). Explain how private data can be accessed in main function. Assume appropriate data members and member functions.
b) Which operator is used for dynamic memory allocation and de-allocation in $\mathrm{C}++$ ? Discuss each of these operators.
[CO-2] [L-2] 10
Q. 3 Create two classes DM and DB which store the value of distances. DM stores distances in metres and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results maybe a DM object or DB object, depending on the units in which the results are required. The display should be in the format of feet and inches or metres and centimetres depending on the object on display. Implement the program in $\mathrm{C}++$.

## [CO2][L3] 20

Q. 4 a) Define default arguments and explain how we can use them with the help of an example.
[CO1][L2] 10
b) Write a program in C++ to demonstrate overloading of ' + ' operator to concatenate two strings.
[CO3][L3] 10
Q. 5 a) Create a class to demonstrate how to make a Private Member Inheritable. [CO4][L3] 10
b) Discuss how ambiguity can be resolved in Inheritance.
Q. 6 Explain how can the following operations be performed on a File with the help of a program:

- Opening a file
- Writing to a File
- Reading from a File
- Close a File
- Counting number of spaces


## 20

Q. 7 a) Write a C++ program to find sum of Array using function template. [CO6][L4] 10
b) Define exception handling. Explain the use of try, catch and throw for exception handling in $\mathrm{C}++$ with the help of an example.
[CO6][L2] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Third Semester <br> DATA STRUCTURES AND ALGORITHMS (BCS-DS-301)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) What do you understand by term data structures?
b) State five structured data types and their applications.
c) Explain 'Asymptotic Notations'.
d) What do you mean by ADT?
e) Discuss the concept of Traversing and Searching.
f) Differentiate between 'B Tree' and 'B+ Tree'.
g) State the various techniques to represent graphs.
h) Discuss in brief, the need of various sorting algorithms.
i) What do you mean by Hashing function in the world of data analysis?
j) Describe the applications of Queues.

## PART-A

Q. 2 What do you mean by an analysis of an algorithm. Discuss any three algorithms with their asymptotic notations and time-space trade off.
[CO-1] [L-2] 20
Q. 3 Write an algorithm to evaluate an Infix expression into Postfix expression. Also state the steps to evaluate given infix expression as $\mathrm{K}+\mathrm{L}-\mathrm{M}^{*} \mathrm{~N}+\left(\mathrm{O}^{\wedge} \mathrm{P}\right)$ * $\mathrm{W} / \mathrm{U} / \mathrm{V} * \mathrm{~T}+\mathrm{Q}$ into postfix expression using stack.
[CO-2] [L-2] 20
Q. 4 Discuss in detail the core concept of Binary Search Tree and its operations with complexity analysis, supported with some suitable example.
[CO-3] [L-2] 20

## PART-B

Q. 5 Discuss the concept of Minimum Spanning Tree. Also, explain MST using Kruskal's algorithm support with example.
[CO-4] [L-2] 20
Q. 6 Discuss Bubble sort algorithm in detail, with its limitation and advantages? Exhibit all the passes to sort the given list using Bubble sort technique.
[12 23458996630 59]
[CO-5] [L- 2] 20
Q. 7 Write short notes on (any two each part carries 10 marks):
a) Stacks and Queues in real world.
b) Heap Sort in detail.
c) Performance and Comparison of sorting algorithms.
d) Hashing.

# End Semester Examination, Dec. 2022 <br> BCA - Second Semester <br> SOFTWARE ENGINEERING (BCA-DS-203/BCA-405A (CB)/BCA- <br> 405(CB) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from Part-A and TWO questions from Part-B. Marks are indicated against each question.
Q. 1 a) $\qquad$ is a software development activity that is not a part of software processes.
i) Validation
ii) Specification
iii) Development
iv) Dependence
b) $\qquad$ is defined as the process of generating analysis and designing documents?
i) Re-engineering
ii) Reverse engineering
iii) Software re-engineering
iv) Science and engineering
c) What is a Functional Requirement?
i) specifies the tasks the program must complete
ii) specifies the tasks the program should not complete
iii) specifies the tasks the program must not work
iv) All of the mentioned
d) What does SDLC stands for?
i) System Design Life Cycle
ii) Software Design Life Cycle
iii) Software Development Life Cycle
iv) System Development Life cycle
e) Who proposed the spiral model?
i) Barry Boehm
ii) Pressman
iii) Royce
iv) IBM
f)
i) Customer collaboration
ii) Individuals and interactions
iii) Working software
iv) All of the mentioned
g) Software Debugging is known as $\qquad$
i) identifying the task to be computerized
ii) creating program code
iii) creating the algorithm
iv) finding and correcting errors in the program code
h) In agile development it is more important to build software that meets the customers' needs today than worry about features that might be needed in the
future. (T/F)
i) Requirements models depict software in which three domains?
i) architecture, interface, component.
ii) cost, risk, schedule.
iii) information, function, behavior.
Iv) None of the above.
j) Non-functional requirements can be safely ignored in modern software development projects.(T/F)
Q. 2 a) Define software process? How is it different from a software product? Discuss any two software process models.
[CO-1,2] [L-1] 10
b) Discuss advantages and disadvantages of prototyping model over evolutionary
model of software development.
[CO-1,2] [L-2] 10
Q. 3 What is cost estimation? Explain various cost estimation techniques used in software engineering. Discuss how COCOMO model helps in cost estimation.[CO-2,3 [L-2] 20
Q. 4 a) Draw ER diagram and DFD level 1 for university examination system. Also mention
the requirements that has been considered for a typical university examination
system
[CO-3] [L-3] 10
b) Discuss any two requirements elicitation techniques with suitable examples.
[CO-2,3] [L-2] 10

## PART-B

Q. 5 How is testing integrated with the life cycle of a software product? Is it sufficient to test a software product only at the end of its life cycle? Explain
[CO-4] [L-4 ] 20
Q. 6 a) Enumerate the important steps involved in developing a software system using
object-oriented methodology.
b) Outline the criteria for selecting a software design method.
Q. 7 a) Discuss integration testing. What are different approaches for it? Explain any three
approaches with merits and demerits.
[CO-6] [L-2] 10
b) Explain all process metrics required for software maintenance of software
[CO-6] [L-3] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - First Semester <br> INTRODUCTION TO OPEN-SOURCE SOFTWARE AND OPEN <br> STANDARDS <br> (BCS-DS-104A) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Discuss the role of apache server.
b) Differentiate between open and closed standards.
c) Define 'SCOSTA'.
d) Outline role of GNU general public license.
e) Discuss about early adopters.
f) Illustrate the role of ITU.
g) Outline the role of Bureau of Indian Standards.
h) Define the features of Free Software Foundation.
i) Explain the role of ASEAN.
j) Illustrate the significance of copyleft.
$[C O-1,2,4,5,6][\mathrm{L}-1,2,3,4] \mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Compare and contrast between open source and closed source softwares. Also discuss the features of any two open as well as closed source softwares.
[CO-4][L-4] 10
b) Justify the vision of OSI with example.
[CO-2][L-6] 10
Q. 3 a) Illustrate the significance of Apache Software Foundation (ASF). [CO-2][L-2] 10
b) Justify how one can contribute to open-source projects and community?
[CO-2][L-6] 10
Q. 4 a) Illustrate the drivers for open-source adoption in open source adoptions with examples.
[CO-1][L-3] 10
b) Summarize the case studies of the following:
i) Mozilla Firefox.
ii) Linux Operating System.
[CO-3][L-2] 5×2

## PART-B

Q. 5 a) Formulate the step-by-step process involved in life cycle of open standards.
[CO-5][L-5] 10
b) Differentiate between De Facto and De Jury standard setters along with their pros and cons.
[CO-4][L-4] 10
Q. 6 a) Demonstrate the following standard setters:
i) International organization for standardization.
ii) Bluetooth special interest group.
[CO-5][L-5] $5 \times 2$
b) Illustrate the role of network effects, lower costs, and impending benefits in

Drivers for adoption of open standards. Also explain various adoption methods and process.
Q. 7 a) Summarize the details of various linux distributions process. Also brief out the role of shells and utilities.
[CO-6][L-2] 10
b) Illustrate the role of the following:
i) Transfer account procedure.
ii) Web standards.

## End Semester Examination, Dec. 2022

## B. Tech. - Second Semester

## PROGRAMMING FOR PROBLEM SOLVING (BCS-101A)

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) Discuss computer components.
[CO1] [L2]
b) What is Algorithm and Flowchart?
[CO2] [L2]
c) Discuss syntax and logical error in a program.
[CO3] [L1]
d) Discuss Branching Statement.
[CO2] [L2]
e) Differentiate between array and a structure.
[CO4] [L1]
f) What is a function?
[CO1] [L2]
g) Discuss 1D and 2D array.
[CO2] [L1]
h) What is Library Files?
[CO3] [L1]
i) What is Ternary Operator?
[CO4] [L2]
j) What is a Syntax error?

## PART-A

Q. 2 a) What is a flow chart? Draw a flow chart for any program of your choice.
[CO1] [L2] 10
b) What is a Data type? Explain the types of Data type in C.
[CO2] [L1] 10
Q. 3 a) What is Operator Precedence? Explain with example of a program. [CO3] [L2] 10
b) Explain bitwise operators with an example from each one.
[CO2] [L2] 10
Q. 4 a) Write a program of addition of 2 Matrix using array
[CO4] [L3] 10
b) Create a student structure and store details of five students in it using structure.
[CO3] [L2] 10

## PART-B

Q. 5 What are functions call-by-value and call-by-reference? Explain with programming examples.
Q. 6 Write a program to demonstrate Bubble Sort and Selection sort.
[CO4] [L3] 20
Q. 7 Write a program to Create, Read and write a file in C.
[CO3] [L3] 20

## End Semester Examination, Dec. 2022

## B. Tech. - First Semester <br> PROGRAMMING FOR PROBLEM SOLVING (BCS-101A)

Time: 3 hrs.
Max Marks: 100

No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Differentiate between 'program' and 'algorithms'.
[CO-3] [L-2]
b) Define 'variables'.
[CO-2] [L-2]
c) What is an operating system?
d) Define one and two dimensional array with suitable examples.
e) What are the various operations performed by a compiler?
[CO-5] [L-2]
f) How to pass the parameters in function.
g) Write any four relational operators with the specifications.
h) What are the various searching techniques? Which is the best technique for the search operation?
i) Define 'Pointers'.
j) Write any two uses of recursion.

## PART-A

Q. 2 a) Write an algorithm to test greatest of 3 numbers. Also draw the flow chart for finding of factorial of a number.
[CO-1] [L-2]10
b) Differentiate between:
i) High Level Language and Low-Level Language.
ii) Magnetic disks and Magnetic tapes.
[CO-1] [L-2] 5×2
Q. 3 a) Explain various data types in C with examples. Write a C function to compare the 4 variables using relational operators and find the smallest element among them.
[CO-2][L-5] 10
b) Write a program to print multiplication of two matrices, entered during run time by the user.
[CO-2][L-5] 10
Q. 4 a) Write a program to Store information of 10 students using concept of array of structure.
[CO-3] [L-4] 10
b) Explain the logic for searching an element in the linear array and also write the algorithm for the same.
[CO-3] [L-5]10

## PART-B

Q. 5 a) Write the code to understand the concept of function parameter passing methods and what are the application of it.
[CO-4] [L-4]10
b) Discuss the scope of local, global and static variables. Also give the example of each?
Q. 6 a) Explain different types of sorting techniques and give the reasons for better sorting techniques.
b) Define the complexity. Write the program for the following equation $x=\left(-b \pm \sqrt{ }\left(b^{2}-4 a c\right)\right) / 2 a$ [CO-5] [L-3]10
Q. 7 a) How a pointer is declared? How does it support to self referential structures?
[CO-6] [L-3] 10
b) List out the various file opening and closing modes and explain each, with example.
[CO-6] [L-3] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - First Semester PROGRAMMING FOR PROBLEM SOLVING (BCS-101A)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) What is the syntax of for-loop statement?
[CO-1] [L-1]
b) Define the term 'pseudo code'.
[CO-3] [L-1]
c) Describe peripheral devices. [CO-2] [L-2]
d) Differentiate between application software's and system software's. [CO-3] [L-2]
e) Mention the scope of a local and global variables. [CO-2] [L-2]
f) Discuss logical operators in C programming language.
g) Illustrate the memory allocation of character arrays in C.
h) Mention any five string functions in C programming language.
i) Explain the need of operating system, with example.
[CO-1] [L-2]
j) Illustrate with suitable example, the concept of sorting.

## PART-A

Q. 2 a) Write a pseudocode to find the top five salaries of 50 employees in an organization, using conditional statements.
[CO-1] [L-3] 10
b) Explain with suitable example, the various types of operating systems, used in a computer system?
[CO-1] [L-2] 10
Q. 3 a) Compare and contrast, built-in functions and user-defined functions, and justify with example?
[CO-2] [L-2] 10
b) Write a C program using the concept of recursive functions to find out the factorial
of a number entered by the user.
[CO-2] [L-6] 10
Q. 4 Explain the following terms with respect to C programming language.
a) Operator precedence.
b) C comments.
[CO-3] [L- 2] 10×2

## PART-B

Q. 5 a) Illustrate binary search algorithm? Explain with example.
[CO-4] [L-3] 10
b) What do you mean by time and space complexity of any algorithm?
[CO-4] [L-5] 10
Q. 6 a) Illustrate the concept of strings? Explain the two-dimensional arrays in C programming, with example.
[CO-5] [L-4] 10
b) Explain the concept of linked lists. Show the implementation of a linked list using
pointers.
[CO-5] [L-5] 10
Q. 7 a) Illustrate the purpose of file handling in C. Write a program to open an existing
file and delete its contents.
b) Discuss with suitable example, the use of structures in C .

# End Semester Examination, Dec. 2022 

## B. Tech. - First Semester <br> PROGRAMMING FOR PROBLEM SOLVING (BCS-101)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from Part-A and TWO questions from Part-B. Each question carries equal marks.
Q. 1 Answer the following questions:
a) Specify the role of an "operating system" in a computer system.
[CO-1] [L-1]
b) Differentiate between compiler and interpreter.
c) Evaluate the following expression: $a=10 * 2 / 4-6 / 2+1$
[CO-2] [L-3]
d) Predict the output of the following patch of code with justification:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a, b;
a = 22;
b = a++;
printf("a = %d and b = %d ", a, b);
getch();
}
```

e) Explain the concept of structures with suitable example.
f) Define "Recursion", with an example.
g) Mention an example for definition of "array of structures".
h) Define 'complexity of an algorithm'.
i) Name various categories of data types and also specify their format specifiers.
j) List benefits of using pointers. Give an example of pointer declaration. [CO-6] [L-2]

## PART-A

Q. 2 a) List out basic operations performed by a computer system. Draw a neat labeled block diagram of a computer system and explain the functions of its each component.
[CO-1] [L-2] 10
b) Differentiate between an algorithm and a flowchart. Write an algorithm to swap the value of two variables, without using a third variable and draw a flowchart to find the smallest among three numbers.
[CO-1] [L-3] 10
Q. 3 a) Write a program that reads a number and determines, if the number is zero, positive or negative.
[CO-3] [L-6]
b) Differentiate between while and do-while loop with the help of a program.
c) Write a program to display the following pattern:
d) Explain the syntax and usage of a switch statement. Write a program to check the divisibilit
Q. 4 a) Explain the logic behind linear search with an example. Write an algorithm to search an element using binary search.
[CO-4] [L-3] 10
b) Define the logic behind a bubble sort. Consider an unsorted array with elements: $\{14,33,27,35,10\}$. Sort an array in ascending order using bubble sort algorithm. Explain each step in detail.

## PART-B

Q. 5 a) Categorize 1-d and 2-d array in detail with syntax and examples. Write a program to print transpose of a matrix.
[CO-5] [L-6] 10
b) Define strings. Give syntax for declaring and initializing string variables. Write a program to find length of a string without using built in library function.[CO5][L3] 10
Q. 6 a) Specify the necessity of using functions in programming. Define the meaning of predefined and user defined functions, giving examples. Explain the usage of various types of unformatted and formatted input-output built-in functions with examples.
[CO-4] [L-3] 10
b) Differentiate between parameter passing methods in functions: "call-byvalue" and "call-by-reference" considering patch of code as an example. Also, explain the difference between actual and formal parameters. [CO-4] [L-5] 10
Q. 7 Answer any four of the following:
a) Define 'files'. Declare a file pointer. Mention the syntax of opening a file using built-in library function.
[CO-6] [L-2]
b) Differentiate between:
i) $\operatorname{scanf}()$ and fscanf( )
ii) $\operatorname{printf(})$ and fprintf( )
[CO-6] [L-2]
c) Discuss purpose of the various file opening modes.
d) Write a program to copy the contents of one file to another.
e) Differentiate between a pointer and a file pointer with an example.

# End Semester Examination, Dec. 2022 

## B. Tech. - Third Semester <br> PROGRAMMING FOR PROBLEM SOLVING (BCS-101)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1


#### Abstract

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.


Q. 1 a) Differentiate between compiler and interpreter.
b) Demonstrate the use of 2 D array.
c) Compare structure with union. Also give their applications.
d) Demonstrate the use of pointer. What do you understand by the increment in pointer?
e) Explain STREAM in FILE.
f) List out the various functions performed by an Operating System.
g) Evaluate the following expression: $a=5+2 * 4-6 / 2+7$
h) Contrast between structure and union.
i) Define "array of structures", giving an example.
j) Explain the notion of complexity of an algorithm.

## PART-A

Q. 2 a) Give the steps of algorithm to test the primness of an integer. Also draw the flow chart for the same.
b) Discuss syntax, logical and runtime errors with examples.
c) Describe the role of a CPU, explaining functions of each sub unit.
Q. 3 a) Design a $C$ function to print a given number in reverse. $\mathbf{1 0}$
b) Write a C program to Fibonacci series up to nth term.
Q. 4 a) Write an algorithm to sort a list of numbers using bubble sort. Explain each step considering an example.

10
b) Write a C function to implement linear search. 10

PART-B
Q. 5 a) Explain function parameter passing methods.
b) Contrast between1-D and 2-D array. Give syntax or examples for declaration and initialization of 1-D and 2-D array. Write a program to find the difference of two matrices.
Q. 6 b) Differentiate between the following (any two):
i) Call by value and call by reference.
ii) Actual and formal parameters.
iii) Recursion and iteration.
b) Write a program to demonstrate array of structure. $\mathbf{1 0}$
Q. 7 a) How a pointer is declared? How it is used in linked list?
b) Explain the purpose of the following (any five): fopen( ), fclose( ), fprintf( ), fscanf( ), r+, w+, eof.10

## End Semester Examination, Dec. 2022

## B. Tech. - First Semester <br> ARTIFICIAL INTELLIGENCE FOR ENGINEERS (BCS-100A)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) When was the social humanoid robot developed?
[CO-4] [L-2]
b) Differentiate between spatial intelligence and musical intelligence.
[CO-1] [L-2]
c) List the various applications of artificial intelligence.
[CO-4] [L-3]
d) Define 'an environment'.
[CO-3] [L-2]
e) What do you mean by production rules?
[CO- 2] [L-2]
f) Describe with examples four categories under which AI is classified.
[CO- 1] [L-3]
g) What are the components of the Intelligence?
[CO-3] [L-2]
h) Define 'Travelling Salesman Problem'.
[CO- 2] [L-2]
i) Interpret what should all engineers know about AI? List the goals of AI.
[CO- 1] [L-3]
j) Define 'pixel'.
[CO- 1] [L-3] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Define 'Intelligence'. Explain the various types of Intelligence. [CO-1] [L-2] 10
b) What are the General Problem Solving Components?
[CO- 2] [L-1] 10
Q. 3 Describe in detail the 8 puzzle problem or Slide Puzzle.
[CO-2] [L-1] 20
Q. 4 a) What are the various properties of environment? Discuss in detail.
[CO- 3] [L-1] 10
b) Discuss the application of AI in Education system.
[CO-1] [L-2] 10

## PART-B

Q. 5 a) Discuss the application of Artificial Intelligence in banking sector.
[CO-5] [L-2] 10
b) What are Limitations of Artificial Intelligence?
[CO-5] [L-3] 10
Q. 6 What are the various Production rules for solving the Water Jug Problem? Illustrate with suitable example.
[CO-1] [L-3] 20
Q. 7 a) Outline the historical evolution of Artificial Intelligence.
[CO-1] [L-2] 10
b) Explain the nature and structure of Intelligent Agents.
[CO-3] [L-
2] 10

## End Semester Examination, Dec. 2022

## B. Tech. - First Semester

## ARTIFICIAL INTELLIGENCE FOR ENGINEERS (BCS-100/BCS100A)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Difference between human and machine intelligence.
b) Differentiate between spatial intelligence and musical intelligence.
[CO-3] [L-2]
c) List the applications of artificial intelligence.
[CO-2] [L-2]
d) Define an 'environment'.
e) What are production rules?
[CO-3] [L-2]
f) Describe the four categories under which AI is classified with examples.
[CO-2] [L-2]
g) What are the components of the intelligence?
[CO-1] [L-3]
h) Explain travelling salesman problem'.
[CO-3] [L-2]
i) Discuss the ethical issues/concerns in AI.
[CO-2] [L-2]
j) When was social humanoid robot developed?
[CO-1] [L-3]

PART-A
Q. 2 a) Define 'intelligence'. Explain the musical and linguistic intelligence in detail.
[CO-1] [L-2] 10
b) What are the general problem solving components?
[CO-2] [L-1] 10
Q. 3 Describe the 8 puzzle problem or slide puzzle.
[CO-2] [L-1] 20
Q. 4 a) What are the various properties of environment?
[CO-3] [L-1] 10
b) Describe the key components in artificial intelligence.
[CO-2] [L-2] 10
PART-B
Q. 5 a) Discuss the application of artificial intelligence in banking sector.
[CO-5] [L-2] 10
b) What are limitations of artificial intelligence?
[CO-5] [L-3] 10
Q. 6 What are the various production rules for solving the water jug problem? [CO1][L3] 20
Q. 7 a) Outline the historical evolution of artificial intelligence.
[CO-1] [L-2] 10
b) Explain the nature and structure of intelligent agents.
[CO-3] [L-2] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - First/Second Semester

## CHEMISTRY FOR ENGINEERS (BCH-106)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) How zeolite can be regenerated? Write the reaction involved.
[CO-3] [L-2]
b) Calculate the permanent hardness of water sample containing $\mathrm{CaCl}_{2} 15.2$ $\mathrm{mg} / \mathrm{l}$ and $\mathrm{MgSO}_{4} 16 \mathrm{mg} / \mathrm{l}$.
[CO-3] [L-3]
c) Write any two applications of Eutectic system.
[CO-1] [L-3]
d) List the applications of phase rule system. [CO-1] [L-2]
e) Differentiate between primary and secondary cells. [CO-3] [L-2]
f) Which conformer of butane is the most stable and why?
[CO-1] [L-2]
g) State Lambert-Beer's Law.
[CO-2] [L-2]
h) Draw d-orbitals splitting patterns with filling of electrons in the appropriate d orbitals in the $\mathrm{d}^{5}$, octahedral low spin complex.
[CO-2] [L-2]
i) What are the prerequisites for a molecule to be IR active?
[CO-2] [L-2]
j) According to the molecular orbital theory, the bond order for the $\mathrm{N}_{2}$ molecule is. $\qquad$ [CO-2] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) A standard hard water contains 1 gm of $\mathrm{CaCO} 3 / \mathrm{l}, 50 \mathrm{ml}$ of this required 25 ml of EDTA solution. 50 ml of a water sample required 18 ml of EDTA solution, 50 ml of sample after boiling required 12 ml of EDTA solution. Calculate all types of hardness in ppm.
[CO-3] [L-4] 10
b) Discuss the process of softening of water by ion exchange process with the help of well labelled diagram?
[CO-3] [L-2,3] 10
Q. 3 a) Calculate the amount of $\mathrm{CO}_{2}$ produced from burning 100 g of butane $\left(\mathrm{C}_{4} \mathrm{H}_{10}\right)$.
[CO-3] [L-2] 10
b) The following is the percentage composition of fuel on mass basis. $\mathrm{C}=78, \mathrm{H}_{2}$ $=2, \mathrm{O}_{2}=3$ and $\mathrm{S}=0.7$ and remaining is ash. Calculate theoretical air required for combustion of 100 g of fuel completely. [CO-3] [L-3] 5
c) Differentiate between i) natural and synthetic fuels with examples. [CO-3] [L-2] 5
Q. 4 a) Draw the labelled phase diagram of water system and explain. [CO-1] [L-2,3] 10
b) Express the number of phases, components and degree of freedom in following:
i) $2 \mathrm{NO}_{2}$ (gas) $\leftrightharpoons \quad \mathrm{N}_{2} \mathrm{O}_{2}$ (gas)
ii) $\mathrm{CuSO}_{4} 5 \mathrm{H}_{2} \mathrm{O}$ (solid) $\leftrightharpoons \mathrm{CuSO}_{4} 3 \mathrm{H}_{2} \mathrm{O}$ (solid) $+2 \mathrm{H}_{2} \mathrm{O}$ (solid)
iii) $\mathrm{PCl}_{5}$ (gas) $\leftrightharpoons \mathrm{PCl}_{3}$ (gas) $+\mathrm{Cl}_{2}$ (gas)
[CO-1] [L-4] 10

## PART-B

Q. 5 a) Derive the expression for energy of a particle in a one-dimensional box of length 'L' and mass 'm'
[CO-1] [L-4] 10
b) Predict the geometry of $\left[\mathrm{Ni}\left(\mathrm{H}_{2} \mathrm{O}\right)_{6}\right]^{2+}$ and $\left[\mathrm{Ni}(\mathrm{CN})_{6}\right]^{2-}$ using CFT. Why $\left[\mathrm{Ni}\left(\mathrm{H}_{2} \mathrm{O}\right)_{6}\right]^{2+}$ is paramagnetic and $\left[\mathrm{Ni}(\mathrm{CN})_{6}\right]^{2-}$ diamagnetic though both are octahedral complexes?
[CO-2] [L-3] 10
Q. 6 a) Draw possible conformations of butane and comment on their stability. Also, draw P.E plot for conformers.
[CO-1] [L-3] 10
b) Label each stereogenic centers as $R$ or $S$.

Q. 7 a) List the different types of transitions involved in UV-visible spectroscopy and write applications of electronic spectroscopy.
b) Describe the principle and various types of fundamental vibrations of IR spectroscopy with applications.
[CO-2] [L-4] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - First Semester CHEMISTRY FOR ENGINEERS (BCH-106) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Why Metal-EDTA complex is more stable than Metal-EBT complex?
[CO-3] [L-2]
b) Calculate the variance of system at triple point of water.
[CO-1] [L-2]
c) Is Eutectic a mixture or compound? Justify.
[CO-1] [L-3]
d) Why hardness of water is expressed in terms of calcium carbonate equivalents?
[CO-3] [L-2]
e) Draw d-orbitals splitting patterns with filling of electrons in the appropriate d orbitals in the $\mathrm{d}^{4}$, octahedral high spin complex.
[CO-2] [L-3]
f) Draw the most stable conformer of $\mathrm{C}_{4} \mathrm{H}_{10}$.
[CO-1] [L-3]
g) Explain the difference between hypsochromic and bathochromic shift in UV spectroscopy.
[CO-2] [L-2]
h) Draw d-orbitals splitting patterns with filling of electrons in the appropriate d orbitals in the $\mathrm{d}^{8}$, octahedral low spin complex.
[CO-2] [L-3]
i) What are the prerequisites for a molecule to be IR active?
[CO-2] [L-2]
j) Express the time-independent Schrödinger equation for a particle of mass $m$ moving in one direction with energy $E$.
[CO-2] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) 0.30 gm of calcium carbonate was dissolved in HCl and the solution made up to 1000 ml with distilled water. 50 ml of this solution required 15 ml of EDTA solution for titration. 50 ml of unknown hard water sample required 17.5 ml of EDTA and after boiling and filtering required 6 ml of EDTA solution. Calculate total, permanent and temporary hardness of water. [CO-3] [L-4] 10
b) Explain the electro dialysis process with the help of well labelled diagram.
[CO-3] [L-3] 10
Q. 3 a) If electricity demand in one particular year is $2.0 \times 10^{13} \mathrm{KJ}$ and energy is generated from combustion of $\mathrm{CH}_{4}$ at a power plant with efficiency of $32 \%$. Calculate the no. of moles of CO2emitted to fulfill the demand. Heat of combustion of $\mathrm{CH}_{4}$ is $890 \mathrm{~kJ} / \mathrm{mole}$.
[CO-3] [L-3] 10
b) The following is the percentage composition of fuel on mass basis. $\mathrm{C}=80, \mathrm{H}_{2}$ $=3, \mathrm{O}_{2}=4.4$ and $\mathrm{S}=0.9$ and remaining is ash. Calculate theoretical air required for combustion of 1 kg of fuel completely.
[CO-3] [L-4] 10
Q. 4 a) Draw the labelled phase diagram of any one component system and explain all the important features.
[CO-1] [L-3] 10
b) Draw well labelled phase diagram of lead silversystem. [CO-1] [L-4] 5
c) Differentiate with true and metastable equilibrium with suitable example.[CO1][L4] 5
Q. 5 a) Calculate the lowest three energy levels of a particle of mass $10^{-26} \mathrm{Kg}$ in a box of length $\mathrm{L}=10^{-9} \mathrm{~m}$.
[CO-1] [L-4] 10
b) Predict the magnetic nature of $\left[\mathrm{Zn}(\mathrm{NH} 3)_{4}\right]^{2+}$ and $\left[\mathrm{Cr}(\mathrm{H} 2 \mathrm{O})_{6}\right]^{3+}$ using crystal field theory.
Q. 6 a) Draw possible conformations of $\mathrm{C}_{2} \mathrm{H}_{6}$ and comment on their stability. Also, draw P.E plot for conformers.
[CO-1] [L-3] 10
b) Assign the $\mathrm{R} / \mathrm{S}$ or $\mathrm{E} / \mathrm{Z}$ configuration:



Q. 7 a) HCl vibrational absorption line is observed at $2990 \mathrm{~cm}-1$. Calculate the value of force constant for this molecule.
[CO-2] [L-4] 10
b) List the different types of transitions involved in electronic spectroscopy, discuss their energy variations and applications of electronic spectroscopy.[CO-2] [L-3] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - First Semester <br> CHEMISTRY FOR ENGINEERS (BCH-106) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from Part-A and TWO questions from Part-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Find the bond order of $\mathrm{N}_{2}$ and $\mathrm{O}_{2}$ molecule as per MOT.
[CO-2] [L-2]
b) Which ions are responsible for temporary and permanent hardness in water?
[CO-3] [L-2]
c) Is Eutectic a mixture or compound? Justify.
[CO-1] [L-3]
d) Calculate the variance of system at eutectic point of two component system.
[CO-1] [L-2]
e) Differentiate dry and wet cells with examples.
[CO-3] [L-2]
f) Draw crystal field splitting diagram with filling of electrons in the d orbital's in the $\mathrm{d}^{6}$, octahedral low spin complex.
[CO-2] [L-3]
g) Draw the least and most stable conformer of $\mathrm{C}_{2} \mathrm{H}_{6}$.
[CO-1] [L-3]
h) Compare hypochromic and hyperchromic shift in UV spectroscopy.
[CO-2] [L-2]
i) What are the prerequisites for a molecule to be IR active?
[CO-2] [L-2]
j) Justify IR active/inactive molecule in $\mathrm{HCL}, \mathrm{NH}_{3}, \mathrm{CL}_{2}$ and $\mathrm{CH}_{4}$.
[CO-2] [L-3] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Explain the zeolite process with the help equations and well labeled diagram.
b) 100 ml of water simple required 4 ml of $\mathrm{H}_{2} \mathrm{SO}_{4}$ for $P$ end point. Another 16 ml of same acid was needed for further titration to get MO end point. Normality of acid is $1 / 50$. Determine the type and amount of Alkalinity in PPM. [CO-3] [L-4] 10
Q. 3 a) Calculate the amount of air required for combustion of 1 kg of fuel completely having percentage composition on mass basis. $\mathrm{C}=70, \mathrm{H}=20, \mathrm{O}=7$ and $\mathrm{S}=$ 3.
[CO-3] [L-4] 10
b) Analyzed the working of Galvanic Cell. Differentiate between primary and secondary cell.
[CO-3] [L-3] 10
Q. 4 a) Draw the labelled phase diagram of $\mathrm{Pb}-\mathrm{Ag}$ and explain all the important features.
[CO-1] [L-3] 10
b) Find the degree of freedom, component and phase of following systems:
i) $\mathrm{N}_{2}(\mathrm{~g})+\mathrm{O}_{2}(\mathrm{~g}) \leftrightarrow 2 \mathrm{NO}(\mathrm{g})$
ii) $\mathrm{CaCO}_{3}(\mathrm{~S}) \leftrightarrow \mathrm{CaO}(\mathrm{S})+\mathrm{CO}_{2}(\mathrm{~g})$
iii) $\mathrm{Fe}(\mathrm{S})+\mathrm{H}_{2} \mathrm{O}(\mathrm{I}) \leftrightarrow \mathrm{FeO}(\mathrm{S})+\mathrm{H}_{2}(\mathrm{~g})$
iv) Saturated solution of sodium chloride.
[CO-1] [L-4] 10

## PART-B

Q. 5 a) Derive the expression for the energy of particles in one dimension box in terms of mass, length and plank's constant.
b) Calculate the magnetic moment of $\left[\mathrm{Ni}(\mathrm{CN})_{6}\right]^{4-}$ and $\left[\mathrm{Co}\left(\mathrm{H}_{2} \mathrm{O}\right)_{6}\right]^{3+}$ using crystal field splitting diagram.
[CO-2] [L-3] 10
Q. 6 a) Draw well labeled potential energy diagram of all conformations of $\mathrm{C}_{4} \mathrm{H}_{10}$ and comment on their stability?
[CO-1] [L-3] 10
b) Find the $\mathrm{R} / \mathrm{S}$ or $\mathrm{E} / \mathrm{Z}$ configuration in following structures.

Q. 7 a) List the different types of fundamental vibrations involved in infrared spectroscopy and applications of IR spectroscopy. [CO-2] [L-3] 10
b) State Lambert Beer Law, explain the principle of UV visible spectroscopy. Write any its any three applications.
[CO-2] [L-4] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - First Semester

CHEMISTRY (BCH-101/BCH-100)
Time: 3 hrs.

Max Marks: 100
No. of pages: 2

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Discuss the penetration power of an electron, in a multi-electron atom.
b) Apply the factors that Influence Polarizability.
[CO-2] [L-1]
c) Which of the followings are aromatic and anti-aromatic molecules?


d) Explain the features that distinguish between hard and soft acids.
[CO-2] [L-2]
e) Find out the number of unpaired electrons are there in $\left[\mathrm{Ni}\left(\mathrm{H}_{2} \mathrm{O}\right)_{6}\right]^{2+}$.
[CO-1] [L-2]
f) Which group in each pair has the highest priority?
[CO-3] [L-5]
$\mathrm{CH}_{3} \mathrm{Br}$ or $-\mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{Br}$
g) In an atom, which electrons tend to do the most shielding (core electrons or valence electrons).
h) Differentiate between dry and wet corrosion.
i) Analyze absorption, spectroscopy and emission spectroscopy.
[CO-5] [L-4]
j) How will you convert benzene into m-nitro chloro benzene?

## PART-A

Q. 2 a) Why crystal field splitting in octahedral complexes is different in comparison to tetrahedral complexes? Discuss with suitable example.
b) i) Calculate the lowest three energy levels of a particle of mass $10^{-26} \mathrm{Kg}$ in a box of length $L=10^{-9} \mathrm{~m}$.
[CO-1] [L-5] 5
ii) Evaluate the bond order and magnetic behavior of NO with the help of energy level diagram.
[CO-1] [L-5] 5
Q. 3 a) Discuss the following terms with suitable examples:
i) Ionization energies.
ii) Electron affinity.
iii) Electronegativity.
iv) Polarizability.
[CO-2] [L-2] 10
b) Define effective nuclear charge and calculate the Zeff of $s$ orbitals of $N$ and $P$ orbital of K.
[CO-2] [L-1, 5] 10
Q. 4 a) Give detailed explanation of conformations of propane?
[CO-3] [L-2] 10
b) Do labeling of following stereo-centers with $R$ or $S$ configuration?
[CO-3] [L-5] 10


Name the following compounds E and Z nomenclature:


## PART-B

Q. 5 a) Differentiate between ideal and real gas. Explain Van der waal's equation for real gas in detail. Write the significance of Vander Waal's constants. [CO-4] [L-4] 10
b) Explain electrochemical theory of corrosion with suitable chemical reaction and diagram.
[CO-4] [L-4] 10
Q. 6 a) What do you mean by electronic spectroscopy? Describe its principle and list out various types of transitions involved in this technique with one example in each case.
[CO-5] [L-2] 10
b) Give a brief note on SEM technique with suitable block diagram. Also write its applications in different fields.
[CO-5] [L-2] 10
Q. 7 a) Discuss the synthesis and purification method of Aspirin.
[CO-6] [L-2] 10
b) Justify SN1 and SN2 reactions with suitable examples.
[CO-6] [L-5] 10

# End Semester Examination, Dec. 2022 OPEN ELECTIVE - COMMAN FOR ALL BRANCHES SOLID WASTE MANAGEMENT (BCE-OE-001A) 

Time: 3 hrs.

Max Marks: $\mathbf{1 0 0}$
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) List two sources contributing to commercial waste.
[CO-2] [L-1]
b) No landfill site should be constructed within ...... m of any lake or pond.
c) Give atleast one benefit of waste to energy projects.
d) Give atleast two examples of bulky waste.
e) List the four attributes of waste on basis of which it is classified as hazardous.
f) Describe the norm for computing the commercial refuse generation rate.[CO-4] [L-2]
g) List the environmental impact of improper waste disposal on land.
[CO-5] [L-2]
h) Explain the formula for calculating the moisture content of waste.
[CO-4] [L-2]
i) What is the objective of environmentally sustainable waste management system?
j) Give any two advantages of waste recycling to economy.

## PART-A

Q. 2 Explain the type-based classification system of waste.
[CO-2] [L-4] 20
Q. 3 a) How is density of waste useful in planning and designing of solid waste management system?
[CO-1] [L-3] 8
b) Compute the quantity of residential refuse generation from the following given data for each locality. Also, estimate the total waste generation from the area.

| S. No | Locality Name | No. of Households | Average no. of persons/household |
| :--- | :--- | :---: | :---: |
| 1 | A | 672 | 4 |
| 2 | B | 471 | 3 |
| 3 | C | 389 | 5 |
| 4 | D | 524 | 4 |
| 5 | E | 731 | 5 |
| 6 | F | 389 | 3 |
| 7 | G | 564 | 4 |
| 8 | H | 280 | 5 |

[CO-5] [L-4]
12
Q. 4 a) Compute the number of $8.5 \mathrm{~m}^{3}$ containers required for storing the waste arising out of a community comprising of the following:

- No. of units $=300$
- Family size $=4$ people/unit
- Per capita waste generation rate $=1.2 \mathrm{~kg} /$ person/day
- Uncompacted specific volume $=150 \mathrm{~kg} / \mathrm{m}^{3}$
- Compacted volume $=250 \mathrm{~kg} / \mathrm{m}^{3}$
- Also compute the waste quantity in terms of biodegradable, non-biodegradable and inert.
b) Discuss the benefits of waste minimization.


## PART-B

Q. 5 a) Explain the process of bio-methanation.
[CO-4] [L-3] 10
b) List the key considerations of MSW Incineration process.
[CO-4] [L-3] 10
Q. 6 Discuss in details the locational criteria of a landfill site.
[CO-4] [L-4] 20
Q. 7 Explain the seven-step approach for preparation of solid waste management plan.
[CO5][L4] 20

# End Semester Examination, Dec. 2022 

# B. Tech - Seventh Semester <br> BRIDGE ENGINEERING (BCE-DS-728) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions in brief:
a) Describe the various forms of Bridge Structure.
[CO-2] [L-2]
b) As per Indian Road Congress (IRC) Bridge Code, define Section IV and Section IX.
[CO-1] [L-1]
c) Evaluate the Impact Factor for a bridge with span length 6 m , subjected to IRC Class AA Tracked Vehicle Loading Condition.
d) With the help of a neat sketch, explain the following loading conditions on a typical section of Box Culvert:
i.) Water Pressure inside Culvert.
ii.) Uniform Lateral Loads on Side Walls.
[CO-3] [L-3]
e) Describe the various conditions for obtaining maximum moment while designing Box Culvert.
f) Compare the different arrangements of pylons in a Cable - Stayed Bridge.
[CO-4] [L-2]
g) Summarize the advantages of Prestressed Concrete Bridge.
[CO-4] [L-2]
h) Determine the Approximate Depth of the Plate Girder Bridge if the span of the bridge is 15 m .
[CO-6] [L-1]
i) Illustrate the importance of a Shear Connector in Composite Bridge.
[CO-6] [L-1]
j) With the help of a neat sketch, define the various shapes of Pier.
[CO-5] [L-2] 2x10

## PART-A

Q. 2 a) Summarize the Preliminary Data to be collected by an Engineer - in - Charge before the construction of a Major Bridge.
[CO-1] [L-2] 12
b) Develop the classification of bridges on the basis of:
i.) Length of Bridge.
ii.) Degree of Redundancy.
iii.) Inter - Span Relations.
iv.) Type of Support.
[CO-1] [L-2] 8
Q. 3 As per Section II of Indian Road Congress (IRC) Bridge Code, write a note on:
a) IRC Class 70R Loading
[CO-1] [L-2] 12
b) Impact Effect for IRC Class AA or Class 70R Loading
Q. 4 Design the Deck Slab for a Reinforced Concrete Slab Culvert, having following data:

- Clear Span of bridge :7m
- 2 - Lane width Roadway
- 1.5 m footpaths on either side of roadway
- Wearing Coat :85 mm
- Width of bearing
: 400 mm
- IRC Class A Loading
- M 25 grade concrete and Fe 415 Steel


## PART-B

Q. 5 a) With the help of neat sketches, explain the different types of Cable Configurations in a typical Cable - Stayed Bridge.
[CO-4] [L-3] 10
b) Summarize the concept of Posttensioning in a Prestressed Concrete Bridge.
[CO-4] [L-2] 10
Q. 6 a) Illustrate the features and different types of Shear Connectors in Composite Bridges.
b) Frame the Design Principles for a typical Plate Girder Bridge.
Q. 7 a) Analyze the stresses acting on a Pier Structure for the following data:

- Simply Supported T - Beam Bridge Deck
- Dead Load from each span : 3200 kN
- Reaction due to Live Load : 1000 kN
- Total height of Pier : 12 m
- Width at GL : 2.5 m
- Width at Bearing Level $: 1.2 \mathrm{~m}$
- Length of Pier :9 m
- Maximum Mean Velocity of current : $3.7 \mathrm{~m} / \mathrm{s}$
- M 20 Grade of Concrete
- Class AA Wheeled Vehicle
b) Summarize the two different categories of bearings.


# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester <br> HIGHWAY CONSTRUCTION AND MANAGEMENT (BCE-DS-722)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Briefly discuss the role of transportation in the economic and social activities of the country.
[CO1, L-1]
b) Explain the various requirements of an ideal highway alignment.
[CO1, L-2]
c) Define the term "stopping sight distance"and also write down the formula for the same.
[CO6, L-1]
d) Explain summit and valley curves and the various cases when these are formed while two different gradients.
[CO3, L-2]
e) Explain the concept of level of service and its effect on capacity of road.
[CO2, L-2]
f) Write down the name of different types of materials used in the pavement and under what circumstances each of these materials is preferred. [CO4,L-2]
g) Calculate the equivalent wheel load factor or VDF value of the following twoaxle loads in terms of the standard axle load of 8.16 t .
i) LCV with rear axle load of 1.8 t
ii) LCV with rear axle load of 16.0 t
[CO5, L-3]
h) Explain the objects of providing construction joints in cement concrete pavement.
[CO5, L-2]
i) Calculate the values of i) Head light sight distance and ii) Intermediate sight distance for a highway with a design speed of 65 kmph . Assume suitably all the data required.
j) Briefly explain the engineering surveys needed for locating a new highway.
[CO2, L-2] 2x10

## PART-A

Q. 2 a) Explain with sketches the various factors controlling the alignment of road.
[CO1, L-2] 10
b) Prepare a DPR for the construction of new 2-Lane highway with paved shoulders from $\mathrm{Km} 0+000$ (Bathinda) to $\mathrm{Km} \mathrm{97+000} \mathrm{(Sirsa)} \mathrm{of} \mathrm{NH-152} \mathrm{in} \mathrm{the}$ State of Punjab and Haryana.
[CO1, L-4] 10
Q. 3 a) Define sight distance and factors causing restrictions to sight distance. Also explain the significance of stopping, intermediate and overtaking sight distances.
[CO6, L-2] 10
b) Drive an equation for finding the superelevation required if the design coefficient of lateral friction is " $f$
[CO6, L-6] 10
Q. 4 a) Explain various types of traffic markings commonly used along with their applications.
[CO3, L-2] 10
b) "The traffic volume study is necessary for design of any geometric feature of road". Make supportive justification.
[CO2, L-5] 10

## PART-B

Q. 5 a) Explain CBR test procedure in the laboratory. Also, explain the need for applying correction in load-penetration curve of CBR test.
[CO4, L-3] 10
b) Explain the principle of the various tests on bitumen; specify the desirable values of the test results.
[CO4, L-2] 10
Q. 6 a) Explain the various factors to be considered for the design of flexible pavements. Discuss significance of each.
[CO5, L-3] 10
b) Discuss the importance of gross wheel load and contact pressure in stress distribution pattern and in pavement design. Illustrate with stress distribution diagram.
Q. 7 a) Using the data given below, calculate the wheel load stresses at interior, edge and corner of a cement concrete pavement by using Westergaard's stress equations.
Modulus of elasticity of concrete $=3.0 \times 10^{5} \mathrm{Kg} / \mathrm{cm}^{2}$
Poisson's ratio of concrete $=0.15$
Thickness of concrete pavement $=25 \mathrm{~cm}$
Modulus of subgrade reaction $=12 \mathrm{Kg} / \mathrm{cm} 3$
Wheel load $=5100 \mathrm{Kg}$
Radius of loaded area $=16 \mathrm{~cm}$
[CO5] [L- 4] 10
b) "The repeated application of heavy load effects the design of rigid pavement".

Make supportive justifications.
[CO5] [L- 5] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Seventh Semester <br> MASONRY STRUCTURE (BCE-DS-721) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1

## Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.

Q. 1 Answer the following questions:
a) Explain the Geometry concept of Masonry.
[CO-1] [L-1]
b) Write down a short note on 'cellular wall systems'.
[CO-1] [L-1]
c) What do you mean by reinforced and prestressed masonry?
[CO-1] [L-2]
d) What is High fatigue resistance?
[CO-3] [L-2]
e) Write down a short note on Stiff-mud Process and soft-mud Process. [CO-3] [L-2]
f) Design a simply supported brickwork beam of span 4 m and of section $215 \mathrm{~mm} \times 365 \mathrm{~mm}$ to carry a moment of 24 kNm assuming that the characteristic strength of the material is $19.2 \mathrm{~N} / \mathrm{mm}^{2}$. Assume also that $Y_{\mathrm{mm}}$ $=2.0$ and $f_{y}=250 \mathrm{~N} / \mathrm{mm}^{2}$.
[CO-5] [L-5]
g) What is Explosive Load?
h) Write a short note on 'Impact Load'.
i) Briefly explain about Function and workability of concrete masonry unit. [CO3] [L2]
j) Write a Brief note on methods of pre-stressing.
[CO-5] [L-2] 2x10

## PART-A

Q. 2 Explain Complex arrangements and Double Cross-wall systems with the help of Cross section channel.
[CO-1] [L-1] 20
Q. 3 What does one understand about the Flexural tensile strength of Masonry Bricks? Illustrate with a diagram.
[CO-2] [L-2] 20
Q. 4 Describe Masonry Assemblage and effect of bed materials on brick prism strength
[CO-3] [L-2] 20

## PART-B

Q. 5 A brickwork column of section $460 \mathrm{~mm} \times 460 \mathrm{~mm}$ is to carry an axial load of 800 kN and a moment of 50 kNm . Assuming that the reinforcement is placed such that $\mathrm{d}_{2}=\mathrm{d}_{1}=130 \mathrm{~mm}$ design the colum n for (1) an effective height of 4.5 m and (2) an effective height of 6.0 m . Take $\mathrm{f}_{\mathrm{k}}=13 \mathrm{~N} / \mathrm{mm}^{2}, \mathrm{f}_{\mathrm{y}}=460 \mathrm{~N} / \mathrm{mm}^{2}, \mathrm{Y}_{\mathrm{mm}}=2.3$.
[CO4][L5] 20
Q. 6 Describe the technique and methods of Pre-stressing of masonry.
Q. 7 Consider a cavity wall of length 5 m with an inner load bearing leaf of thickness 170 mm and a total thickness 272 mm . Assume that the clear height between restraints is 3.0 m and that the characteristic steel strength is $250 \mathrm{~N} / \mathrm{mm}^{2}$. [CO-6] [L-4] 20

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester <br> MASONRY STRUCTURE (BCE-DS-721)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) What is basic design consideration in Masonry Structure?
[CO-1] [L-1]
b) Enlist different types of foundations in Masonry Structure. [CO-1] [L-1]
c) Enumerate different types of shear test specimens.
[CO-2] [L-2]
d) Write Earthquake - Resistant Design and Construction Masonry IS Codes.
[CO-2] [L-2]
e) Design a simply supported brickwork beam of span 4 m and of section $215 \mathrm{~mm} \times 365 \mathrm{~mm}$ to carry a moment of 24 kNm assuming that the characteristic strength of the material is $19.2 \mathrm{~N} / \mathrm{mm}^{2}$. Assume also that $Y_{m m}$ $=2.0$ and $\mathrm{f}_{\mathrm{y}}=250 \mathrm{~N} / \mathrm{mm}^{2}$.
f) What do you mean by reinforced and prestressed masonry?
[CO-3] [L-4]
g) Briefly explain the methods of prestressing concrete.
[CO-3] [L-3]
h) What kind of advantages does prestressing offer over reinforced masonry? [CO-5] [L-2]
i) Write a short text regarding Accidental Loading.
[CO-5] [L-3]
j) Briefly explain the efforts made to reduce the accident death statistics.
[CO-6] [L-4] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Describe Masonry Assemblage and effect of bed materials on brick prism strength
[CO-1] [L-1] 10
b) Explain complex arrangements and double cross-wall systems with the help of cross section channel.
[CO-1] [L-3] 10
Q. 3 a) Explain the following:
i) Flexural Tensile Strength normal to bed-joint.
[CO-2] [L-4] 5
ii) Flexural Tensile Strength parallel to bed-joint.
[CO-2] [L-4] 5
b) What does one understand about the Flexural tensile strength of Masonry Bricks? Illustrate with a diagram.
[CO-2] [L-4] 10
Q. 4 a) Write short notes on:
i) Workability of Brick clay.
ii) Water Retentivity.
[CO-3] [L-1] 5×2
b) Describe Masonry Assemblage and effect of bed materials on brick prism strength.
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Explain in detail:
i) Uniaxial Bending.
ii) Biaxial Bending.
[CO-4] [L-3] 5×2
b) What do you understand Reinforced Masonry? Write Additional assumption and limitations of Reinforced Masonry.
[CO-5] [L-5] 10
Q. 6 a) Explain the Shear strength of different types of brickwork beams of a similar cross-section.
b) Consider a cavity wall of length 5 m with an inner load bearing leaf of thickness 170 mm and a total thickness 272 mm . Assume that the clear height between restraints is 3.0 m and that the characteristic steel strength is 250N $/ \mathrm{mm}^{2}$. Find tie area. [CO-4] [L-5] 10
Q. 7 a) Describe the technique and methods of Prestressing of masonry. [CO-5] [L-3] 10
b) Explain the importance and utility of ties in masonry structure.

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester <br> MASONRY STRUCTURE (BCE-DS-721)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) What is basic design consideration in Masonry Structure?
[CO-1] [L-1]
k) Enlist different types of foundations in Masonry Structure.
I) Enumerate different types of shear test specimens. [CO-2] [L-2]
m) Write Earthquake - Resistant Design and Construction Masonry IS Codes.
[CO-2] [L-2]
n) Design a simply supported brickwork beam of span 4 m and of section $215 \mathrm{~mm} \times 365 \mathrm{~mm}$ to carry a moment of 24 kNm assuming that the characteristic strength of the material is $19.2 \mathrm{~N} / \mathrm{mm}^{2}$. Assume also that $Y_{\mathrm{mm}}$ $=2.0$ and $f_{y}=250 \mathrm{~N} / \mathrm{mm}^{2}$.
o) What do you mean by reinforced and prestressed masonry?
p) Briefly explain the methods of prestressing concrete.
q) What kind of advantages does prestressing offer over reinforced masonry? [CO-5] [L-2]
r) Write a short text regarding Accidental Loading.
[CO-5] [L-3]
s) Briefly explain the efforts made to reduce the accident death statistics.
[CO-6] [L-4] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Describe Masonry Assemblage and effect of bed materials on brick prism strength
[CO-1] [L-1] 10
b) Explain complex arrangements and double cross-wall systems with the help of cross section channel.
[CO-1] [L-3] 10
Q. 3 a) Explain the following:
i) Flexural Tensile Strength normal to bed-joint.
[CO-2] [L-4] 5
ii) Flexural Tensile Strength parallel to bed-joint.
[CO-2] [L-4] 5
b) What does one understand about the Flexural tensile strength of Masonry Bricks? Illustrate with a diagram.
[CO-2] [L-4] 10
Q. 4 a) Write short notes on:
i) Workability of Brick clay.
ii) Water Retentivity.
[CO-3] [L-1] 5×2
b) Describe Masonry Assemblage and effect of bed materials on brick prism strength.
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Explain in detail:
i) Uniaxial Bending.
ii) Biaxial Bending.
[CO-4] [L-3] 5×2
b) What do you understand Reinforced Masonry? Write Additional assumption and limitations of Reinforced Masonry.
[CO-5] [L-5] 10
Q. 6 a) Explain the Shear strength of different types of brickwork beams of a similar cross-section.
b) Consider a cavity wall of length 5 m with an inner load bearing leaf of thickness 170 mm and a total thickness 272 mm . Assume that the clear height between restraints is 3.0 m and that the characteristic steel strength is 250N $/ \mathrm{mm}^{2}$. Find tie area. [CO-4] [L-5] 10
Q. 7 a) Describe the technique and methods of Prestressing of masonry. [CO-5] [L-3] 10
b) Explain the importance and utility of ties in masonry structure.

# End Semester Examination, Dec. 2022 

# B. Tech. - Seventh Semester <br> FOUNDATION ENGINEERING (BCE-DS-703) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.

Q 1 Answer the following questions in brief:
a) The shape of the footing effects the bearing capacity of soil. Justify the statement.
[CO2, L3]
b) Enlist the factors affecting minimum depth for shallow foundation. [CO1, L2]
c) Indicate the circumstances under which combined footings are adopted.
[CO1, L3]
d) What type of pile foundation would you recommend for the weak subsoil underlain by hard rock?
[CO3, L3]
e) Differentiate between 'total settlement' and 'differential settlement'.
[CO2, L2]
f) List various types of anchorages used in sheet pile walls.
[CO4, L2]
g) What is the function of weep hole in retaining wall construction?
[CO5, L2]
h) Write the expression for factor of safety for cohesionless soils.
[CO6, L2]
i) What are the important factors that cause instability of slopes?
[CO6, L2]
j) Under what conditions pile foundation is more suitable than shallow foundations?
[CO2, L2] 2x10

## PART-A

Q. 2 a) To obtain a higher bearing capacity, either width of the footing could be increased or the depth of foundation can be increased. Compare relative merits and demerits.
[CO1, L5] 10
b) With the help of neat sketch explain different types of shallow foundations.
[CO1, L3] 10
Q. 3 A strip footing of width 3 m is founded at a depth of 2 m below the ground surface in a (c- $\Phi$ ) soil having a cohesion $\mathrm{c}=30 \mathrm{kN} / \mathrm{m}^{2}$ and angle of shearing resistance $\Phi=35^{\circ}$. The water table is at a depth of 5 m below the ground level. The moist weight of soil above the water table is $17.25 \mathrm{kN} / \mathrm{m}^{3}$ Determine the ultimate bearing capacity of the soil b) the net bearing capacity of soil. Use General shear failure. $\mathrm{N}_{\mathrm{c}}=57.8, \mathrm{~N}_{\mathrm{q}}=14.4, \mathrm{~N}_{\mathrm{\gamma}}=42.4$.
[CO2, L5] 20
Q. 4 Discuss various types of deep foundations on the basis of material used and mode of transfer.
[CO3, L3] 20

## PART-B

Q. 5 Justify the different types of sheet pile walls with their suitability. Draw sketches showing pressure distribution.
[CO4, L5] 20
Q. 6 a) You are appointed as geotechnical engineer and have been tasked to design/ select retaining wall. Describe on what factors it depends and also mention the advantages and disadvantages of providing gravity walls?
b) How overturning and sliding failure can be controlled for a gravity wall? Explain.
[CO5, L5] 5
Q 7 a) Describe step by step procedure to find out factor of safety by Swedish Circle method.
[CO6, L3] 10
b) A canal having side slopes 1 to 1 is proposed to be constructed in a cohesive soil to a depth of 5 m below the ground surface. The soil properties are given below $\Phi=15^{\circ}, \mathrm{cu}=12 \mathrm{kN} / \mathrm{m}^{2,} \mathrm{e}=1.0, \mathrm{Gs}=2.65$. Using Taylor's stability number $S_{n}=0.08$, find the FOS w,r.t cohesion against failure of the bank slopes when the canal is full of water.
[CO6, L5] 10

## End Semester Examination, Dec. 2022

## B. Tech. - Seventh Semester

CIVIL ENGINEERING SOCIETAL AND GLOBAL IMPACTS
(BCE-DS-701)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Name the first country where industry related production commenced.
[CO2,L:1]
b) Give the Great Britain's advantages during the industrial revolution. [CO1, L:2]
c) Suggest a tleast two solutions for making cities smart.
[CO5, L:3]
d) Give any two advantages of water transport.
e) List a few tasks civil engineers of 2025 will be required to do.
[CO1,L:3]
f) What is the purpose of screening in EIA?
[CO1, L:2]
g) On basis of which factors is fibre considered useful as a construction material?
[CO5, L-2]
h) How is water logging related with aesthetics?
[CO4, L:4]
i) Citing relevant examples explain the external causes of failure of a structure.
[CO1, L-3]
j) What inference can be made from TL 15?
[CO3, L-3] 2x10

## PART-A

Q. 2 a) Give an over-view of the first industrial revolution.
(CO1,L:2] 10
b) Citing relevant examples explain how global warming is a matter of concern for Civil engineers.
[CO2,L-4] 10
Q. 3 Describe outcome of summit on the future of civil engineering organized by the American Society of Civil Engineers.
[CO5,L:4] 20
Q. 4 Explain the mass transit systems and their environmental and economic impacts.

## PART-B

Q. 5 Write short notes on:
a) Desalination by evaporation.
b) Applications of treated wastewater.
[CO5, L-4]. 10x2
Q. 6 a) Discuss the steps to control noise pollution.
[CO2,L-4] 10
b) Explain the concept of built environment and its effect on human health and environment.
[CO4,L-3] 10
Q. 7 a) Construct a flowchart of the EIA process and explain the salient features of each component.
[CO3, L-4] 10
b) Discuss the different type of fibres used in construction and their applications.
[CO3, L-4] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Sixth Semester <br> DESIGN OF STEEL STRUCTURES (BCE-DS-627) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Explain the terms "Ductility" and "Hardness" with regards to structural steel.
b) Justify the significance of factor of safety in steel structure designing. [CO-2] [L-2]
c) Express the deflection limits for the following cases
i) Cantilever beam loaded with uniformly varying load throughout its span,
ii) Simply support beam loaded with concentrated load at its mid span.
d) Explain the procedure to determine the "class of section" as per IS 800:2007.
[CO-3] [L-3]
e) Define "lacing" with regards to design of columns. [CO-4] [L-1]
f) State the different elements of Plate Girder. [CO-6] [L-2]
g) Explain the terms: "purlins" and "Rafters". [CO-5] [L-2]
h) List any 4 factors governing the site selection for planning and design of industrial structures.
[CO-2] [L-2]
i) List the allowable impact allowances for loads for the design of gantry girders.
[CO-2] [L-2]
j) Describe the application of Built-up sections.
[CO-2] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 Explain with proper detailing, the various methods of fabrications for structural steel designs.
[CO-1] [L-2]
Q. 3 Assuming fy as $400 \mathrm{~N} / \mathrm{mm} 2$, design a splice for tension member sections 180 x 10 mm and $250 \times 14 \mathrm{~mm}$. The member is subjected to a pull of 400 kN . [CO-2] [L-6]
Q. 4 Calculate the strength of a discontinuous strut of length 5 m . The strut consists of two unequal angles $100 \mathrm{~mm} \times 75 \mathrm{~mm} \times 8 \mathrm{~mm}$, with long legs connected and placed:
a) on the opposite side of a 10 mm thick gusset plate
b) on the same side of the gusset plate ( 10 mm thick)
[CO-3] [L-4] 20

## PART-B

Q. 5 Design a welded plate girder of span 30 m to carry superimposed load of 40 $\mathrm{kN} / \mathrm{m}$. Avoid use of bearing and intermediate stiffeners.
Q. 6 Figure shows 16 m steel roof truss resting on brick masonry with one end hinged and the other supported on rollers. Determine the design forces in the members of the steel roof truss (shown in the figure). The trusses are placed $8 \mathrm{~m} \mathrm{c} / \mathrm{c}$. The rise of the truss is $1 / 4$ of span. Roofing is of AC sheets of dead weight $160 \mathrm{~N} / \mathrm{m}^{2}$. The wind load normal to the roof truss is $925 \mathrm{~N} / \mathrm{m}^{2}$

[CO-5] [L-4] 20
Q. 7 Design of a simply supported gantry girder of Span 9 m to carry an electric overhead travelling crane. Span of crane girder is 15 m with crane capacity of 150 kN . Self-weight of crane girder excluding trolley is 200 kN , Self-weight of trolley is 50 kN . Consider Minimum hook approach of 1.0 m where the self-weight of the rails is $0.3 \mathrm{kN} / \mathrm{m}$
[CO-6] [L-5] 20

## End Semester Examination, Dec. 2022 <br> B. Tech. - Sixth Semester <br> DESIGN OF CONCRETE STRUCTURES-I (BCE-DS-605)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from Part-A and TWO questions from Part-B. Each question carries equal marks.
Q. 1 a) Define characteristic strength as specified in BIS codal provisions.
[CO-1] [L-1]
b) Draw stress-strain curve for concrete in working stress design and mention the salient points?
[CO-5] [L-2]
c) State the formula and IS code clause for finding the effective width of TBeam and L-Beam.
[CO-4] [L-1]
d) Mention the clause for minimum shear reinforcement in beam.
[CO-1] [L-2]
e) State the difference of one way and two-way slab with the help of a load transfer diagram.
[CO-1] [L-1]
f) What are the assumptions made in the working stress method?
[CO-2] [L-3]
g) In which particular cases do we need to provide torsion reinforcements in two way slabs?
h) Classify columns on the basis of reinforcement type and slenderness ratio.
i) State the limit states at which the structure ceases to function.
j) What are the critical sections to be taken for checking a footing in one way shear and two way shears? Mention the BIS clause.

## PART-A

Q. 2 a) State the Advantages of limit state method over the other methods of RCC design.
[CO-1] [L-2] 10
b) Develop a relation to find the Moment of Resistance of a balanced Singly Reinforced beam.
[CO-1] [L-3] 10
Q. 3 a) Explain under Reinforced, Balanced and Over Reinforced Sections as followed in Limit State Method.
[CO-2] [L-2] 10
b) Calculate the moment of resistance of a rectangular R.C.C. beam of size $B=$ $350 \mathrm{~mm}, \mathrm{D}=650 \mathrm{~mm}$, Effective Cover $=50 \mathrm{~mm}$ when area of steel is:
i) 3 bars of 16 mm
ii) 6 bars of 25 mm

Use limit state method of structural design.
[CO-2] [L-3] 10
Q. 4 a) Compare the type of shear reinforcements that can be employed. [CO-3] [L-2] 5
b) A rectangular beam of size $300 \mathrm{~mm} \times 600 \mathrm{~mm}$ is subjected to a load of 60 $\mathrm{kN} / \mathrm{m}$ over a simply supported span of 6.5 m . Design the beam for shear if \% tension reinforcement is $1.2 \%$. Use M20Fe 415 and LSM of design. [CO-3] [L-5] 15

## PART-B

Q. 5 Design a slab of dimensions $5 \mathrm{~m} \times 11 \mathrm{~m}$ supported on 230 mm thick walls and is supposed to carry a live load of $4 \mathrm{kN} / \mathrm{m}^{2}$. Use LSM and specify BIS provisions wherever used.
Q. 6 Design a circular column with 400 mm dia and spiral reinforcement if it's subjected to a factored load of 1500 kN . The column has an unsupported length of 3.4 m . Use M25 concrete and Fe 415 steel
Q. 7 Design a RCC footing for a column of $500 \mathrm{~mm} \times 500 \mathrm{~mm}$ carrying an axial load of 450 kN under service loads. Assume safe bearing capacity of soil as $350 \mathrm{kN} / \mathrm{m}^{2}$ at a depth of 1 m below the ground level. Use M 20 and Fe 415 for the design. Draw the reinforcement details.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Sixth Semester <br> HYDROLOGY AND WATER RESOURCES ENGINEERING (BCE-DS603) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Explain Hydrological cycle.
[CO-1] [L-2]
b) Define the following terms: Interception, Transpiration, $\varnothing$-index, w-index. [CO2][L1]
c) Define 'runoff'.
[CO-4] [L-1]
d) Explain different types of indices. [CO-5] [L-2]
e) Illustrate the distribution of soil moisture in the infiltration process.
[CO-3] [L-3]
f) List out the methods for direct determination of stream discharge.
[CO-1] [L-2]
g) Write an expression for discharge in area-velocity method.
[CO-1] [L-3]
h) List various factors affecting runoff.
[CO-6] [L-2]
i) Distinguish between confined and unconfined aquifer,
[CO-6] [L-2]
j) Write properties of aquifer?
[CO-6] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Explain the evapotranspiration estimation methods.
[CO-1] [L-2] 10
b) Explain about the different methods of measurement of rainfall with neat diagram.
[CO-1] [L-3] 10
Q. 3 a) Describe briefly the various measures to reduce loss of water due to evaporation
in reservoir.
[CO-2] [L-3] 10
b) Explain step by step Penman's equation method.
[CO-2] [L-3] 10
Q. 4 a) Define the term "Infiltration." Describe the factors affecting for infiltration rates.
[CO-3] [L-3] 10
b) The infiltration capacities of an area at different intervals of time are indicated below. Find an equation for the infiltration capacity in the exponential form.

| Time (hrs) | 0 | 0.25 | 0.50 | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 2.00 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Infiltration <br> capacity (cm/hr) | 10.5 | 5.65 | 3.20 | 2.18 | 1.50 | 1.25 | 1.10 | 1.0 | 1.0 |

## PART-B

Q. 5 a) The rain gauge station $X$ was in operative for a part of a month during storm occurred. The storm rainfall recorded at the three surrounding stations $\mathrm{A}, \mathrm{B}$, and
was 75,55 , and 85 mm respectively. If the average annual rainfall of the stations $B, C$, and $X$ are $780,660,850$ and 700 mm respectively. Estimate the storm rainfall of station $X$.
b) Explain area velocity method in detail.
Q. 6 a) Define 'unit hydrograph'. What are the assumptions underlying the unit hydrograph theory? Explain uses of unit hydrograph.
[CO-5] [L-3] 10
b) The ordinates of 3 hour unit hydrograph are given below:

| Time | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Ordinates | 0 | 10 | 25 | 20 | 16 | 12 | 9 | 7 | 5 | 3 | 0 |

Find the ordinates of 6 hour unit hydrograph for same.
Q. 7 a) What is Darcy's law? What are its limitations? How will you measure the coefficient
of permeability of soil?
[CO-6] [L-3] 10
b) Describe a method of determining the yield from an open well.

## End Semester Examination, Dec. 2022

## B. Tech. - Fifth Semester

## ENGINEERING MATERIALS FOR SUSTAINABILITY (BCE-DS-523)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) With suitable examples, define sustainable development.
[CO1][L-1]
b) In present scenarios, illustrate the need of green buildings. [CO1][L-1]
c) Define some of the by wastes from industries that can be used as a partial replacement of sand in making of sustainable concrete. [CO2][L-1]
d) Correlate "autoclaved aerated concrete bricks" as one of the sustainable building material.
[CO2] [L-4]
e) Explain "Sustainability Matrices".
[CO3] [L-1]
f) Compare the parameters of IGBC and LEEDs towards measuring of sustainability of any structure.
g) Relate the significance of "Life - Cycle Assessment" and sustainability. [CO4] [L-4]
h) Explain the various types of construction specifications.
[CO5] [L-1]
i) Summarize the role of Sustainable development goals (SDGs) 2030.
[CO1] [L-2]
j) Explain in brief, the concept of sustainability at institutional level.
[CO1][L-1] $2 \times 10$

## PART-A

Q. 2 a) Correlate the sustainable development goals 2030 and the three pillars of sustainability.
[CO1] [L-4] 10
b) Describe the importance of material flow analysis in making as sustainable community.
[CO1] [L-1] 10
Q. 3 Illustrate the application of sustainability in the following sub - disciplines of Civil Engineering:
a) Geotechnical engineering.
b) Environmental engineering.
Q. 4 Correlate LEEDs as one of the measures of green building rating tools. [CO3][L-4] 20

## PART-B

Q. 5 a) Write a well - detailed note on "Life - cycle assessment".
[CO4] [L-2] 10
b) Describe the various steps involved in the Life - cycle assessment of a concrete column of size $500 \mathrm{~mm} \times 550 \mathrm{~mm}$.
Q. 6 a) Illustrate the importance of material specification and sustainable development.
[CO5] [L-4] 10
b) Relate the concept of material specification in sustainable civil engineering approach in context with concrete industry.
Q. 7 Plan the various parameters that must be taken into consideration to make the following buildings "sustainable":
a) Institutional complex.
b)Heritage monumental complex. $\mathbf{1 0 \times 2}$

## End Semester Examination, Dec. 2022

## B. Tech (Civil Engineering) - Fifth Semester CONCRETE TECHNOLOGY (BCE-DS-506)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) With suitable examples, define Calcareous Compounds.
[CO1] [L-1]
b) Explain the function of "Alumina" in cement.
[CO1] [L-1]
c) In a laboratory experiment, if the consistency of the cement measured is 23 percent, determine the percentage of water to be added into the sample of cement to determine the compressive strength of cement.
[CO1] [L-4]
d) Compare Flakiness Index and Elongation Index.
[CO2] [L-2]
e) Define "Duff - Abram's Law".
[CO3] [L-1]
f) With the help of neat sketch, differentiate between the three different conditions of slump.
[CO3] [L-3]
g) Relate the significance of "Target Mean Strength of Concrete" as per IS 10262: 2019.
[CO6] [L-4]
h) As per IS 10262: 2019, correlate M 45. Briefly explain the significance of M-45.
[L-4]
i) Summarize the commonly used plasticizers in concrete industry.
[CO5] [L-2]
j) Recognize the Indian Standard Codal Provisions for the following:
i.) Fineness of Cement by Dry Sieving.
ii.) Plain and Reinforced Concrete - Code of Practice.
[CO6] [L-1]

## PART-A

Q. 2 a) Compare the different ingredients of cement on the basis of their function.
b) Explain Bogue's Compounds in detail.
Q. 3 a) Classify aggregates on the basis of their shape.
[CO2] [L-2] 10
b) Evaluate the Fineness Modulus of the given sample of aggregate for the following data:

- The total weight of the sample : 20 Kg
- Weight retained on 40 mm IS Sieve : 2.5 Kg
- Weight retained on 20 mm IS Sieve : 3.75 Kg
- Weight retained on 10 mm IS Sieve : 4.25 Kg

What do you infer from the result obtained?
[CO2] [L-5] 10
Q. 4 What do you understand by "Fresh Concrete"? Explain in detail the various laboratory experiments which are conducted on the concrete sample to determine its workability?
[CO3] [L-1] 20

## PART-B

Q. 5 Correlate the following in terms of concrete making process:
a) Plasticizers.
b) Super - Plasticizers.
c) Fly Ash.
d) Metakaolin.
[CO4] [L-4] 20
Q. 6 a) Compare the Cold - Weather Concreting and Hot - Weather Concreting on the basis of fresh and hardened properties of concrete.[CO-BCE-DS-506.5] [L-2] 10
b) Correlate the provision of fibres in fibre - reinforced concrete as a reinforcing material to reduce crack formation with the steel bars in reinforced cement concrete.
[CO5] [L-4] 10
Q. 7 As per IS 10262: 2019, design a Concrete Mix of grade M 35 for the following given data:

- Grade Designation
: M 35
- Type of Cement
: OPC 33 Grade
- Maximum Nominal Size of Aggregates : 20 mm
- Exposure Condition
: Very Severe
- Workability
: 80 mm
Make suitable assumptions .


## End Semester Examination, Dec. 2022

## B. Tech. - Fifth Semester

## PROFESSIONAL PRACTICE, LAW AND ETHICS (BCE-DS-504)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer any four out of the following:
a) Criticize the concept of value education.
(CO2) (L-4)
b) Analyze the needs of Self ('I') and 'Body'.
(CO2) (L-4)
c) List the differences between society and crowd.
(CO5) (L-1)
d) Analyze the need of natural acceptance of human values.
(CO2) (L-4)
e) Discuss the learning from the "story of stuff".
(CO6) (L-2) 5x4

## PART-A

Q. 2 What is value education? Discuss the need of value education in today's scenario.
(CO1) (L-2) 20
Q. 3 ' I ' is a conscious unit while the body is a material unit. Examine this statement.
"Human being is more than just the body" - Explain.
(CO2) (L-3) 20
Q. 4 Articulate how Universal Order; from family to world family can be attained?
(CO4) (L-3) 20

## PART-B

Q. 5 Discuss the equivalence of existence with co-existence.
(CO4) (L-2) 20
Q. 6 Illustrate the steps involved in living in harmony at all the levels of being.
(CO4) (L-4) 20
Q. 7 Referring to the video "Hiware Bazaar", Reflect on the following:

Man influences society/system or man has to conform to society/system? Is there space in the current system for individuals to express themselves and to participate?
(CO6) (L-5) 20

# End Semester Examination, Dec. 2022 

# B. Tech. - Fifth Semester <br> STRUCTURAL ENGINEERING (BCE-DS-503A) 

Time: 3 hrs.
Max Marks: 100

No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Define "Characteristic Strength" of concrete and mention the clause.
[CO3] [L-2]
b) With context to the structural engineering, illustrate the difference between design and analysis of structural elements.
c) List the basic sources of building loads.
d) Evaluate the Static Indeterminacy for the following Howe Truss:

[CO1] [L-3]
e) State the IS code for determining the Earthquake Loads, Dead Loads, Live Loads and Wind Loads on the structure.
[CO4] [L-1]
f) As per IS 800: 2007, correlate ISA $100 \times 150 \times 12$ with help of a diagram. [CO4] [L-4]
g) Elaborate the concept of Two - Way Slab in transferring the loads to beam sections.
[CO5] [L-2]
h) With the help of a neat sketch, quote the expression for "stresses developed due to external loading" introduced in the concrete during prestressing of concrete member.
[CO6] [L-3]
i) List the assumptions considered in the design of Pre - stressed Concrete structural element.
[CO6] [L-1]
j) What is the Minimum Grade of Concrete used for the following?

- Pretensioned Pre - stressed Concrete Member.
- Posttensioned Pre - stressed Concrete Member.
[CO6] [L-2] 2x10


## PART-A

Q. 2 a) Using WSM, frame the design procedure for a singly-reinforced beam.
[CO1] [L-6] 10
b) Enumerate the recent advancements of Sustainable Development in the discipline of Structural Engineering.
[CO1] [L-2] 10
Q. 3 a) Illustrate the properties of Structural Steel in Steel Construction Industry.
[CO2] [L-4] 10
b) A rectangular beam of size $500 \mathrm{~mm} \times 550 \mathrm{~mm}$ is used for simply supported, effective span of 6.5 m . Calculate what maximum load can be applied over the beam, if the beam is provided with 4 bars of 20 mm dia. Use M25 and Fe415, effective cover $=50 \mathrm{~mm}$. (by using WSM)
[CO2] [L-5] 10
Q. 4 a) Elaborate the design philosophies in structural design.
b) Compare static and kinematic degree of indeterminacy for the following figure:

[CO1] [L-2] 10

## PART-B

Q. 5 Using LSM, design a doubly reinforced beam section for the following data:

- $b=300 \mathrm{~mm}$
- $\mathrm{D}=600 \mathrm{~mm}$
- Clear Cover $=25 \mathrm{~mm}$
- $M_{u}=350 \mathrm{kNm}$
- M20 and Fe 415

Assume other relevant data.
Q. 6 a) State the various Assumptions of working stress method.
[CO4] [L-3] 5
b) Design a one - way simply supported slab for a roof of a stadium having internal dimensions $3.5 \mathrm{~m} \times 8 \mathrm{~m}$. The thickness of the walls is 250 mm all around. Assume a Live Load of $4 \mathrm{kN} / \mathrm{m}^{2}$ and floor finish of $1 \mathrm{kN} / \mathrm{m}^{2}$. Use M20 concrete and Fe 415 steel.
[CO4] [L-6] 15
Q. 7 a) Summarize the different types of losses experience by a Pre - stressed Concrete member.
[CO1] [L-2] 10
b) With the help of a neat sketch, correlate the concept of Pre-stressing in a RC Member with stress blocks.

## End Semester Examination, Dec. 2022

## B. Tech. - Fifth Semester

STRUCTURAL ENGINEERING (BCE-DS-503A)
Time: 3 hrs.

Max Marks: 100
No. of pages: 2

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) What do you understand by geophysical source of building loadings?
[CO-1] [L-2]
b) Highlight the allowable percentage of reduction for live loads.
c) What do you understand by the term "Design Safety"?
[CO-2] [L-2]
d) Summarize the planning and design process involved while designing a structure.
[CO-2] [L-1]
e) Explain 'Indeterminate Structures'. Distinguish between the determination of static and kinematic indeterminacy.
f) Enunciate the various assumptions made during structural analysis. [CO-4] [L-2]
g) Explain "Effective Depth" and "Development Length" with proper diagram.
[CO-4] [L-2]
h) Differentiate between under reinforced and over reinforced section with proper stress block diagram.
[CO-6] [L-2]
i) List the different types of steel channel sections.
[CO-5] [L-1]
j) Summarize the concept of "Prestressed Concrete".

## PART-A

Q. 2 a) Discuss the role/functions of: i) Structural Engineer; and ii) Architects.
[CO-1] [L-2] 10
b) Classify the various Civil Engineering Structures.
Q. 3 a) Explain in detail the basic sources of building loads giving specific importance to its codal provisions.
[CO-2] [L-3] 10
b) Write a detailed note on the 'hardened properties of concrete'. What is the purpose of using water in concrete?
[CO-2] [L-3] 10
Q. 4 a) Differentiate between Design and Analysis of structural systems.
[CO-2] [L-3] 8
b) Compare Static and Kinematic indeterminacy for the figure below:
[CO-2] [L-4] 12


## PART-B

Q. 5 a) List the advantages of steel design and explain the stress strain curve of structural steel. [CO-4][L-2] 8
b) Design a rectangular RCC beam for simply supported effective span of 10 m subjected to LL of $40 \mathrm{kN} / \mathrm{m}$. Use M30 concrete and Fe415 steel. [CO-4] [L-5] 12
Q. 6 a) Discuss the assumptions made in the "Limit state of collapse - Flexure".
[CO-5] [L-2] 8
b) A singly reinforced rectangular beam of 250 mm wide has a span of 7 m and carried a load of $18 \mathrm{kN} / \mathrm{m}$. Find effective depth and $\mathrm{A}_{\text {st. }}$. Use M20 concrete and Fe415 steel.
[CO-5] [L-5] 12
Q. 7 Explain the various losses in prestress with the help of a neat sketch. [CO-6] [L-3] 20

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester

## GEOTECHNICAL ENGINEERING (BCE-DS-502)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Find the porosity of soil with void ratio of 1.24 .
(CO1) (L-2)
b) What is liquefaction of soil?
(CO6) (L-1)
c) What are advantages of triaxial test over direct shear test?
(CO6) (L-2)
d) Differentiate between primary and secondary consolidation.
(CO5) (L-2)
e) Write expression for the vertical stress at a point due to line load.
(CO4) (L-2)
f) List different methods of determination of coefficient of permeability of soil.
(CO2) (L-2)
g) Why permeability of the soil partially saturated soil less than fully saturated soil?
(CO2) (L-3)
h) If liquid limit of a soil is $35 \%$ and plastic limit is $12 \%$. What would be the plasticity index?
(CO1) (L-3)
i) Which method of compaction will you prefer for compacting cohesive soil?
(CO2) (L-3)
j) What is placement water content?
(CO2) (L-3) 2x10

## PART-A

Q. 2 a) What is the use of classification of soil? Give step by step procedure of classification of soil by Indian classification system.
(CO1 (L-2) 10
b) The volume of a soil sample having natural water content of $42 \%$ is 26 cm 3 and its weight is 45 gms. Calculate the dry density, void ratio, porosity and degree of saturation for the soil sample if $G=2.76$.
(CO1) (L-3) 10
Q. 3 a) What are the factors which affect permeability of soil? Discuss in detail.
(CO2) (L-2) $\mathbf{1 0}$
b) Calculate the horizontal and vertical permeability of a soil deposits consisting of four layers $3 \mathrm{~m}, 1 \mathrm{~m}, 1.5 \mathrm{~m}$ and 3 m thick with permeabilties $0.2,3 \times 10^{-4}$, 0.06 , and $5 \times 10^{-7} \mathrm{~cm} / \mathrm{sec}$ respectively.
(CO2) (L-3) 10
Q. 4 a) Discuss the effect of compaction on various properties of soil.
(CO3) (L-3) $\mathbf{1 0}$
b) What is compaction curve? Give its salient features.
(CO3) (L-3) 10

## PART-B

Q. 5 a) Discuss various approximate methods for the determination of the vertical stress at a point. What are their limitations?
(CO4) (L-3) 10
b) Vertical point load on surface $=1000 \mathrm{kN}$ Find incremental vertical pressure at depths 4 m and 8 m directly under the load and at a distance 5 m radially away from the load axis on these depths.
Q. 6 What are different causes of preconsolidation? How is it determined? What is the effect of preconsolidation on the settlement?
Q. 7 a) Define slow, quick and consolidated quick triaxial shear test, illustrating their use by atleast one field example.
(CO3) (L-3) $\mathbf{1 0}$
b) Describe unconfined compressive strength test. What are its merits and demerits?
(CO3) (L-3) $\mathbf{1 0}$

## End Semester Examination, Dec. 2022

## B. Tech. - Fifth Semester HYDRAULIC ENGINEERING (BCE-DS-501)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Define the term: "weight density".
[CO-1] [L1]
b) Define 'specific gravity'.
c) Describe viscosity.
d) Discuss application of dimension analysis.
[CO-2] [L2]
e) Explain Buckingham's P-method.
[CO-2] [L2]
f) Define 'unsteady flow'.
[CO-3] [L1]
g) Explain the various application of Manning's formula.
[CO-3] [L1]
h) Describe weir and its classification.
[CO-3] [L2]
i) Define 'standing wave'.
[CO-5] [L1]
j) Categorize minor energy losses in a pipe.
[CO-6] [L4] 2x10

## PART-A

Q. 2 Calculate the dynamic viscosity of an oil, which is used for lubrication between a square plate of size 0.8 m X 0.8 m and an inclined plane with angle of inclination $30^{\circ}$ as shown in Fig. The weight of the square plate is 300 N and it slides down the inclined plane with a uniform velocity of $0.3 \mathrm{~m} / \mathrm{s}$. The thickness of oil film is 1.5 mm .
Q. 3 Find an expression for the drag force on smooth sphere of diameter D , moving with a uniform velocity V in a fluid of density r and dynamic viscosity $\mu$.[CO-2] [L5] 20
Q. 4 Find the bed slope of trapezoidal channel of bed width 6 m , depth of water 3 m and side slope of 3 horizontal to 4 verticals, when the discharge through the channel is $30 \mathrm{~m} / \mathrm{s}$. Take Chezy's constant, $\mathrm{C}=70$.

[CO-2] [L3] 20

## PART-B

Q. 5 The discharge of water through a rectangular channel of width 8 m , is $15 \mathrm{~m} / \mathrm{s}$ when depth of flow of water is 1.2 m . Evaluate:
(i) Specific energy of the flowing water,
(ii) Critical depth and critical velocity,
(iii) Value of minimum specific energy.
[CO-3] [L5] 20
Q. 6 Derive the expression for depth of hydraulic jump in an open channel in term of Froud's Number.
[CO-6] [L5] 20
Q. 7 Design the parameter of a pipe of length 2000 m when the rate of flow of water through the pipe is 200 litres/s and the head lost due to friction is 4 m . Take the value of $C=50$ in Chezy's formulae.
[CO-6] [L6] 20

# End Semester Examination, Dec. 2022 

# B. Tech. - Fourth Semester <br> BUILDING CONSTRUCTION (BCE-DS-407) 

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Name any four tools required for construction of brick masonry.
[CO-1] [L-1]
b) Classify the shallow foundation and deep foundation.
c) What is the purpose of providing cavity wall?
d) Mention the purpose of providing roof in a building.
e) State two reasons for settlement of foundation.
f) What is the name of arch having four centres?
g) Give relative merits and demerits of lintel over arches?
h) A wooden floor is to be constructed on the ground floor room. List various parts.
[CO-5] [L-3]
i) What are the benefits of rainwater harvesting?
[CO-6] [L-2]
j) What precautions tobe adopted in fire resistant Buildings?

## PART-A

Q. 2 a) Compare brick masonry and stone masonry on the basis of cost, strength , durability
and appearance.
[CO-1] [L-2] 10
b) Supposing you are supervising the construction of residential building in a good
locality, write the general principles you would expect the brick layer to observe
during construction of brick masonry.
Q. 3 a) Explain the salient features of load bearing and framed structure. [CO-2] [L-2] 10
b) Write short notes on:
i) Hollow and solid concrete block.
ii) Composite masonry walls.
[CO-2] [L-3] 10
Q. 4 a) Identify the properties on which the bearing capacity of soil depends?
[CO-3] [L-2] 10
b) Suggest relevant type of foundation with sketch for commercial building on sandy
soil with justification
[CO-3] [L-3] 10

## PART-B

Q. 5 a) Distinguish between a lintel and an Arch.
[CO-4] [L-1]
10
b) Explain the necessity of lintel along with its classification by material. Draw a labeled
sketch of reinforced concrete lintel with chajja projection.
[CO-4] [L-4] 10
Q. 6 a) Describe the procedure of any two types of flooring along with its suitability in building construction
b) With the help of neat sketches discuss the different types of roofs. [CO-5] [L-3] $\mathbf{1 0}$
Q. 7 a) What are green buildings? How is green building related to smart growth and sustainable development?
[CO-6] [L-3] 10
b) What are the criteria for a building to be rated as one star, two star, three star,
star and five star as per GRIHA? four
[CO-6] [L-4] 10

## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester

## TRANSPORTATION ENGINEERING (BCE-DS-406)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Explain classification of roads as per Nagpur road plan.
b) If you are planning for a road pattern for a new city what factors you will consider for adopting a particular pattern.
[CO-1] [L-3]
c) Calculate the values of (i) head light sight distance and (ii) intermediate sight distance for a highway with a design speed of 80 kmph . Take reaction time as 2.5 sec and friction coefficient 0.36 .
[CO-2] [L-3]
d) With neat sketches shows various types of traffic signs, classifying them in proper group.
e) Describe the purpose of each layer of flexible pavement.
f) Define the following terms: modulus of sub grade reaction, radius of relative stiffness, equivalent radius of resisting section.
g) Explain the uses of bitumen emulsion. Also list the tests carried out on emulsion.
[CO-3] [L-2]
h) Define the term "Thirteenth highest hourly traffic volume".
[CO-5] [L-1]
i) Explain the objects of providing expansion joints in cement concrete pavement.
[CO-4] [L-3]
j) Explain the uses of map study.
[CO-1] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Explain with sketches the various factor controlling the alignment of road.
[CO1][L2] 10
b) Explain obligatory points. With sketches, discuss how these controls the alignment.
[CO-1] [L-4] 10
Q. 3 a) Explain the objective of providing transition curves on the horizontal alignment of the highways.
[CO-2] [L-2]
b) The radius of a horizontal circular curve is 500 m . The design speed is 100 kmph and the design coefficient of lateral friction is 0.15 .
i) Evaluate the super elevation required if full lateral friction is assumed to develop.
ii) Find the coefficient of friction needed if no super elevation is provided.
iii) Calculate the equilibrium super elevation if the pressure on inner and outer wheels should be equal.
[CO-2] [L-3] 10
Q. 4 a) Explain the significance of road user characteristics in traffic engineering. Discuss briefly the various factors which affect the road user characteristics and their effects in traffic performance.
b) Classify different types of signals along with its advantages and disadvantages.

## PART-B

Q. 5 a) Explain the desirable properties of bitumen to be used in different types of pavement constructions.
[CO-3] [L-2] 10
b) Explain various tests for judging the suitability of road stone. Discuss the objects of carrying out each of these tests and their advantages and limitations.
[CO-3] [L-2] 10
Q. 6 a) Explain the CBR method of pavement design. How is this method useful to determine thickness of component layers?
[CO-4] [L-2] 10
b) Plate load bearing tests were conducted using 30 cm diameter plate on soil subgrade and over a base course of thickness 45 cm . The pressure yielded at 0.5 cm deflection on the subgrade and base course were $1.2 \mathrm{~kg} / \mathrm{cm}^{2}$ and 7.5 $\mathrm{kg} / \mathrm{cm}^{2}$, respectively. Design the thickness requirement of flexible pavement for a wheel load of 6000 kg with tyre pressure of $8.0 \mathrm{~kg} / \mathrm{cm}^{2}$ for an allowable deflection of 0.5 cm using Burmister's two-layer deflection factor chart.[CO-4] [L-3] 10
Q. 7 a) Describe briefly various types of joints in cement concrete pavement and their functions.
[CO-4] [L-3] 10
b) Calculate the stresses at interior, edge and corner of a cement concrete pavement by using Westergaard's stress equations.

Modulus of elasticity of concrete, $\mathrm{E}=3.0 \times 10^{5} \mathrm{Kg} / \mathrm{cm}^{2}$
Poisson's ratio of concrete $=0.15$
Thickness of concrete pavement, $\mathrm{h}=18 \mathrm{~cm}$
Modulus of subgrade reaction, $\mathrm{K}=6.0 \mathrm{Kg} / \mathrm{cm}^{3}$
Wheel load, $\mathrm{P}=5100 \mathrm{Kg}$
Radius of loaded area, $a=15 \mathrm{~cm}$
[CO-4] [L-3] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Fourth Semester MATERIAL TESTING AND EVALUATION (BCE-DS-404A)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) List any three sustainable materials for buildings.
[CO-1] [L-1]
b) What are three principles of Green engineering?
[CO-1] [L-1]
c) State the function of sand in mortar.
[CO-2] [L-1]
d) Differentiate between dry process and wet process of cement.
[CO-2] [L-1]
e) What are super plasticizers? How are these helpful in modifying the properties of concrete?
[CO-5] [L-3]
f) Mention the name of various processes adopted to manufacture of steel.[CO-2] [L-1]
g) Explain in brief the various uses of non-ferrous metals used in engineering structures.
[CO-2] [L-2]
h) How is consistency different from workability?
[CO-5] [L-2]
i) What are nanomaterials?
[CO-2] [L-1]
j) What are limitations of ultrasonic test?
[CO-6] [L-2] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) What are the criteria's for choosing material for construction? [CO-1] [L-2] 10
b) "The earth is losing its carrying capacity due to unsustainable production and consumption"- Can engineers help regain the carrying capacity of earth? Do you agree or disagree? State the reasons for your answer.
[CO-1] [L-2] 10
Q. 3 a) Summarize various stages of manufacturing of cement.
[CO-2] [L-2] 10
b) What are properties of Hardened concrete? Explain in Brief?
[CO-2] [L-3] 10
Q. 4 Write short note on:
a) Carbon fiber reinforced concrete.
b) Nanomaterials.
c) Shape-memory.
d) 3D printing of materials.

## PART-B

Q. 5 a) Discuss the relevance of structural integrity assessment.
[CO-4] [L-6] 5
b) What is torsion? Why is it necessary for structural design? Explain any one laboratory method to determine it.
Q. 6 a) What are the various methods used for curing? How 28 day concrete strength can be predicted in one day?
b) Describe the factors affecting strength of concrete.
[CO-4] [L-4] 5
c) Describe the methods of testing fresh concrete.
[CO-4] [L-4] 10
Q. 7 a) Compare destructive and non destructive testing.
[CO-6] [L-2] 5
b) Explain various nondestructive tests performed on hardened concrete.

# End Semester Examination, Dec. 2022 

## B. Tech. - Third Semester <br> SURVEYING AND GEOMATICS (BCE-DS-403)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) What do you understand by the term "Levelling"?
[CO-1] [L-2]
b) Compare "Accumulative Error" and "Compensating Error".
c) Represent $\mathrm{N} 85^{\circ} \mathrm{E}$ in Whole Circle System of Bearing.
[CO-2] [L-3]
d) Justify the statement: "Sum of all the Deflected Angles for a Closed Traverse is $360^{\circ}$."
[CO-2] [L-3]
e) Elaborate "Reverse Curve" with the help of a neat sketch.
[CO-3] [L-2]
f) Write the formulae to determine ground distances between object A and Focal Point in case of a vertical photograph.
g) Define the concept of "Oblique Photograph".
[CO-4] [L-1]
h) Summarize the applications of remote sensing in surveying.
i) List the different purposes of geographical information system.
j) What do you understand by the term "geographical positioning system"? [CO6] [L-2]
$\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Write a well - explanatory note on "Theory of Weights".
[CO-1] [L-2] 8
b) The following values were extracted from a level field book, some of the entries being illegible owing to exposure to rain. Insert the missing values and verify your result.
[CO-1] [L-4] 12

| Station | B.S. | I.S. | F.S. | Rise | Fall | R.L. | Remarks |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2.285 |  |  |  |  | 232.460 | B.M. 1 |
| 2 | 1.650 |  | $?$ | 0.020 |  |  |  |
| 3 |  | 2.105 |  |  | $?$ |  |  |
| 4 | $?$ |  | 1.960 | $?$ |  |  |  |
| 5 | 2.050 |  | 1.925 |  | 0.300 |  |  |
| 6 |  | $?$ |  | $?$ |  | 232.255 | B.M. 2 |
| 7 | 1.690 |  | $?$ | 0.340 |  |  |  |
| 8 | 2.865 |  | 2.100 |  | $?$ |  |  |
| 9 |  |  | $?$ | $?$ |  | 233.425 | B.M. 3 |

Q. 3 a) Determine the missing values for a Closed Traverse:
[CO-2] [L-5] 10

| Lines | Length (m) | Bearings |
| :---: | :---: | :---: |
| AB | $\mathbf{X}$ | $72^{0}$ |
| BC | 160 | $146^{0}$ |
| CD | $\mathbf{Y}$ | $214^{0}$ |
| DE | 310 | $325^{0}$ |
| EA | 190 | $14^{0}$ |

b) With the help of neat sketch, compare the different systems of bearings in compass surveying.
Q. 4 a) What do you understand by "Contour Intervals"? Illustrate the various properties of "Contours" with the help of neat sketches.
[CO-3] [L-3] 10
b) Explain the following terms in context of a Simple Curve:
i) Apex distance.
ii) Mid - Ordinate.
iii) Long Chord.
iv) Different methods of setting out of a simple curve
[CO-3] [L-3] 10

## PART-B

Q. 5 a) With the help of a neat sketch, explain and plan a mechanism to determine the magnitude of Relief Displacement.
[CO-4] [L-4] 8
b) An area of length 60 km and width 40 km is considered for taking vertical photographs. Evaluate the total number of photographs required if the size of one photograph is $30 \mathrm{~cm} \times 25 \mathrm{~cm}$ with longitudinal and side overlaps be 35 \% and 25 \% respectively.
Q. 6 a) Explain the features of Energy Interaction with Earth's surface.
b) Write a short note on "Rayleigh Scatter".
Q. 7 a) Distinguish between the two data structures for GIS.
b) Correlate the concept of "User - Equipment Segment" in GPS.

## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester

## INTRODUCTION TO SOLID MECHANICS (BCE-DS-402)

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) What do you understand by the term "Stress"?
[CO-1] [L-2]
b) Define "Poisson's ratio".
[CO-1] [L-2]
c) With the help of neat sketch, explain the significance of bending moment. [CO-2] [L-2]
d) Express the formulae for determining shear force in a simply supported beam subjected to a Udl over its entire span.
e) State the "Theory of simple bending".
f) Evaluate the MOI of a rectangular beam section of size $300 \mathrm{mmX400mm}$.
[CO-4] [L-2]
g) What do you understand by the term, "Shear stresses"?
[CO-4] [L-2]
h) Compare "Thin cylinders" and "Thick cylinders".
[CO-6] [L-2]
i) Explain the justification of the concept of "Torsional rigidity". [CO-5] [L-1]
j) Illustrate Hoop Stresses with the help of neat diagram.

## PART-A

Q. 2 With the help of neat sketch, explain the stress - strain curve for mild steel.
[CO-1] [L-3] 20
Q. 3 a) Plan a mechanism to determine the shear force and bending moment of a fixed beam subjected to a concentrated load ' $P$ '.
[CO-2] [L-5] 10
b) Plan a mechanism to determine the shear force and bending moment of a cantilever beam subjected to udl over its entire span.
[CO-2] [L-3] 10
Q. 4 Derive an expression for evaluating section modulus of a solid circular section. Support your answer by stating the assumptions of "Theory of flexure". [CO-3] [L-4] 20

## PART-B

Q. 5 Work out the procedure to determine the shear stresses for "Rectangular" and "I -Section".
[CO-4] [L-3] 20
Q. 6 State the assumptions considered in the derivation of Torsional equation. Plan the mechanism to determine the formulae for combined torsion and bending for circular shafts.
Q. 7 Plan the mechanism to determine "Longitudinal stresses" in a cylinder subjected to internal pressures.
[CO-6] [L-5] 20

## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester

## INTRODUCTION TO FLUID MECHANICS (BCE-DS-401)

Time: 3 hrs.

Max Marks: $\mathbf{1 0 0}$
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Dynamic viscosity
b) Laminar flow and turbulent flow.
c) Kinematic viscosity.
d) Cavitation.
e) Ideal and real fluid flow.
f) Weber number.
g) Dimensions of specific weight.
h) Bulk modulus of elasticity.
i) Capilarity.
j) Buoyancy.

## PART-A

Q. 2 a) State Newton's law of viscosity.
[CO-2] [L-1] 5
b) Calculate the capillary rise in a glass tube of 2.5 mm diameter when immersed vertically in water and mercury. Take specific tension $0.0725 \mathrm{~N} / \mathrm{m}$ for water and $0.52 \mathrm{~N} / \mathrm{m}$ for mercury in contact with air. The specific gravity of mercury is 13.6 and angle of contact is $130^{\circ}$.
[CO-2] [L-4] 15
Q. 3 Calculate the pressure due to a column of 0.3 of :
a) Water
b) An oil of specific gravity 0.8 .
c) Mercury of specific gravity 13.6. Density of water= $1000 \mathrm{~kg} / \mathrm{m} 3$
[CO-1,2] [L-5] 20
Q. 4 Derive continuity equation in 3 dimensions cartesian coordinates. [CO-3] [L-6] 20

## PART-B

Q. 5 Derive Bernoulli's equation of motion and discuss its practical applications. [CO2,4][L6] 20
Q. 6 An orificemeter with orifice dia 10 cm is inserted in a pipe of 20 cm dia. The pressure gauges fitted upstream and downstream of the orifice meter gives the readings of $19.62 \mathrm{~N} / \mathrm{cm} 2$ and $9.81 \mathrm{~N} / \mathrm{cm} 2$ respectively. Co-efficient of discharge for the meter is 0.6 . Find the discharge of water through pipe.
[CO-1,5] [L-5] 20
Q. 7 a) State Buckingham pi theorem.
[CO-6] [L-4] 4
b) The efficiency $\eta$ of fan depends on density $\rho$, dynamic viscosity $\mu$ of fluid, angular velocity $\omega$, diameter D of rotor and discharge Q . Express n in terms of dimensionless parameters.

## End Semester Examination, Dec. 2022

## B. Tech. - Fourth Semester

## INTRODUCTION TO FLUID MECHANICS (BCE-DS-401)

Time: 3 hrs.

Max Marks: $\mathbf{1 0 0}$
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) Dynamic viscosity
b) Laminar flow and turbulent flow.
c) Kinematic viscosity.
d) Cavitation.
e) Ideal and real fluid flow.
f) Weber number.
g) Dimensions of specific weight.
h) Bulk modulus of elasticity.
i) Capilarity.
j) Buoyancy.

## PART-A

Q. 2 a) State Newton's law of viscosity.
[CO-2] [L-1] 5
b) Calculate the capillary rise in a glass tube of 2.5 mm diameter when immersed vertically in water and mercury. Take specific tension $0.0725 \mathrm{~N} / \mathrm{m}$ for water and $0.52 \mathrm{~N} / \mathrm{m}$ for mercury in contact with air. The specific gravity of mercury is 13.6 and angle of contact is $130^{\circ}$.
[CO-2] [L-4] 15
Q. 3 Calculate the pressure due to a column of 0.3 of :
a) Water
b) An oil of specific gravity 0.8 .
c) Mercury of specific gravity 13.6. Density of water= $1000 \mathrm{~kg} / \mathrm{m} 3$
[CO-1,2] [L-5] 20
Q. 4 Derive continuity equation in 3 dimensions cartesian coordinates. [CO-3] [L-6] 20

## PART-B

Q. 5 Derive Bernoulli's equation of motion and discuss its practical applications. [CO2,4][L6] 20
Q. 6 An orificemeter with orifice dia 10 cm is inserted in a pipe of 20 cm dia. The pressure gauges fitted upstream and downstream of the orifice meter gives the readings of $19.62 \mathrm{~N} / \mathrm{cm} 2$ and $9.81 \mathrm{~N} / \mathrm{cm} 2$ respectively. Co-efficient of discharge for the meter is 0.6 . Find the discharge of water through pipe.
[CO-1,5] [L-5] 20
Q. 7 a) State Buckingham pi theorem.
[CO-6] [L-4] 4
b) The efficiency $\eta$ of fan depends on density $\rho$, dynamic viscosity $\mu$ of fluid, angular velocity $\omega$, diameter D of rotor and discharge Q . Express n in terms of dimensionless parameters.

# End Semester Examination, Dec. 2022 

## B. Tech. - Third Semester

## INTRODUCTION TO MATERIALS SCIENCE (BCE-DS-306)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from Part-A and TWO questions from Part-B. Each question carries equal marks.
Q. 1 a) Give electron configurations for the $\mathrm{Fe}^{3+}$ and $\mathrm{S}^{2-}$ ions.
[CO-1] [L-1]
b) What are crystalline and amorphous materials? [CO-3] [L-2]
c) What is the coordination number for the FCC crystal structure?
[CO-3] [L-1]
d) What types of defects exist in solid materials?
[CO-2] [L-2]
e) What are the interfacial defects?
[CO-2] [L-2]
f) Explain solubility limit.
g) What is the formula of Gibbs phase rule?
[CO-2] [L-1]
h) What are the differences between stress and strain?
i) Explain proportional limit.
j) What is the difference between electronic and ionic conduction?

## PART-A

Q. 2 a) Explain why covalently bonded materials are generally less dense than ionically or metallically bonded ones.
[CO-1] [L-2] 8
b) Describe ionic, covalent, metallic and van der Waals bonds.
[CO-1] [L-2] 12
Q. 3 a) Draw sketches illustrating for Miller indices (111), (100) and (110). [CO-3] [L-3] 6
b) Calculate the atomic packing factor for simple cubic.
[CO-3] [L-3] 8
c) A simple cubic crystal has atomic radius of $1.75 \AA$. Determine the spacing of planes having Miller indices (200) and (111).
[CO-3] [L-4] 6
Q. 4 a) Differentiate between interstitial and substitutional defects.
[CO-2] [L-2] 6
b) Explain the Frenkel defects in details.
[CO-2] [L-2] 6
c) Describe the atomic structure within the vicinity of grain boundary.

## PART-B

Q. 5 a) With the help of a diagram, explain the mechanism of diffusion. [CO-2] [L-4] 8
b) Differentiate between steady-state and nonsteady-state diffusion. [CO-2] [L-2] 6
c) Schematically sketch simple isomorphous phase diagram.
[CO-2] [L-4] 6
Q. 6 a) Differentiate between elastic deformation and plastic deformation behavior of materials.
[CO-4] [L-2] 8
b) Name the two hardness-testing techniques and differentiate between them.
c) Write short note on tensile strength.
Cold
a) Write shot note on ferroelecticity and
Q. 7 a) Write short note on ferroelectricity and piezoelectricity?
b) Explain the behaviour of dielectrics in an external field.
c) Explain the paramagnetism, ferromagnetism, antiferromagnetism and ferrimagnetism with suitable examples.

## End Semester Examination, Dec. 2022

## B. Tech. - Third Semester

## INTRODUCTION TO MATERIALS SCIENCE (BCE-DS-306)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Give electron configurations for the $\mathrm{Fe}^{3+}$ and $\mathrm{S}^{2-}$ ions.
[CO-1] [L-1]
b) What are crystalline and amorphous materials? [CO-3] [L-2]
c) What is the coordination number for the FCC crystal structure? [CO-3] [L-1]
d) What types of defects exist in solid materials?
[CO-2] [L-2]
e) What are the interfacial defects? [CO-2] [L-2]
f) Explain solubility limit. [CO-2] [L-2]
g) What is the formula of Gibbs phase rule?
[CO-2] [L-1]
h) What are the differences between stress and strain?
i) Explain proportional limit.
j) What is the difference between electronic and ionic conduction?

## PART-A

Q. 2 a) Explain why covalently bonded materials are generally less dense than ionically or metallically bonded ones.
[CO-1] [L-2] 8
b) Describe ionic, covalent, metallic and van der Waals bonds.
[CO-1] [L-2] 12
Q. 3 a) Draw sketches illustrating for Miller indices (111), (100) and (110). [CO-3] [L-3] 6
b) Calculate the atomic packing factor for simple cubic. [CO-3] [L-3] 8
c) A simple cubic crystal has atomic radius of $1.75 \AA$. Determine the spacing of planes having Miller indices (200) and (111).
[CO-3] [L-4] 6
Q. 4 a) Differentiate between interstitial and substitutional defects.
[CO-2] [L-2] 6
b) Explain the Frenkel defects in details.
[CO-2] [L-2] 6
c) Describe the atomic structure within the vicinity of grain boundary.

## PART-B

Q. 5 a) With the help of a diagram, explain the mechanism of diffusion.
b) Differentiate between steady-state and nonsteady-state diffusion.
c) Schematically sketch simple isomorphous phase diagram.
Q. 6 a) Differentiate between elastic deformation and plastic deformation behavior of materials.
[CO-4] [L-2] 8
b) Name the two hardness-testing techniques and differentiate between them.
[CO-4] [L-2] 8
c) Write a note on 'tensile strength'.
[CO-4] [L-2] 4
Q. 7 a) Write a note on 'ferroelectricity and piezoelectricity'.
[CO-5] [L-2] 8
b) Explain the behaviour of dielectrics in an external field.
[CO-5] [L-2] 4
c) Explain the paramagnetism, ferromagnetism, antiferromagnetism and ferrimagnetism with suitable examples.

# End Semester Examination, Dec. 2022 

# B. Tech. - Third Semester <br> ENGINEERING GEOLOGY (BCE-DS-305) 

Time: 3 hrs.

Max Marks: $\mathbf{1 0 0}$
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) Evolution of the peak of Mt. Everest is attributed to which process.
[CO-6] [L-3]
b) Differentiate between elastic and ductile deformation.
c) Draw a neat sketch of anticline and syncline fold.
[CO-4] [L-2]
d) Define 'streak'.
e) Give two examples of basic rocks.
f) Compile a list of any four processes used for treatment of rocks.
[CO-5] [L-3]
g) Give the need of an artificial slope.
h) List any two natural causes of a landslide.
[CO-6] [L-3]
i) Give the classification of sedimentary rocks on the basis of the mode of formation.
[CO-3] [L-2]
j) Give atleast two requirements rendering a site suitable for development of a dam.
[CO-6] [L-3] 2x10

## PART-A

Q. 2 a) Summarize the importance of engineering geology for civil engineers.
[CO-6] [L-3] 10
b) With the help of a neat sketch explain the interior of earth.
[CO-1] [L-3] 10
Q. 3 a) With the help of a neat sketch describe the rock cycle.
[CO-3] [L-3] 10
b) Explain the process of formation of sedimentary rocks and the economic significance of these rocks.
[CO-3] [L-3] 10
Q. 4 a) Discuss the factors that affect weathering.
[CO-4] [L-3] 10
b) Discuss desert landform and their features.
[CO-5] [L-4] 10

## PART-B

Q. 5 Discuss folds in detail including their classification, mechanism and causes.
[CO-4] [L-4] 20
Q. 6 a) Discuss the consideration you will incorporate in design of buildings in seismically active areas.
[CO-5] [L-4] 10
b) Give an over-view of the retaining walls. Also draw a neat sketch showing different parts of the same.
[CO-5] [L-3] 10
Q. 7 You have been entrusted the job for finalizing the site for locating a dam, prepare a detailed write up comprising of considerations you will cover. [CO-6] [L-4] 20

# End Semester Examination, Dec. 2022 

## B. Tech. - Third Semester <br> DISASTER PREPAREDNESS AND PLANNING (BCE-DS-303)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) What do you understand by the term "Disaster Planning"?
[CO-1] [L-2]
b) Justify the importance of "Vulnerability and Reliability Analysis".
c) Describe "Man - made Disaster" with suitable examples.
d) Comment on the Post Disaster Environmental Response w.r.t. Waste Management and Sanitation.
[CO-2] [L-1]
e) List the different authorities working towards Disaster Preparedness and Planning in Indian context.
[CO-3] [L-2]
f) List the repercussions of disaster's impact on the environment.
[CO-4] [L-2]
g) With the help of neat sketch, illustrate the components of Disaster Management in brief.
[CO-4] [L-2]
h) Summarize the responsibilities of NDMA.
i) Define "Disaster Mitigation".
[CO-5] [L-1]
j) Illustrate the impact of Dams on disaster and its management.
[CO-6] [L-1] 2x10

## PART-A

Q. 2 Explain in detail the "Natural Disaster" in Indian context.
[CO-2] [L-3] 20
Q. 3 Elaborate the repercussions of disaster's impact on the ecology.
[CO-3] [L-3] 20
Q. 4 Discuss the various objectives of Disaster management.
[CO-1] [L-4] 20
PART-B
Q. 5 Illustrate the Emerging Trends in Disaster Planning, Preparedness and Mitigation.
[CO-4] [L-3] 20
Q. 6 Write an explanatory note on holistic approach in reconstruction and development methods.
Q. 7 Summarize the Disaster Risk reduction programs in India.
[CO-5] [L-3] 20

## End Semester Examination, Dec. 2022

B. Tech. - Third Semester

ENGINEERING MECHANICS FOR CIVIL ENGINEERS (BCE-DS-
302A)
Time: 3 hrs.
Max Marks: 100
No. of pages: 3
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from Part-A and TWO questions from Part-B. Each question carries equal marks.
Q. 1 a) State Lami's theorem
[CO-1] [L-1]
b) What are the different types of loads as used in the analysis of structures?
c) Define Shear Force and Bending Moment.
[CO-2] [L-1]
d) Write the assumptions used in the analysis of a truss.
[CO-3] [L-1]
e) Write the Moment of Inertia about centroidal Y-Axis.

[CO-1] [L-2]
f) When is the work done by a force is positive, zero and negative.
[CO-4] [L-2]
g) Define Position Vector. Illustrate for a 3D right handed coordinate system.
[CO-4] [L-2]
h) In a framed structure, as shown in the below figure, what is the force in the member $B C$.

i) Two like parallel forces are acting at a distance of 24 mm apart and their resultant is 20 N . It the line of action of the resultant is 6 mm from any given force, determine the magnitude of two forces.
[CO-2] [L-3]
j) What are free vibrations?

## PART-A

Q. 2 Determine the magnitude of P and F necessary to keep the concurrent force system in Fig. below in equilibrium.
[CO-1] [L-3] 20

Q. 3 a) Determine the Moment of inertia of a hollow circular section, as shown in the below figure about $Z$-axis perpendicular to the plane of the paper. [CO-4] [L-3] 10

b) Determine the support reactions of the following beam.
[CO-2] [L-5] 10

Q. 4 Determine the nature and magnitude of forces in the members $\mathrm{BC}, \mathrm{CH}$ and HG in the truss given below.

Q. $5 \quad$ A $80-\mathrm{kg}$ block rests on a horizontal plane. Find the magnitude of the force $P$ required to give the block an acceleration of $5 \mathrm{~m} / \mathrm{s}^{2}$ to the right. The coefficient of kinetic friction between the block and plane is $=0.25$. Write De-Alembert's equations.

Q. 6 A sack slides off the ramp with a horizontal velocity of $12 \mathrm{~m} / \mathrm{s}$. If the height of the ramp is 6 m from the floor, Evaluate the time needed for the sack to strike the floor and range R where sacks begin to pile up.
[CO-4] [L-4] 20

Q. 7 Analyse the period of oscillation for the simple pendulum. The bob has a mass $m$ and is attached to a cord of length L. Neglect the size of the bob.
Find the natural frequency and time period of a bob of mass 2 kg suspended with an inextensible cord of length 0.5 m .

# End Semester Examination, Dec. 2022 <br> B. Tech. - Sixth Semester <br> MULTIMEDIA AND ANIMATION (BCA-603A/BCA-DS-604) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from Part-A and TWO questions from Part-B. Marks are indicated against each question.
Q. 1 a) The people when weave multimedia into meaningful tapestries are called :
i) Programmers
ii) Multimedia developers
iii) Software engineers
iv) Hardware engineers
b) Session initiation protocol (SIP) is very
i) Independent
ii) Flexible
iii) Dependant
iv) Complex
c) How many types of video compressions exist?
i) 2
ii) 3
iii) 4
iv) 6
d) In Gray scale colour mode, we get $\qquad$ number of different colour.
i) 224
ii) 28
iii) 216
iv) 22 .
e) $\qquad$ audio/video refers to the use of the internet for interactive audio/video applications
i) Interactive
ii) Streaming Live
iii) Streaming Stored
iv) none of the above
f) All of the following are technologies used to gather information about you online
except $\qquad$ .
i) spy ware
ii) cookies
iii) gmail
iv) anonymizers
g) Which image files are lossy format?
i) GIF
ii) MPEG
iii) JPEG
iv) PNG
h) A printed page might be presented in which of these orientations?
i) newscape
ii) portrait
iii) flat-file
iv) $x$-height
i) How many step process for creating a 3D animation are required?
i) 2
ii) 3
iii) 4
iv) 5
j) A series of slides displayed in a particular sequence is called.
i) Placeholder
ii) Template
iii) Layout
iv) Slide show

## PART-A

Q. 2 What do you understand by the term Multimedia? Explain the impact of Multimedia on social platforms.
Q. 3 a) Explain the need of Hypermedia and Hypertext applications. Give their advantages.
b) Discuss various Font Editing and Design tools.
Q. 4 a) Elaborate on the various attributes of Sound and images used in multimedia.
b) Differentiate between MIDI and Digital Audio.

## PART-B

Q. 5 a) What is Animation? Explain its types. Mention various Principles of Animation.
Q. 6 Write short note on any two
i) Video and its Display
ii) Digital Video Containers (Codecs \& Video Format Converters)
iii) Non Linear Editing(NLE) in Videos
Q. 7 a) Give a detailed role of the various stages of Multimedia Project. [CO-6] [L-3] 10
b) Hardware and Software requirements for Multimedia Projects have changed over the last few years. Comment.

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester BIOREMEDIATION TECHNOLOGY (BBT-DS-723)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Differentiate between biodegradation and Biomineralization.
[CO-3] [L-3]
b) Name few fungal enzymes having significant application in removal of pesticide contamination.
[CO-4] [L-1]
c) Higher the methyl branching lower is the extent of $\beta$-oxidation. Comment.
[CO-4] [L-5]
d) What are low cost adsorbents? Give examples.
[CO-2] [L-1]
e) What do you mean by incineration?
[CO-3] [L-1]
f) Define 'Seeding'.
[CO-1] [L-1]
g) Differentiate between biostimulation and bioaugmentation.
[CO-1] [L-3]
h) Name three most important fungi used for Myco-remediation.
[CO-4] [L-1]
i) What are Meisenheimer complexes?
[CO-1] [L-1]
j) Which genes are responsible for microbial degradation of PCBs?

## PART-A

Q. 2 What are the different physical and chemical techniques for the removal for pollutants from water? Discuss in detail with suitable examples.
[CO-1] [L-2] 20
Q. 3 a) How Microbial Metagenomics, Metabolomics and Fluxomics play a significant role in Bioremediation?
[CO-1] [L-3] 10
b) Classify the most common ways microbes use or interact with heavy metals.
[CO-4] [L-1] 10
Q. 4 a) Explain the process of microbial aerobic degradation of hydrocarbons associated with growth process.
[CO-4] [L-2] 10
b) Summarize the factors affecting the biodegradation of hydrocarbons.
[CO-5] [L-3] 10

## PART-B

Q. 5 Discuss the microbial pathways of biodegradation of Trichloroethane in detail.
[CO-2] [L-2] 20
Q. 6 a) Compare the different PCB Remediation Technologies.
[CO-4] [L-4] 15
b) The lower-chlorinated PCB congeners with a high Kow ( $\log$ Kow $>6$ ) tend to be
present in soils and sediments compared to higher-chlorinated PCB congeners. Is the statement correct? Critically analyze and Comment. [CO-4] [L-4] 5
Q. 7 a) Nitroaromatics act as a cell signaling molecule. Critically analyze and comment on the statement.
b) Discuss the different strategies of microbial remediation of nitroaromatics in detail.
[CO-6] [L-4] 10

# End Semester Examination, Dec. 2022 <br> <br> B. Tech. - Seventh Semester <br> <br> B. Tech. - Seventh Semester <br> <br> MOLECULAR THERAPEUTICS (BBT-DS-722) 

 <br> <br> MOLECULAR THERAPEUTICS (BBT-DS-722)}

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Differentiate between Therapy and Molecular Therapy.
(CO1) (L2)
b) What is the basic criteria for selecting the type of molecular therapy?
(CO12) (L2)
c) What are the barriers in gene delivery? Explain any two.
(CO11) (L2)
d) Name any two biomaterials used in tissue engineering and related application.
(CO13) (L2)
e) What is the biological name of growth hormone?
(CO12) (L2)
f) What is recombinant therapy?
(CO13) (L2)
g) How insulin was administered as therapeutic molecule before recombinant therapy?
(CO13) (L2)
h) What is an antiviral oligonucleotide?
(CO13) (L2)
i) Name any two immunomodulators.
(CO13) (L2)
j) What is the clinical application of streptokinase?
(CO13) (L2) $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 Give an account of various steps and important considerations in gene delivery for gene therapy.
(CO1.2,3) (L3) 20
Q. 3 "Stem cell and ethics". Comment on the relation with appropriate examples.
(CO12, 1) (L4)
Q. 4 Is Recombinant therapy advantageous than gene therapy and stem cell therapy. Share your views on topic with appropriate pointers.
(CO13, 1) (L3) 20

## PART-B

Q. 5 Give an account of various steps and important considerations in assigning immunotherapy.
(CO14, 5) (L3) 20
Q. 6 Gene silencing is a natural mechanism that has found applicability. Using examples support your justification.
(CO15, 6) (L4) 20
Q. 7 "Immune effect or cells have regulators". Mention them and discuss their role.
(CO14,6) (L3) 20

# End Semester Examination, Dec 2022 

## B. Tech. - Seventh Semester <br> DRUG DESIGNING (BBT-DS-703)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Elaborate the different sources of drug.
[CO-1][L-1]
b) Enlist different process involved in drug discovery.
[CO-1][L-1]
c) What are the features present in receptor molecules?
[CO-2][L-1]
d) Illustrate the factor that affects drug distribution.
[CO-2][L-1]
e) Explain the approaches used for drug-target identification.
[CO-6][L-3]
f) What do you mean by high throughput screening?
[CO-5][L-1]
g) Illustrate drug repurposing.
[CO-4][L-1]
h) Outline the drug discovery process using flow diagram?
[CO-3][L-1]
i) Elaborate CoMFA and CoMSIA.
[CO-5][L-1]
j) Distinguish between alpha helix and beta sheet.

## PART-A

Q. 2 Highlight the pharmacokinetics concepts in drug discovery process.
[CO-1][L-4] 20
Q. 3 Construct the sequence and events which take place for target identification and validation of a drug.
[CO-2][L-3] 20
Q. 4 Evaluate the preclinical and clinical event that takes place during drug development process.
[CO-3] [L-5] 20

## PART-B

Q. 5 Identify why combinatorial chemistry based approaches for lead identification is more suited than traditional method.
[CO-4] [L-3] 20
Q. 6 Evaluate how QSAR is used in ligand based drug designing process? [CO-5] [L-4] $\mathbf{2 0}$
Q. 7 Homology modeling is widely used in 3D structure prediction. Discuss using suitable example.
[CO-6] [L-2] 20

# End Semester Examination, Dec. 2022 

# B. Tech. - Seventh Semester <br> STEM CELL TECHNOLOGY (BBT-DS-701) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Define stem cell niche hypothesis. What is its significance?
b) Illustrate diagramatically the non-canonical Wnt signalling pathway.
c) Does hypoxia promote pluripotency? Give reasons.
d) Briefly explain the various models of cancer stem cells.
e) Enlist the controversies associated with Somatic Cell Nuclear Transfer technology.
f) Spell out the various applications of bone marrow transplantation.
g) Differentiate between ex-vivo and in-vivo gene therapy.
h) What are the limitations of iPSC cells?
i) How to reduce the incidence of graft-vs-host disease?
j) Distinguish between adult stem cells and embryonic stem cells. $\mathbf{2 x 1 0}$

PART-A
Q. 2 a) Write a note on: various properties of stem cells.
[CO-1] [L-2] 10
b) Classify stem cells and give examples.
[CO-3] [L-4] 10
Q. 3 Discuss the various pathways that help stem cells to maintain their pluripotency.
[CO-2] [L-2] 20
Q. 4 a) Explain JAK/STAT pathway with the help of a diagram.
[CO-2] [L-2] 10
b) Compare and contrast between normal stem cells and cancer stem cells.
[CO-2] [L-4] 5
c) Explain the role of Wnt signaling pathway in skin cancer.
[CO-2] [L-3] 5

## PART-B

Q. 5 a) Draw the flow chart and explain the protocol for generating iPSC from fribroblasts.
[CO5] [L-3] 10
b) How do you evaluate the pluripotency of iPSC generated by above protocol?
[CO-5] [L-4] 5
c) Summarize briefly the various steps involved in performing SCNT.
Q. 6 a) Elaborate on the following and give examples:
i) CAR-T therapy.
ii) Oligonucleotide therapy.
[CO-4] [L-2] 10
b) Outline the mechanism of CRISPR-CAS technology using a diagram.
[CO-5][L-3] 10
Q. 7 a) Show how stem cells can be used in treatment of diabetes melitus. [CO-6] [L-3] $\mathbf{1 0}$
b) "In 1997, Oliver Brüstle filed a patent for using neural precursor cells obtained from embryonic stem cells in treatment of neural defects in humans and animals".

Argue if the given case is patent eligible as per law of German Federal
Supreme Court. [CO-6] [L-5] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Sixth Semester <br> MOLECULAR DIAGNOSTICS (BBT-DS-622) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Capillary electrophoresis is a principle or technique? Comment.
[CO-1] [L-2]
b) Pedigree analysis is done for $\qquad$ .
c) Differentiate between PCR and qPCR.
d) Mention the types of blotting techniques.
e) Justify the role of immunology in diagnostics.
f) ELISA refers to $\qquad$ .
g) Demarcate the importance of prenatal diagnosis.
h) What is genotyping?
i) Differentiate between heteroduplex and homoduplex.
j) What is HCG and AFP?

## PART-A

Q. 2 a) Explain various sample collection and processing methods. What precautions should be taken into account while dealing with infectious samples? [CO-1] [L-2] 10
b) PCR is used as a preferred tool in molecular diagnosis. How and why?
[CO-1, 2] [L-3] 10
Q. 3 a) How do we detect mutations using molecular diagnostics?
[CO-2] [L-3] 10
b) How genotyping qualifies to be a tool for molecular diagnostics?
[CO-4] [L-3] 10
Q. 4 Elaborate the principle and applications of probes in hybridization techniques.
[CO-4] [L-2] 20

## PART-B

Q. 5 a) How gradient electrophoresis has proven to be important tool for disease diagnosis
[CO-5] [L-2] 10
b) Prenatal diagnosis is a complicated process and requires a multifaceted approach. Explain and discuss.
[CO-6] [L-2] 10
Q. 6 Enlist various tests available to diagnose viral diseases and discuss their pros and cons.
Q. 7 Genetic testing has advanced to new levels in the field of molecular diagnostics. Comment.
[CO-5] [L-3] 20

# End Semester Examination, Dec. 2022 

# B. Tech. - Fifth Semester <br> VIROLOGY (BBT-DS-523) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) What is the difference between antiviral and antiretroviral?
(CO1) (L2)
b) Explain attachment and what follows just after.
(CO2) (L2)
c) What is meant by infection?
(CO3) (L2)
d) Mention the need for containment.
(CO3) (L2)
e) What is prognosis?
(CO4) (L2)
f) Mention target steps of antivirals.
(CO6) (L2)
g) What is horizontaltransmission?
(CO4) (L2)
h) Mention the types of Influenza virus.
(CO5) (L2)
i) Name the two most common vaccine delivery methods.
(CO5) (L2)
j) What is meant by biosafety?
(CO6) (L2) 2x10

## PART-A

Q. 2 What are Retroviruses? How do they differ from RNA Viruses? Explain in context with classification, salient features and structural differences. (CO1, 2) (L2) 20
Q. 3 Explain the importance of viral quantification. Mention and explain the traditional and modern methods of quantification.
(CO2, 3) (L3) 20
Q. 4 Elaborate on the replication mechanism of a specific DNA virus with suitable diagram and examples.
(CO1) (L2) 20

## PART-B

Q. 5 a) Discuss the various strategies of antiviral design with special emphasis on insilico methods to achieve the task.
(CO4, CO5) (L2) 10
b) What are the various types of vaccine delivery? What needs to be taken into account to decide on the delivery method?
(CO4, CO5) (L2) 10
Q. 6 a) Give an account of different types of viral vectors. (CO4, CO6) (L2) $\mathbf{1 0}$
b) Elaborate on the various biosafety levels adopted for virological laboratories.
(CO4, CO6) (L2) 10
Q. 7 Discuss about the structure, diagnosis and treatment for influenzavirus. Illustrate the structure and types with the help of diagram.
$(\mathrm{CO} 5,6)(\mathrm{L} 2) 20$

# End Semester Examination, Dec. 2022 

B. Tech. - Fifth Semester<br>Virology (BBT-DS-523)

Time: 3 hrs.
Max Marks: 100
No. of pages:' 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) What is the difference between viroid and virus?
b) What are the major events in viral life cycle?
[CO1) L2]
c) What is receptor mediated endocytosis?
[CO2) L2]
d) Why does a virus undergo uncoating?
e) What is candling?
[CO3) L2]
f) What are antivirals?
[CO3) L2]
[CO4) L2]
g) What is passive immunity?
h) Mention the taxonomy of Chikungunya Virus.
[CO6) L2]
[CO4) L2]
i) Name the two most common vaccine delivery methods.
[CO5) L2]
j) What is meant by biosafety?
[CO5) L2]
[CO6) L2] 2x10

## PART-A

Q. 2 What are DNA Viruses? How do they differ from RNA Viruses? Explain in context with classification, salient features and biophysical differences.
(CO1, CO2) (L2) 20
Q. 3 Explain the importance of eggs in the area of virology. What are the advanced alternatives to this method?
(CO2, CO3) (L3) 20
Q. 4 Elaborate on the replication mechanism of positive Strand RNA viruses with suitable diagram and examples.
(CO1,1) (L2) 20

## PART-B

Q. 5 a) Discuss the various routes of vaccine delivery. (CO4, 5) (L2) 10
b) What are the various processes in vaccine preparation? (CO4,5) (L2) 10
Q. 6 a) Give an account of different types of eukaryotic expression vectors. $\mathbf{1 0}$
b) Elaborate on the various biosafety levels adopted for virological laboratories.
(CO4, 6) (L2) $\mathbf{1 0}$
Q. 7 Discuss about the structure, diagnosis and treatment for SARS Virus. Illustrate the structure with the help of diagram.
(CO5, 6) (L2) 20

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester <br> INTRODUCTION TO BIOMATERIALS (BBT-DS-521)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in brief:
a) Name the device which detects an analyte and has a biological component with a physicochemical detector.
b) Define 'biocompatibility'.
c) Why are metals hard but not brittle?
d) Can haptens alone elicit an immune response? Why?
e) What is creep and recovery? Give the equation for creep and recovery of a biomaterial.
f) Give two examples of temporary implants.
g) Explain the role of pyrolytic carbon as a biomaterial.
h) What kind of coating is needed on a biomaterial to avoid biofilm formation?
i) What are hydrogels?
j) Mention any two applications of biomaterials. [CO1-6, L2] $\mathbf{2 x 1 0}$

## PART-A

Q. 2 a) Enlist the different categories of polymeric biomaterials with examples.
[CO-1][L-1] 10
b) What is a non-fouling surface? State its importance in brief. [CO-1][L-2] 10
Q. 3 a) How does wear and tear in a biomaterial happen? Give details.
[CO-2][L-2] 10
b) Discuss briefly: i) Tensile strength ii) Fracture toughness iii) Hardness.
[CO-2][L-2] 10
Q. 4 a) What is the role of adhesive proteins? How does it help an implant in vivo?
[CO-3][L-2] 10
b) What causes an implant to get rejected in vivo?
[CO-3][L-2] 10

## PART-B

Q. 5 a) Explain systemic toxicity. How does an implant cause toxicity?
[CO-4][L-3] 10
b) Why does inflammation occur? Explain with suitable example. [CO-4][L-3] 4
c) Discuss in detail the blood interactions with implants.
[CO-4][L-3] 6
Q. 6 a) Why are inert metals used as implants? Give insight into the degradation of a metallic implant.
[CO-5][L-5] 10
b) How is an implant tested both in vitro and in vivo?
[CO-5][L-3] 10
Q. 7 a) What are the concepts to be considered in the design of artificial organs?
[CO-6][L-3] 8
b) Explain in detail the various types of tissue responses to implants.
[CO-6][L-2] 12

# End Semester Examination, Dec. 2022 <br> B. Tech. (Biotechnology) - Fifth Semester ANIMAL BIOTECHNOLOGY (BBT-DS-503) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Give one disadvantage of Type-2 microbiological safety cabinet?
[CO1] [L2]
b) What is animal biotechnology?
[CO1] [L1]
c) What is cryopreservation?
[CO1] [L1]
d) Why was penicillin a game changer during $2^{\text {nd }}$ world war?
[CO1] [L2]
e) Calculate the number of cell harvested after 10 generations, when the initial inoculum contained 20,000 cells.
[CO1] [L3]
f) What is a Serum free media?
[CO1] [L1]
g) What is an immortalized cell?
[CO1] [L1]
h) Which phase of growth curve is crucial for adaptation of cells to their environment?
[CO1] [L2]
i) What is Glass Transition temperature?
[CO1] [L2]
j) Name the two classes of promoters used in mammalian expression vectors.
[CO1] [L2] 2x10

## PART-A

Q. 2 a) Write a short note on parameters for designing a cell culture lab. [CO1,2] [L1,2] 10
b) Write a short note on column-based and column-free magnetic cell separation.
[CO1] [L2] 10
Q. 3 Describe the various phases of cell growth? Calculate the number of generations passed when the number of cell seeded were $10^{3}$ and the number of harvested cells is $10^{7}$. [Given that $\log _{2} 10^{3}=9.97$ and $\log _{2} 10^{7}=23.25$ ]. Using the above data calculate the Multuplication rate ( $r$ ) after 48 hours. What will be the population doubling time (PDT)?
[CO1,3] [L3] 20
Q. 4 a) What is nocodazole and how does it affect the cell cycle?
[CO4] [L3] 4
b) The figure below shows Cell Cycle Analysis using FACS. What changes are observed from figure $A$ to $B$ ? What kind of a chemical can bring about this change? How do you think that chemical works? [CO4] [L5] 6


c) Name the genetic elements required for optimal mammalian expression.
d) Name the 4 types of 3D spheroid structures and explain the properties of any two.
[CO3] [L4] 6

## PART-B

Q. 5 a) Write a short note on the different types of cell culture based tests for cytotoxicity assessment.
[CO3] [L2] 10
b) Briefly describe the principle and protocol for MTT assay. [CO3] [L2] 5
c) Differentiate between embryonic and induced pluripotent stem cells. What is stem cell hierarchy?
Q. 6 Explain the principal and process for Hybridoma technology. Draw diagrams wherever necessary.
[CO4] [L3] 20
Q. 7 a) Differentiate between natural and artificial media.
[CO5] [L2] 5
b) Write a short note of different types of incubators used for cell culture.
[CO4] [L2] 5
c) What are the advantages and disadvantage of serum containing media?
[CO4] [L3] 5
d) What steps would you take to contain the spread of contamination, if you found a single flask in the incubator contaminated?
[CO5] [L4] 5

## End Semester Examination, Dec. 2022

## B. Tech. (Biotechnology) - Fifth Semester FOOD BIOTECHNOLOGY (BBT-DS-502)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) Explain the sources and types of microorganisms in food.
[CO1 L1]
b) Differentiate between extrinsic and intrinsic microbial parameters of foods. [CO2L2]
c) Elaborate the spoilage of fresh and processed meats.
[CO3 L1]
d) Discuss the food additives of fermentation origin.
e) Give the temperature effect on milk.
f) What are flavor potentiators, explain with suitable examples?
[CO4 L3]
g) Discuss the fermentative production of riboflavin.
h) Name five microbial enzymes used as food additives with their applications.
[CO6 L1]
i) What are the functional properties of single cell protein (SCP)?
[CO5 L2]
j) Expand MPN and DMC.
[CO2 L1] 2x10

## PART-A

Q. 2 What are the primary sources of microorganisms found in foods? Explain common food borne bacteria with genera of molds and yeasts that are common to foods.
[CO1] [L2] 20
Q. 3 a) Elaborate the determination and detection of microorganism in food.
[CO2] [L2] 10
b) Discuss membrane filters and microscopic colony count.
[CO2] [L2] 10
Q. 4 Explain the spoilage of fruits and vegetables. What precautionary measures can be adopted in order to prevent these from spoilage?
[CO3] [L3] 20

## PART-B

Q. 5 List the various types of whey beverages. Discuss the pre-treatments of whey while using as a substrate. Mention the environmental conditions for yeast production from whey.
Q. 6 a) Discuss the microbial role in food process operations and production.
[CO5] [L3] 10
b) Explain the fermentative production of food and alcoholic beverages.
[CO5] [L3] 10
Q. 7 Give the effect of proteolytic enzymes on protein quality of foods. Discuss some important enzymatic reactions in food fermentations.

# End Semester Examination, Dec. 2022 

# B. Tech. - Fifth Semester RECOMBINANT DNA TECHNOLOGY (BBT-DS-501) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 a) How bacteria protects itself from the action of their owm restriction enzymes?
[CO4] [L4]
b) What types of cuts are made by restriction enzymes?
[CO1] [L2]
c) A plasmid is having two antibiotic resistant genes, say ampicillin resistant and tetracycline resistant. If the plasmid grows in ampicillin containing medium but not in tetracycline, what can be concluded?
[CO4] [L4]
d) Plasmid Amplification is carried out in various plasmids in the presence of chloramphenicol. State whether it is true and false with proper explanation.
[CO1] [L4]
e) State whether the following statements are true or false with regards to lambda bacteriophage genome.If the statement is incorrect, the write the correct statement.
i) It is single stranded genome.
ii) It is circular double stranded genome.
iii) The ends are blunt with cos (cohesive) sequences.
iv) The ends are created by cleavage at cos sites during phage packaging.
[CO3] [L2]
f) What will be the fate of lambda bacteriophage if its CI gene is mutated?
[CO2] [L2]
g) What technique would be followed for the Identification of a particular gene expression in a tissue or cell type?
[CO2] [L2]
h) What is the difference between a constitutive and inducible promoter?
[CO2] [L2]
i) How Northern blotting is different from Souther blotting.
[CO2] [L2]
j) Which vectors are used for cloning very large pieces of DNA?
[CO3] [L2] 2x10

## PART-A

Q. 2 How a recombinant DNA molecule can be created? Enumerate the basic steps of the same. What are the major differences amongst Type-I, II and III restriction enzymes.
[CO1] [L4] 20
Q. 3 How nutritional conditions in which E.coli grows determine the fate of infecting lambda bacteriophage. Explain the molecular basis of the same. [CO3] [L2] 20
Q. 4 a) How cDNA and genomic libraries are different? Explain the method to create them.
[CO3] [L3] 12
b) How YAC are screened for the presence of gene of interest? [CO3] [L3] 8

## PART-B

Q. 5 a) What is the principle of Sangers method of sequencing? How it is different from chemical method?
[CO4] [L3] 14
b) What is receptor mediated endocytosis?
Q. 6 a) Briefly outline the advantages and disadvantages of $E$ coli as a host for heterologous protein production. [CO3] [L3] 7
b) Design a strategy to tailor S. cerevisiae to overeexpress the enzyme X .
[CO6] [L5] 13
Q. 7 a) A student researcher over expresses an exogenous protein in cell culture and wants to determine if that protein, is in fact, over expressed. What technique would best demonstrate that this protein is expressed in these cells? Enumerate the steps to carry out the same.
[CO6] [L5] 12
b) How PCR product can be quantified?
[CO6] [L5] 8

## End Semester Examination, Dec. 2022

B. Tech. (Biotechnology) - Fourth Semester

BIOSTATISTICS (BBT-DS-404)
Time: 3 hrs.

Max Marks: 100
No. of pages: 11

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) State the difference between discreet and continuous random variable [CO-1] [L-1,2]
b) Observe the graphs given below carefully and identify them according to their skewness.
[CO-3] [L-3,4]

c) Given below are the frequency distribution graphs for two Populations (population
and B$)$. Which population has the maximum range?

[CO-3] [L-3,4]
d) Observe the histograms given below and identify them according to their kurtosis.
[CO-3] [L-3,4]

a

b


C
e) Two samples were drawn from the population and their coefficient of variance
calculated. The C.V. for sample 1 and 2 is $6.9 \%$ and $12.5 \%$, respectively. Which
sample according to you is more variable?
f) What is the property of exhaustiveness in probability?
g) For the SET notation given below, identify the type of probability.
h) Give the SET notation fi


$$
P(A \cup B)=P(A)+P(B)-P(A \cap B)
$$

ability given below:
[CO-3] [L-3,4]
[CO-4] [L-3,4,5]
i) For the three normal distributions given below, what is the nature of mean and
variance?

j) Identify the type of normal distribution given below:

[CO-3] [L-2,3] 2×10

## PART-A

Q. 2 The following table gives the age distribution for the number of deaths in New York State due to accidents for residents age 25 and older. For the data given construct the following:

| Age (Years) | Number of Deaths Due to Accidents |
| :---: | :---: |
| $25-34$ | 393 |
| $35-44$ | 514 |
| $45-54$ | 460 |
| $55-64$ | 341 |
| $65-74$ | 365 |
| $75-84$ | 616 |
| $85-94^{*}$ | 618 |

a) Histogram for the given data
b) A cumulative frequency distribution table
c) A relative frequency distribution table
d) A cumulative relative frequency distribution table
Q. 3 a) Suppose two samples of human males yield the following results:

|  | Sample 1 | Sample 2 |
| :--- | :---: | :---: |
| Age | 25 years | 11 years |
| Mean weight | 145 pounds | 80 pounds |
| Standard deviation | 10 pounds | 10 pounds |

Calculate the coefficient of variation for both samples and identify which sample
more variable?
[CO-1,2,3,5] [L-4,5] 5
b) Indicate for the following variables which you think would be a better measure
of
central tendency, the mean, the median, or mode, and justify your choice:
i) Annual incomes of licensed nurses in India
[CO-5] [BTL5]
ii) Diagnoses of patients seen in the emergency department of a large city hospital
[CO-5] [L-5]
iii) Weights of high-school male basketball players.
c) Your statistics teacher tells you on the first day of class that there will be five exams
during the term. From the scores on these tests for each student, the instructor will compute a measure of central tendency that will serve as the student's final course
grade. Before taking the first test, you must choose whether you want your final
grade to be the mean or the median of the five exam scores. Which would you
choose? Why?
[CO-5,6] [L-5] 3
d) Identify the skewness on the basis of the data given below:
i) Mean=Median=Mode
ii) Mode<Median<Mean
iii) Mean<Median<Mode
(CO-5)(L5) 1×3
e) A simple random sample of 11 subjects was drawn from the population. The age (in years) of the 11 subjects is as follows:
$x_{1}=10, x_{2}=15, x_{3}=20, x_{4}=17, x_{5}=18, x_{6}=9, x_{7}=13, x_{8}=11, x_{9}=12, x_{10}=6$, $\mathrm{x}_{11}=19$
Calculate:
i) Mean
ii) Median
(CO-1,2) (L3)
iii) Mode
(CO-1,2) (L3)
(CO-1,2) (BTL3) $\mathbf{1 \times 3}$
Q. 4 a) The primary aim of a study by Carter et al. was to investigate the effect of the age at onset of bipolar disorder on the course of the illness. One of the variables investigated was family history of mood disorders. Table given below shows the frequency of a family history of mood disorders in the two groups of interest (Early age at onset defined to be 18 years or younger and Later age at onset defined to be later than 18 years).

| Fanmby thintary of | Eentv - Teces | Cuter > - 6 icil | Bormi |
| :---: | :---: | :---: | :---: |
| P4egutive (4) | S6 | 36 | 63 |
| Hepmiar obismenier IM | 18 | 38 | 63 |
| Uripooser 407 | *) | 4.4 | \% |
|  | $6 \times$ | 40 | *Ea |
| Tonse | 10.1 | 17 | *** |

Answer the following questions:
i) What is the probability that this personwill be 18 years old or younger?
(CO-1,2,3, 5) (L5,6)
ii) Suppose we pick a subject at random from the 318 subjects and find that he is 18 years or younger ( E ). What is the probability that this subject will be one who has no family history of mood disorders (A)? (CO-1,2,3,5) (L5,6)
iii) Suppose we pick a subject at random and find that he is 18 years or above (L). What is the probability that this subject will be one who has a history of Bipolar disorder in their family (B)?
(CO-1,2,3, 5) (L5,6)
iv) What is the probability that a person picked at random from the 318 subjects will be Early (E) and will be a person who has no family history of mood disorders ( $A$ )?
v) What is the joint probability of Early (E) age at onset and a negative family history of mood disorders (A)?
(CO-1,2,3, 5) (L5,6)
vi) What is the probability that a person picked at random from 318 subjects will be late onset (L) and will be a person who has history of both unipolar and bipolar disorder in their family?
(CO-1,2,3, 5) (L5,6)
vii) What is the probability that this person will be an Early age (E) of onset subject or will have no family history of mood disorders (A) or both?
(CO-1,2,3, 5) (L5,6)
viii) What is the probability that this person will be 18 years old or above?
ix) Suppose we pick a subject at random and find that he is 18 years or above (L). What is the probability that this subject will be one who has a history of unipolar disorder in their family (B)?
(CO-1,2,3, 5) (L5,6)
$x$ ) What is the joint probability of Late (E) age at onset and a negative family history of mood disorders (A)?
(CO-1,2,3, 5) (L5,6)
$1 \times 10$
b) A medical research team wished to evaluate a proposed screening test for Alzheimer's disease. The test was given to a random sample of 450 patients with Alzheimer's disease and an independent random sample of 500 patients without symptoms of the disease. The two samples were drawn from populations of subjects who were 65 years of age or older. The results are as follows:(4 x $2.5=10$ marks)
i) Estimate the sensitivity of the test.
ii) Estimate the specificity of the test.
(CO-1,2,3, 5) (BTL3)
iii) Estimate the predictive value positive
(CO-1,2,3, 5) (BTL3)
iv) Estimate the predictive value negative.
(CO-1,2,3, 5) (BTL3)

## PART-B

Q. 5 In an article appearing in the Journal of the American Dietetic Association, Holben et al. looked at food security status in families in the Appalachian region of southern Ohio, USA. The purpose of the study was to examine hunger rates of families with children in a local Head Start program in Athens, Ohio. The survey
instrument included the 18 -question U.S. Household Food Security Survey Module for measuring hunger and food security. In addition, participants were asked how many food assistance programs they had used in the last 12 months.Table below shows the number of food assistance programs used by subjects in this sample.

| Number of Assistance |  |
| :--- | :---: |
| Programs Utilized by Families with <br> Children in Head Start Programs in <br> Southern Ohio |  |
| Number of Programs | Frequency |
| 1 | 62 |
| 2 | 47 |
| 3 | 39 |
| 4 | 39 |
| 5 | 58 |
| 6 | 37 |
| 7 | 4 |
| 8 | 11 |
| Total | 297 |

Source: David H. Holben, Ph.D. and John P. Holcomb, Ph.D. Used with permission

Use the data given in the table and answer the following:
a) Using the data construct probability distribution table.
b) Construct a cumulative probability distribution table.
c) What is the probability that a randomly selected family used three assistance programs?
d) What is the probability that a randomly selected family used either one or two programs?
e) What is the probability that a family picked at random used two or fewer assistance programs?(CO-1,2,3, 4) (BTL5)(1 mark)
f) What is the probability that a randomly selected family used fewer than four programs?
(CO-1,2,3, 4) (L5)
g) What is the probability that a randomly selected family used five or more programs?

> (CO-1,2,3, 4) (L5)
h) What is the probability that a randomly selected family used between three and five programs, inclusive?
(CO-1,2,3, 4) (L5)
i) What is the probability that a randomly selected family used seven or more programs?
(CO-1,2,3, 4) (L5)
j) What is the probability that a randomly selected family used between five and six programs, inclusive?
(CO-1,2,3, 4) (L5) $\mathbf{2 \times 1 0}$
Q. 6 a) Coughlin et al. estimated the percentage of women living in border counties along the southern United States with Mexico (designated counties in California, Arizona, New Mexico, and Texas) who have less than a high school education to be $18.7 \%$. Assume the corresponding probability is 0.19 . Suppose we select 5 women at random. Find the probability that the number withless than a high-school education is:
i) Exactly Zero
ii) Exactly one
iii) More than one
iv) Two or fewer
(CO-1,2,3,5) (L5)
v) Exactly three
(CO-1,2,3,5) (L5) $\mathbf{1 \times 5}$
b) A. In a survey of nursing students pursuing a master's degree, 50 percent stated that they expect to be promoted to a higher position within one month after receiving the degree. If this percentage holds for the entire population, find, for a sample of 15 , the probability that the number expecting a promotion within a month after receiving their degree is:
i) Six
(CO-1,2,3,5) (L5)
ii) at least seven
(CO-1,2,3,5) (L5)
iii) No more than five
(CO-1,2,3,5) (L5)
iv) Between six and nine, inclusive
(CO-1,2,3,5) (L5)
v) More than 4, inclusive
(CO-1,2,3,5) (L5) $\mathbf{1 \times 5}$
c) A. In a study of drug-induced anaphylaxis among patients taking rocuronium bromide as part of their anesthesia, Laake and Røttingen found that the occurrence of anaphylaxis followed a Poisson model with $\lambda=12$ incidents per year in Norway. Find the probability that in the next year, among patients receiving rocuronium:
i) exactly 3 will experience anaphylaxis
(CO-1,2,3,5) (L5)
ii) at least 3 patients
iii) more than 2
iv) less than 7
(CO-1,2,3,5) (L5)
v) between 4 and 5
(CO-1,2,3,5) (L5) $\mathbf{1 \times 5}$
d) Find area of the shaded region under the standard normal distribution:
i)
(CO-1,2,3,4,5)

ii)

(CO-1,2,3,4,5) (L4)
iii)

(CO-1,2,3,4,5) (L4)
iv)

v)

(CO-1,2,3,4,5) (L4)
(CO-1,2,3,4,5) (L4)

$1 \times 5$

Q. 7 a) Explain why each of the following measurements is or is not the result of a Bernoulli trial:
i) The gender of a newborn child.
(CO-5) (L5)
ii) The classification of a hospital patient's condition as stable, critical, fair, good, or poor.
iii) The weight in grams of a newborn child.
(CO-5) (L5)
iv) The number of surgical procedures performed in a hospital in a week. (CO5)(L5)
v) A hospital patient's temperature in degrees Celsius.
vi) A hospital patient's vital signs recorded as normal or not normal. (CO-5) (L5) $\mathbf{2 \times 6}$
b) Given the standard normal distribution find:
i.) $\quad P(z \geq 0.66)$
(CO-1,2,3,4) (L4)
ii.) $\quad P(z \geq-0.66)$
(CO-1,2,3,4) (L4)
iii.) $\quad P(z \leq-1.33)$
(CO-1,2,3,4) (L4)
iv.) $P(z \leq 1.33)$
(CO-1,2,3,4) (L4)
v.) $P(-1.76 \leq z \leq 2.33)$
(CO-1,2,3,4) (L4)
vi.) $P(-2.33 \leq z \leq 1.76)$
(CO-1,2,3,4) (L4)
vii.) $\quad P(z=0.65)$
(CO-1,2,3,4) (L4)
viii.) $\quad P(-1.25 \leq z \leq 1.25)$

## Table1

## Cumulative Binomial Probability Distribution

| $n=5$ |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $x^{p}$ | . 01 | . 02 | . 03 | . 04 | . 05 | . 06 | . 07 | . 08 | . 09 | . 10 |
| 0 | . 9510 | . 9039 | . 8587 | . 8154 | . 7738 | . 7339 | . 6957 | . 6591 | . 6240 | . 5905 |
| 1 | . 9990 | . 9962 | . 9915 | . 9852 | . 9774 | . 9681 | . 9575 | . 9456 | . 9326 | . 9185 |
| 2 | 1.0000 | . 9999 | . 9997 | . 9994 | . 9988 | . 9980 | . 9969 | . 9955 | . 9937 | . 9914 |
| 3 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | . 9999 | . 9999 | . 9998 | . 9999 | . 9995 |
| 4 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
|  | . 11 | . 12 | . 13 | . 14 | . 15 | . 16 | . 17 | . 18 | . 19 | . 20 |
| 0 | . 5584 | . 5277 | . 4984 | . 4704 | . 4437 | . 4182 | . 3939 | . 3707 | . 3487 | . 3277 |
| 1 | . 9035 | . 8875 | . 8708 | . 8533 | . 8352 | . 8165 | . 7973 | . 7776 | . 7576 | . 7373 |
| 2 | . 9888 | . 9857 | . 9821 | . 9780 | . 9734 | . 9682 | . 9625 | . 9563 | . 9495 | . 9421 |
| 3 | . 9993 | . 9991 | . 9987 | . 9983 | . 9978 | . 9971 | . 9964 | . 9955 | . 9945 | . 9933 |
| 4 | 1.0000 | 1.0000 | 1.0000 | . 9999 | . 9999 | . 9999 | . 9999 | . 9998 | . 9998 | . 9997 |
| 5 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| $\times$ | . 21 | . 22 | . 23 | . 24 | . 25 | . 26 | . 27 | . 28 | . 29 | . 30 |
| 0 | . 3077 | . 2887 | . 2707 | . 2536 | . 2373 | . 2219 | . 2073 | . 1935 | . 1804 | 1681 |
| 1 | . 7167 | . 6959 | . 6749 | . 6539 | . 6328 | . 6117 | . 59007 | . 5697 | . 5489 | . 5282 |
| 2 | . 9341 | . 9256 | . 9164 | . 9067 | . 8965 | . 8857 | . 8743 | . 8624 | . 8499 | . 8369 |
| 3 | . 9919 | . 9903 | . 9886 | . 9866 | . 9844 | . 9819 | . 9792 | . 9762 | . 9728 | . 9692 |
| 4 | . 9996 | . 9995 | . 9994 | . 9992 | . 9990 | . 9988 | . 9986 | . 9983 | . 9979 | . 9976 |
| 5 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| - | . 31 | . 32 | . 33 | . 34 | . 35 | . 36 | 37 | . 38 | . 39 | . 40 |
| 0 | . 1564 | . 1454 | . 1350 | . 1252 | . 1160 | . 1074 | . 0992 | . 0916 | . 0845 | . 0778 |
| 1 | . 5077 | . 4875 | . 4675 | . 4478 | . 4284 | . 4094 | . 3907 | . 3724 | . 3545 | . 3370 |
| 2 | . 8234 | . 8095 | . 7950 | . 7801 | . 7648 | . 7491 | . 7330 | . 7165 | . 69997 | . 6826 |
| 3 | . 9653 | . 9610 | . 9564 | . 9514 | . 9460 | . 9402 | . 9340 | . 9274 | . 9204 | . 9130 |
| 4 | . 9971 | . 9966 | . 9961 | . 9955 | . 9947 | . 9940 | . 9931 | . 9921 | .9910 | . 9898 |
| 5 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |


| $n=15$ (continued) |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\times{ }^{p}$ | . 41 | . 42 | . 43 | . 44 | . 45 | . 46 | . 47 | . 48 | . 49 | . 50 |
| 0 | . 0004 | ,0003 | . 0002 | . 0002 | .0001 | . 0001 | . 0001 | . 0001 | . 0000 | . 0000 |
| 1 | . 0042 | . 0034 | . 0027 | . 0021 | . 0017 | . 0013 | . 0010 | . 0008 | . 0006 | . 0005 |
| 2 | . 0227 | . 0189 | . 0157 | . 0130 | . 0107 | . 0087 | . 0071 | . 0057 | . 0046 | . 0037 |
| 3 | . 0785 | . 0678 | . 0583 | . 0498 | . 0424 | . 0359 | . 0303 | . 02.54 | . 0212 | . 0176 |
| 4 | . 1948 | . 1739 | .1546 | . 1367 | . 1204 | . 1055 | . 0920 | . 0799 | . 0690 | . 0592 |
| 5 | . 3726 | . 3430 | . 3144 | . 2869 | . 2608 | . 2359 | . 2125 | . 1905 | . 1699 | . 1509 |
| 6 | . 5786 | . 5470 | . 5153 | . 4836 | . 4522 | . 4211 | . 3905 | . 3606 | . 3316 | . 3036 |
| 7 | . 7626 | . 7370 | . 7102 | . 6824 | . 6535 | . 6238 | . 5935 | . 5626 | . 5314 | . 5000 |
| 8 | . 8905 | . 8746 | . 8573 | . 8385 | . 8182 | . 7966 | . 7735 | . 7490 | . 7233 | . 6964 |
| 9 | . 9596 | . 9521 | . 9435 | . 9339 | . 9231 | . 9110 | . 8976 | . 8829 | . 8667 | . 8491 |
| 10 | . 9884 | . 9857 | . 9826 | . 9789 | . 9745 | . 9695 | . 9637 | . 9570 | . 9494 | . 9408 |
| 11 | . 9975 | . 9968 | . 9960 | . 9949 | . 9937 | . 9921 | . 9903 | . 9881 | . 9855 | . 9824 |
| 12 | . 9996 | . 9995 | . 9993 | . 9991 | . 9989 | . 9986 | . 9982 | . 9977 | . 9971 | . 9963 |
| 13 | 1.0000 | 1.0000 | . 9999 | . 9999 | . 9999 | . 9998 | . 9998 | . 9997 | . 9996 | . 9995 |
| 14 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| $n=16$ |  |  |  |  |  |  |  |  |  |  |
| $x^{p}$ | . 01 | . 02 | . 03 | . 04 | . 05 | . 06 | . 07 | . 08 | . 09 | . 10 |
| 0 | . 8515 | . 7238 | . 6143 | . 5204 | . 4401 | . 3716 | . 3131 | . 2634 | . 2211 | . 1853 |
| 1 | . 9891 | . 9601 | . 9182 | . 8673 | . 8108 | . 7511 | . 6902 | . 6299 | . 5711 | . 5147 |
| 2 | . 9995 | . 9963 | . 9887 | . 9758 | . 9571 | . 9327 | . 9031 | . 8688 | . 8306 | . 7892 |
| 3 | 1.0000 | . 9998 | . 9989 | . 9968 | . 9930 | . 9868 | . 9779 | . 9658 | . 9504 | . 9316 |
| 4 | 1.0000 | 1.0000 | . 9999 | . 9997 | . 9991 | . 9981 | . 9962 | . 9932 | . 9889 | . 9830 |
| 5 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | . 9999 | . 9998 | . 9995 | . 9990 | . 9981 | . 9967 |
| 6 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | . 9999 | . 9999 | . 9997 | . 9995 |
| 7 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | . 9999 |
| 8 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| ${ }^{p}$ | . 11 | .12 | . 13 | . 14 | . 15 | . 16 | . 17 | . 18 | . 19 | . 20 |
| 0 | . 1550 | . 1293 | . 1077 | . 0895 | . 0743 | . 0614 | . 0507 | . 0418 | . 0343 | . 0281 |
| 1 | . 4614 | . 4115 | . 3653 | . 3227 | . 2839 | . 2487 | . 2170 | . 1885 | . 1632 | . 1407 |
| 2 | . 7455 | . 7001 | . 6539 | . 6074 | . 5614 | . 5162 | . 4723 | . 4302 | . 3899 | . 3518 |
| 3 | . 9093 | . 8838 | . 8552 | . 8237 | . 7899 | . 7540 | . 7164 | . 6777 | . 6381 | . 5981 |
| 4 | . 9752 | . 9652 | . 9529 | . 9382 | . 9209 | . 9012 | . 8789 | . 8542 | . 8273 | . 7982 |
| 5 | . 9947 | . 9918 | . 9880 | . 9829 | . 9765 | . 9685 | . 9588 | . 9473 | . 9338 | . 9183 |
| 6 | . 9991 | . 9985 | . 9976 | . 9962 | . 9944 | . 9920 | . 9888 | . 9847 | . 9796 | . 9733 |
| 7 | . 9999 | . 9998 | . 9996 | . 9993 | . 9989 | . 9984 | . 9976 | . 9964 | . 9949 | . 9930 |
| 8 | 1.0000 | 1.0000 | . 9999 | . 9999 | .9998 | . 9997 | . 9996 | . 9993 | . 9990 | . 9985 |
| 9 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | . 9999 | . 9999 | . 9998 | . 9998 |
| 10 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Table 2
Cumulative Poisson Distribution $P(X \leq X \mid \lambda)$. 1000 Times the Probability of $\boldsymbol{X}$ or Fewer Occurrences of Event That Has Average Number of Occurrences Equal to $\lambda$


## Table 3

Normal Curve Areas $P\left(z \leq z_{0}\right)$. Entries in the Body of the Table Are Areas Between $-\infty$ and $z$

|  | -0.09 | -0.08 | -0. | -0. | -0 | -0.0 | -0.03 | - | -0.01 | 0.0 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $-3.80$ | . 0001 | . 0001 | . 0001 | . 0001 | . 0001 | . 000 | , | . 0001 | 01 | . 0001 | -3.80 |
| -3.70 | . 0001 | . 0001 | . 0001 | . 0001 | . 0001 | . 000 | . 0001 | . 0001 | . 0001 | . 0001 | 70 |
| -3 | . 0001 | . 000 | , | . | . 00 | . 00 | . 0 | . 00 | . 000 | . 0002 | $-3.60$ |
| $-3.50$ | . 0002 | . 0002 | . 0002 | . 0002 | . 0002 | . 0002 | . 0002 | . 0002 | . 0002 | . 0002 | $-3.50$ |
| $-3.40$ | . 0002 | . 0003 | . 0003 | . 0003 | . 0003 | . 0003 | . 0003 | . 0003 | . 0003 | . 0003 | $-3.40$ |
| $-3.30$ | . 0003 | . 0004 | . 0004 | . 0004 | . 0004 | . 0004 | . 0004 | . 0005 | . 0005 | . 0005 | $-3.30$ |
| -3.20 | . 0005 | . 0005 | . 0005 | 006 | . 0006 | . 000 | . 0006 | 0006 | . 0007 | . 0007 | 3.20 |
| -3.10 | . 0007 | . 000 |  |  | . 00 | . 00 | 0 | . 0009 | 000 |  | 10 |
| -3.00 | . | . 0010 | . 0011 | . 0011 | . 00 | . 0012 | . 0012 | 0013 | . 0013 | . 0013 | $-3.00$ |
| $-2.90$ | . 0014 | . 0014 | . 0015 | . 0015 | . 0016 | . 0016 | . 0017 | . 0018 | . 0018 | . 0019 | $-2.90$ |
| -2.80 | . 0019 | . 0020 | . 0021 | . 0021 | . 0022 | . 0023 | . 0023 | . 0024 | . 0025 | . 0026 | $-2.80$ |
| -2.70 | . 0026 | . 0027 | . 0028 | 029 | . 0030 | . 0031 | 03 | 0033 | . 0034 | . 0035 | . 70 |
| $-2.60$ | . 0036 | . 0037 | . 0038 | . 0039 | . 0040 | . 004 | . 00 | . 0044 | . 0045 |  | 2.60 |
| -2.50 | . 0048 | . 0049 | . 0051 | ,0052 | .0054 | . 0055 | . 0057 | 0059 | . 0060 | .0062 | $-2.50$ |
| -2.40 | . 0064 | . 0066 | . 0068 | . 0069 | . 0071 | . 0073 | . 0075 | . 0078 | . 0080 | . 0082 | $-2.40$ |
| $-2.30$ | . 0084 | . 0087 | . 0089 | . 0091 | . 0094 | . 0096 | . 0099 | . 0102 | . 0104 | . 0107 | $-2.30$ |
| -2.20 | . 0110 | . 0113 | . 0116 | . 0119 | . 0122 | . 0125 | . 0129 | 0132 | . 0136 | . 0139 | $-2.20$ |
| $-2.10$ | . 0143 | . 0146 | . 0150 | . 015 | . 0158 | . 0162 | . 016 | . 0170 | . 0174 | . 0179 | $-2.10$ |
| $-2.00$ | . 0183 | . 0188 | . 01 | . 0197 | . 0202 | . 020 | . 0212 | 0217 | . 0222 | . 0228 | $-2.00$ |
| $-1.90$ | . 0233 | . 0239 | . 024 | . 0250 | . 0256 | . 0262 | . 0268 | . 0274 | . 0281 | . 0287 | $-1.90$ |
| $-1.80$ | . 0294 | . 0301 | . 0307 | . 0314 | . 0322 | . 0329 | . 0336 | . 0344 | . 0351 | . 0359 | $-1.80$ |
| -1.70 | . 0367 | . 0375 | . 0384 | . 0392 | . 0401 | . 0409 | . 0418 | . 0427 | . 0436 | . 0446 | $-1.70$ |
| $-1.60$ | . 0455 | . 0465 | . 0475 | . 0485 |  | . 0505 | . 0516 | . 0526 | . 0537 |  |  |
| $-1.50$ | . 0559 | . 0571 | . 0582 | . 0594 | . 0606 | . 0618 | . 0630 | . 0643 | . 0655 | . 0668 | $-1.50$ |
| -1.40 | . 0681 | . 0694 | . 0708 | . 0721 | . 0735 | . 0749 | . 0764 | . 0778 | . 0793 | . 0808 | $-1.40$ |
| -1.30 | . 0823 | . 0838 | . 0853 | . 0869 | . 0885 | . 0901 | . 0918 | . 0934 | . 0951 | . 0968 | $-1.30$ |
| -1.20 | . 0985 | . 1003 | . 1020 | . 1038 | . 1056 | . 1075 | . 1093 | . 1112 | . 1131 | . 1151 | $-1.20$ |
| $-1.10$ | . 1170 | . 1190 | . 1210 | . 1230 | . 1251 | . 1271 | . 1292 | . 1314 | . 1335 | . 1357 | -1.10 |
| $-1.00$ | . 1379 | . 1401 | . 1423 | . 1446 | . 1469 | . 1492 | . 1515 | . 1539 | . 1562 | . 1587 | $-1.00$ |
| -0.90 | . 1611 | . 1635 | . 1660 | . 1685 | . 1711 | . 1736 | . 1762 | . 1788 | . 1814 | . 1841 | -0.90 |
| -0.80 | . 1867 | . 1894 | . 1922 | . 1949 | . 1977 | . 2005 | . 2033 | . 2061 | 2090 | . 2119 | -0.80 |
| -0.70 | . 2148 | . 2177 | . 2206 | . 2236 | . 2266 | . 2296 | . 2327 | 2358 | . 2389 | . 2420 | $-0.70$ |
| -0.60 | . 2451 | . 2483 | . 2514 | . 2546 | . 2578 | . 2611 | . 2643 | . 2676 | . 2709 | . 2743 | $-0.60$ |
| -0.50 | . 2776 | . 2810 | . 2843 | . 2877 | . 2912 | . 2946 | . 2981 | 3015 | 3050 | . 3085 | $-0.50$ |
| -0.40 | . 3121 | . 3156 | . 3192 | . 3228 | . 3264 | . 3300 | . 3336 | . 3372 | . 3409 | . 3446 | -0.40 |
| -0.30 | . 3483 | . 3520 | . 3557 | . 3594 | . 3632 | . 3669 | . 3707 | . 3745 | . 3783 | . 3821 | $-0.30$ |
| -0.20 | . 3859 | . 3897 | . 3936 | . 3974 | . 4013 | . 4052 | . 4090 | . 4129 | . 4168 | . 4207 | $-0.20$ |
| -0.10 | . 4247 | . 4286 | -4325 | . 4364 | . 4404 | . 4443 | . 448 | . 4522 | . 4562 | . 4602 | $-0.10$ |
| 0.00 | . 4641 | . 4681 | . 4721 | . 4761 | . 4801 | . 4840 | . 4880 | . 4920 | . 4960 | . 5000 | 0.0 |

TABLE D (continued)

| $z$ | 0.00 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.09 | $z$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 0.00 | . 5000 | . 5040 | . 5080 | . 5120 | . 5160 | . 5199 | . 5239 | . 5279 | . 5319 | . 5359 | 0.00 |
| 0.10 | . 5398 | . 5438 | . 5478 | . 5517 | . 5557 | . 5596 | . 5636 | , 5675 | . 5714 | . 5753 | 0.10 |
| 0.20 | . 5793 | . 5832 | . 5871 | . 5910 | . 5948 | . 5987 | . 6026 | . 6064 | . 6103 | . 6141 | 0.20 |
| 0.30 | . 6179 | . 6217 | . 6255 | . 6293 | . 6331 | . 6368 | . 6406 | . 6443 | . 6480 | . 6517 | 0.30 |
| 0.40 | . 6554 | . 6591 | . 6628 | . 6664 | . 6760 | . 6736 | . 6772 | . 6808 | . 6844 | . 6879 | 0.40 |
| 0.50 | . 6915 | . 6950 | . 6985 | . 7019 | . 7054 | . 7088 | . 7123 | . 7157 | . 7190 | . 7224 | 0.50 |
| 0.60 | . 7257 | . 7291 | . 7324 | . 7357 | . 7389 | . 7422 | . 7454 | . 7486 | . 7517 | . 7549 | 0.60 |
| 0.70 | . 7580 | . 7611 | . 7642 | . 7673 | . 7704 | . 7734 | . 7764 | . 7794 | . 7823 | . 7852 | 0.70 |
| 0.80 | .7881 | . 7910 | . 7939 | . 7967 | . 7995 | . 8023 | . 8051 | . 8078 | . 8106 | . 8133 | 0.80 |
| 0.90 | . 8159 | . 8186 | . 8212 | . 8238 | . 8264 | . 8289 | . 8315 | . 8340 | . 8365 | . 8389 | 0.90 |
| 1.00 | . 8413 | . 8438 | . 8461 | . 8485 | . 8508 | . 8531 | . 8554 | . 8577 | . 8599 | . 8621 | 1.00 |
| 1.10 | . 8643 | . 8665 | . 8686 | . 8708 | . 8729 | . 8749 | . 8770 | . 8790 | . 8810 | . 8830 | 1.10 |
| 1.20 | . 8849 | . 8869 | . 8888 | . 8907 | . 8925 | . 8944 | . 8962 | . 8980 | . 8997 | . 9015 | 1.20 |
| 1.30 | . 9032 | . 9049 | . 9066 | . 9082 | . 9099 | . 9115 | . 9131 | . 9147 | . 9162 | . 9177 | 1.30 |
| 1.40 | . 9192 | 9207 | . 9222 | . 9236 | . 9251 | . 9265 | . 9279 | . 9292 | . 9306 | . 9319 | 1.40 |
| 1.50 | . 9332 | . 9345 | . 9357 | . 9370 | . 9382 | . 9394 | . 9406 | . 9418 | . 9429 | . 9441 | 1.50 |
| 1.60 | . 9452 | . 9463 | . 9474 | . 9484 | . 9495 | . 9505 | . 9515 | . 9525 | . 9535 | . 9545 | 1.60 |
| 1.70 | . 9554 | . 9564 | . 9573 | . 9582 | .9591 | . 9599 | . 9608 | . 9616 | . 9625 | . 9633 | 1.70 |
| 1.80 | . 9641 | . 9649 | . 9656 | . 9664 | . 9671 | . 9678 | . 9686 | . 9693 | . 9699 | . 9706 | 1.80 |
| 1.90 | . 9713 | . 9719 | . 9726 | . 9732 | . 9738 | . 9744 | . 9750 | . 9756 | . 9761 | . 9767 | 1.90 |
| 2.00 | .9772 | . 9778 | . 9783 | . 9788 | . 9793 | . 9798 | . 9803 | 9808 | . 9812 | . 9817 | 2.00 |
| 2.10 | . 9821 | . 9826 | . 9830 | . 9834 | . 9838 | . 9842 | . 9846 | . 9850 | . 9854 | . 9857 | 2.10 |
| 2.20 | . 9861 | . 9864 | . 9868 | . 9871 | . 9873 | . 9878 | . 9881 | . 9884 | . 9887 | . 9890 | 2.20 |
| 2.30 | . 9893 | . 9896 | . 9898 | . 9901 | . 9904 | . 9906 | . 9909 | . 9911 | . 9913 | . 9916 | 2.30 |
| 2.40 | . 9918 | . 9920 | . 9922 | . 9925 | . 9927 | . 9929 | . 9931 | . 9932 | . 9934 | . 9936 | 2,40 |
| 2.50 | . 9938 | . 9940 | . 9941 | . 9943 | . 9945 | . 9946 | . 9948 | . 9949 | . 9951 | . 9952 | 2.50 |
| 2.60 | . 9953 | . 9955 | . 9956 | . 9957 | . 9959 | . 9960 | . 9961 | . 9962 | . 9963 | . 9964 | 2.60 |
| 2.70 | . 9965 | . 9966 | . 9967 | . 9968 | . 9969 | . 9970 | . 9971 | . 9972 | . 9973 | . 9974 | 2.70 |
| 2.80 | . 9974 | . 9975 | . 9976 | . 9977 | . 9977 | . 9978 | . 9979 | . 9979 | . 9980 | . 9981 | 2.80 |
| 2.90 | . 9981 | . 9982 | . 9982 | . 9983 | . 9984 | . 9984 | . 9985 | . 9985 | . 9986 | . 9986 | 2.90 |
| 3.00 | . 9987 | . 9987 | . 9987 | .9988 | . 9988 | . 9989 | . 9989 | . 9989 | . 9990 | . 9990 | 3.00 |
| 3.10 | . 9990 | . 9991 | . 9991 | . 9991 | . 9992 | . 9992 | . 9992 | . 9992 | . 9993 | . 9993 | 3.10 |
| 3.20 | . 9993 | . 9993 | . 9994 | . 9994 | . 9994 | . 9994 | . 9994 | . 9995 | . 9995 | . 9995 | 3.20 |
| 3.30 | . 9995 | . 9995 | . 9995 | . 9996 | .9996 | . 9996 | . 9996 | . 9996 | . 9996 | . 9997 | 3.30 |
| 3.40 | . 9997 | . 9997 | . 9997 | . 9997 | . 9997 | . 9997 | . 9997 | . 9997 | . 9997 | . 9998 | 3.40 |
| 3.50 | . 9998 | . 9998 | . 9998 | . 9998 | . 9998 | . 9998 | . 9998 | . 9998 | . 9998 | . 9998 | 3.50 |
| 3.60 | . 9998 | . 9998 | . 9999 | . 9999 | . 9999 | . 9999 | . 9999 | . 9999 | . 9999 | . 9999 | 3.60 |
| 3.70 | . 9999 | . 9999 | . 9999 | . 9999 | . 9999 | . 9999 | . 9999 | . 9999 | . 9999 | . 9999 | 3.70 |
| 3.80 | . 9999 | . 9999 | . 9999 | . 9999 | . 9999 | . 9999 | . 9999 | . 9999 | . 9999 | . 9999 | 3.80 |

# End Semester Examination, Dec. 2022 

# B. Tech. - Fourth Semester <br> MOLECULAR BIOLOGY (BBT-DS-401) 

Time: 3 hrs
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) What is the difference between negative and positive supercoiling?
[CO1][L2]
b) What is C value paradox? What accounts for the same?
[CO1][L2]
c) What are histone proteins?
[CO2][L2]
d) The base sequence of an mRNA is:
$3^{\prime}$ AGUGAGCGGAUAGCUU 5'
Write the sequence of the DNA molecule and indicate the template and non template strands.
[CO3][L2]
e) What sequences in promoter help to initiate transcription?
[CO2][L2]
f) Differentiate between autonomous and non autonomous transposable elements.
[CO6][L2]
g) What will be the state of tryptophan operon if tryptophan is present in the cell?
h) How pre mRNA is different from mRNA?
[CO5][L3]

## PART-A

Q. 2 How the genetic material of prokaryotes and eukaryotes undergo compaction to fit within the cell?
[CO-1] [L-2] 20
Q. 3 a) Discuss the process of replication in bacteria. Indicate the role of the major proteins/enzymes involved in the same.
[CO-2] [L-2] 14
b) Explain eukaryotes, polymerase switching during DNA replication. Why it occurs?
[CO-6] [L-2] 6
Q. 4 a) How RNA polymerase carries out the process of transcription in prokaryotes? How this process is distinguishable from that in eukaryotes?
[CO-6] [L-3] 12
b) Why is TATA binding protein referred to as universal transcription factor?
[CO-6] [L-3] 8

## PART-B

Q. 5 How lactose is utilized as a carbon source inside a bacterial cell? How this process is regulated in the absence and presence of glucose?
[CO-3,6] [L-3] 20
Q. 6 a) What is post translational modification? Explain any two.
[CO-5] [L-4] 10
b) How the information present in mRNA is decoded to form the proteins in prokaryotes?
[CO-4] [L-3] 10
Q. 7 Give a brief account of transposable elements in bacteria. What is the evolutionary significance of transposons?

# End Semester Examination, Dec. 2022 

## B. Tech. - Third Semester

## BIOINFORMATICS AND COMPUTER APPLICATIONS (BBT-DS-305)

Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in brief:
a) Give example of literature database and sequence database.
b) Expand NCBI, DDBJ, PIR and RCSB.
c) What do you mean by swissprot?
d) Differentiate between pairwise and multiple sequence alignment tool.
e) What do you mean by SVM?
f) Define rooted tree with well label diagram.
g) Contrast between protein structure determination and prediction method.
h) What do you mean by Ramachandran plot?
i) Elaborate the contribution of Markov.
j) What do you mean by homology?

## PART-A

Q. 2 a) Bioinformatics is an amalgamation of different fields. Justify the statement.
[CO-1] [L-2] 10
b) Discuss primary and secondary sequence database.
Q. 3 Predict the sequence alignment using Smith Waterman algorithm. Where the match score is 2 mismatch score is -1 and gap is 0 and the sequences are ATGCT, CTGAT
[CO-2] [L-4] 20
Q. 4 Evaluate the given sequences using distance matrix and show cladogram. ATATCGGGCCCC, CCGCTACGGTTT, ATCGACTCTAAT, CCCCCCCCCCTT ATGCTACATCGA, TCCCGGGGGAAA

## PART-B

Q. 5 a) Explain different secondary structure component present in a protein.
[CO-4] [L-3] 10
b) Apply homology modeling to show protein structure predictions. [CO-4] [L-3] 10
Q. 6 Infer artificial neural network in protein secondary structure prediction using suitable diagram.
Q. 7 Design an appropriate experiment to show the applications of peptide mass fingerprinting.
[CO-6] [L-2] 20

# End Semester Examination, Dec. 2022 

# B. Tech. - Third Semester <br> BIOANALYTICAL TECHNIQUES (BBT-DS-304A) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) Distinguish between 'error' and 'bias' in measurement.
b) Why is it necessary to calibrate analytical instruments?
c) Identify the role of filters in fluorescence microscope.
d) How can you calculate RCF on the particle under centrifugation?
e) What is the basis of separation in ion exchange chromatography?
f) Mention the type of stationary phase and mobile phase used in reverse phase chromatography.
g) Criticize the use of reducing agents in SDS-PAGE.
h) Identify the use of X-rays in characterization of compounds.
i) What is meant by 'absorption maxima' of a compound?
j) Compare the properties of alpha, beta and gamma particles.

## PART-A

Q. 2 a) Differentiate between random and systematic errors with examples. [CO-1] [L-4] 10
b) Assess various types of errors in an analytical instrument.
[CO-1] [L-5] 10
Q. 3 a) Illustrate the magnification of an object in a light microscope through ray diagram.
[CO-2] [L-3] 10
b) Evaluate the interactions between matter and accelerated electrons that are utilized in electron microscopy.
[CO-3] [L-5] 10
Q. 4 a) Demonstrate the process of centrifugal separation of cell organelles. [CO-3] [L-2] 10
b) Explain the instrumental set-up of HPLC with diagram.

## PART-B

Q. 5 a) Develop an electrophoretic technique to separate proteins.
b) Describe briefly the technique of 2-D Gel electrophoresis.
Q. 6 a) Draw and explain the schematic of a UV-VIS spectrophotometer.
[CO-4] [L-2] 10
b) Examine the significance of Beer-Lambert's Law in spectroscopy.
Q. 7 a) Elaborate the method of radioactivity measurement using proportional counter.
[CO-6] [L-6] 10
b) Criticize radioisotope toxicity and suggest rules for handling radioisotopes.
[CO-5] [L-5] 10

# End Semester Examination, Dec. 2022 

# B. Tech. - Third Semester <br> BIOANALYTICAL TECHNIQUES (BBT-DS-304) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following briefly:
a) Differentiate between native and SDS-polyacrylamide gel electrophoresis. [CO4][L2]
b) List the properties of $a, \beta$ and $\gamma$ rays.
[CO-6][L-1]
c) Why is it important to calibrate analytical instruments?
[CO-1][L-3]
d) How is scanning electron microscopy different from a transmission electron microscopy?
[CO-5][L-2] 5x4

## PART-A

Q. 2 a) Describe the meaning of the following performance indicators of an instrument:
i) Sensitivity ii) Resolution iii) Threshold.
b) Explain the principle behind adsorption chromatography.
[CO-1][L-1] 10
Q. 3 a) Devise a methodology to isolate nucleus from cell extracts. Give reasons for your choice of instruments.
[CO-2][L-6] 10
b) Describe image formation in a compound microscope with the help of a ray diagram.
[CO-1][L-4] 10
Q. 4 a) Describe a utility of molecular exclusion chromatography.
[CO-3][L-3] 10
b) What is the reason for using high salt for elution of bound proteins during ion-exchange chromatography?
[CO-3][L-2] 10

## PART-B

Q. 5 a) What are the principles behind the following electrophoresis techniques: Immuno-electrophoresis and isoelectric focusing?
[CO-4][L-1] 10
b) How is DNA separated, visualized and analyzed by gel electrophoresis? [CO4][L4] 10
Q. 6 a) Provide a sketch of the various components of a UV-Vis spectrophotometer and explain its working.
[CO-5][L-3] 10
b) Describe fluorescence spectroscopy alongwith an example of its usage. [CO5][-3] $\mathbf{1 0}$
Q. 7 a) How do scintillation counters work?
[CO-6][L-2] 10
b) List the differences between Geiger Muller counting and scintillation counting.
[CO-6][L-2] 10

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester <br> BIOCHEMISTRY (BBT-DS-303) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) What is a glycosidic bond?
b) Identify the stored carbohydrates in plants and animals.
c) Draw the general structure of a triglyceride.
d) How do lipids contribute in fluidity of cell membrane?
e) Mention the significance of Ramchandran plot.
f) Depict the formation of a peptide bond.
g) Criticize the role of a co-enzyme.
h) Calculate the number of ATPs formed during complete oxidative breakdown of 1 mol of glucose.
i) Illustrate a transamination reaction.
j) What causes phenylketonuria?

## PART-A

Q. 2 a) Differentiate between homopolysaccharides and heteropolysaccharides with examples.
[CO-1] [L-4] 10
b) Assess the biological roles of carbohydrates in organisms.
[CO-1] [L-5] 10
Q. 3 a) Classify lipids and give a detailed account of each class with example.
[CO-2] [L-5] 10
b) Illustrate the structure of cholesterol and mention its physiological importance.
[CO-2] [L-2] 10
Q. 4 a) Evaluate various types of bonds and interactions stabilizing the secondary folding of proteins.
[CO-3] [L-5] 10
b) Discuss the mechanism and factors affecting denaturation and renaturation of proteins.
[CO-3] [L-6] 10

## PART-B

Q. 5 a) Derive the Michaelis-Menten equation for a one-substrate enzyme-catalyzed reaction.
[CO-5] [L-3] 10
b) Explain the allosteric regulation of enzymes.
[CO-5] [L-2] 10
Q. 6 a) Distinguish between glycolysis and gluconeogenesis.
[CO-4] [L-4] 10
b) Identify the mechanism of oxidative phosphorylation and explain the coupling of redox reactions.
Q. 7 a) Illustrate the Urea Cycle giving its salient features.
[CO-4] [L-2] 10
b) Demonstrate the salvage pathways of purine metabolism.
[CO-6] [L-2] 10

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester <br> MICROBIOLOGY (BBT-DS-302) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) How synchronous culture is obtained?
b) What is dipicolinic acid and where it is found?
c) What is competency and how it is achieved?
d) Differentiate between 'bacteriostatics' and 'bacteriocidals'.
e) What genera of microorganisms produce most antibiotics?
f) Describe the mode of action of penicillin.
g) Distinguish between a disinfectant and an antiseptic.
h) How does thermoplasma strengthen its membrane to survive harsh living conditions?
i) How do algae differ from cyanobacteria?
j) Citric acid cycle plays two major roles in the cell. Comment.

## PART-A

Q. 2 a) How the doctrine of spontaneous generation was challenged. In this context, describe the experiments conducted out by different naturalists.
[CO-1] [L-2] 12
b) How would you convince a friend that microorganisms are much more than just agents of disease?
[CO-2] [L-6] 8
Q. 3 a) How cell wall material is synthesized? Describe the site of action of different antibiotics that act to inhibit the cell wall synthesis.
[CO-4] [L-4] 10
b) Draw a well labeled diagram of flagella. How bacteria moves in response to a gradient of a chemical?
[CO-2] [L-2] 10
Q. 4 a) A bacterial culture has an initial cell density of $0.5 \times 10^{3}$ cells $/ \mathrm{ml}$. Its generation time is 20 min . What will be the cell density at the end of I hr 20 $\min$ ?
[CO5] [L-5] 8
b) How can bacterial populations be measured indirectly?

## PART-B

Q. 5 a) What type of metabolic reactions ensue when $E$ coli is grown in the presence of gluconate as a source of carbon?
b) Discuss the fate of NADH whwn bacteria is grown under aerobic and anaerobic conditions.
Q. 6 A generalized transducing phage is used to transduce an $a^{-} b^{-} c^{-} d^{-} e^{-}$recipient strain of $E$. coli with an $a^{+} b^{+} c^{+} d^{+} e^{+}$donor. The recipient culture is plated on various media with the results shown in the table below. (Note that $a^{-}$ determines a requirement for $A$ as a nutrient, and so forth.)

Explain how specialized transduction occurs? What can you conclude about the linkage and order of the genes?

| Compounds added to | Presence $(+)$ or <br> absence $(-)$ <br> of colonies |
| :--- | :---: |
| minimal medium | - |
| C D E | - |
| B D E | + |
| B C E | + |
| B C D | - |
| A D E | - |
| A C E | - |
| A C D | - |
| A B E | - |
| A B D | - |
| A B C |  |

Q. 7 a) How phenol coefficient method is used to determine the efficacy of disinfecting agent?
b) Discuss how would you sterilize the following:
i) Air.
ii) Culture broth.
iii) Inoculating loop.
iv) Antibiotic solution.
v) Media containing spores.
vi) Glass pipettes.
vii) Laminar air floe chamber.
viii) Vaccines and drugs. [CO-6] [L-3] 1

## End Semester Examination, Dec. 2022

## B. Tech. - Third Semester

MICROBIOLOGY (BBT-DS-302A)
Time: 3 hrs.

Max Marks: 100
No. of pages: 1

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) List four silent features of Algae.
[CO-1] [L-1]
b) Names the various modes of nutrition in fungi. [CO-3] [L-1]
c) What are plastids?
[CO-2] [L-1]
d) What is genetic transduction?
e) Illustrate the diagram of the bacteriophage.
f) Name the various types of pigments found in Algae.
g) Names the various modes of nutrition in fungi.
h) List any two criteria used for the classification of bacteria.
i) What is genetic transformation?
j) What are antenna pigments?

## PART-A

Q. 2 Discuss various bacterial groups and their silent features.
[CO-1] [L-6] 20
Q. 3 a) Illustrate the various types of asexual reproduction in fungi.
[CO-3] [L-2] 10
b) Summarize the various methods of microbial growth measurement.
[CO-2] [L-2] 10
Q. 4 Explain the five-kingdom classification of Whittaker.
[CO-4] [L-2] 20

## PART-B

Q. 5 Discuss the life cycle of a virus.
[CO-1] [L-6] 20
Q. 6 Elaborate the various methods of sterilization.
[CO-4] [L-6] 20
Q. 7 a) Explain aerobic and anaerobic respiration.
[CO-3] [L-2] 10
b) Summarize the idea of the classification of microbes based on nutrition.
[CO-3] [L-2] 10

# End Semester Examination, Dec. 2022 <br> B. Tech. - Third Semester <br> CELL BIOLOGY (BBT-DS-301) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) List two types of transport mechanisms across the cell membrane.
[CO-1] [L-1]
b) What are microtubules and microfilaments? [CO-2] [L-1]
c) Define 'apoptosis'.
d) Illustrate the GPCR signaling pathway.
[CO-3] [L-2]
e) Explain the functions of nucleus.
f) Write a short note on the lysosomes. [CO-2] [L-1]
g) List the cell membrane proteins.
h) Compare convergence and divergence mode of cell signaling.
i) Explain the neurotransmitters.
j) Define 'Extracellular matrix'.

## PART-A

Q. 2 Compare between Endoplasmic reticulum and Golgi complex structure and functions.
Q. 3 Describe the fluid mosaic model of cell membrane with diagram.
[CO-3] [L-2] 20
Q. 4 Describe the structure and function of the mitochondria and nucleus. [CO-3] [L-4] 20

## PART-B

Q. 5 Explain various receptors of the cell signaling.
[CO-1] [L-2] 20
Q. 6 Describe the cell junctions and adhesion.
Q. 7 a) Illustrate the structure and function of neurons.
b) Discuss the structural proteins of the muscles.

# End Semester Examination, Dec. 2022 

## B. Tech. - Second Semester <br> BIOLOGY FOR ENGINEERS (BBT-100)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly.
a) What is meant by Taxonomy?
b) Define 'growth'.
c) What is the binomial nomenclature of Human beings?
d) Distinguish between bacteria and virus.
e) What is Acid Mine Drainage?
f) Mention Universal Donor and Universal acceptor blood groups.
g) Identify the functions of nerve cells.
h) What are electrolytes?
i) Enlist the functions of blood.
j) Justify the importance of Computational Biology.
[CO-1] [L-1] 2x10

## PART-A

Q. 2 a) Explain the characteristics which distinguish living things from the non-living things.
b) Demonstrate the structural organization of a plant cell.
Q. 3 a) Describe various types of microbes giving their characteristic features.
b) Evaluate the special features of Archaea-bacteria.
[CO-2] [L-2] 10
[CO-2] [L-5] 10
Q. 4 a) Analyze the role of carbohydrates in living organisms.
[CO-3] [L-4] 10
b) Elaborate the properties and dietary significance of proteins.
[CO-3] [L-2] 10

## PART-B

Q. 5 a) Discuss the characteristics and functions of epithelial tissue.
[CO-3] [L-6] 10
b) Explain the process of digestion in humans.
[CO-3] [L-2] 10
Q. 6 a) How is Blood Pressure measured? What does it indicate?
[CO-4] [L-2] 10
b) Assess various modes of microbial infections in humans and suggest ways to prevent them.
[CO-4] [L-5] 10
Q. 7 a) Describe Mendelian inheritance.
b) Explain epigenetic modifications and their consequences.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Second Semester <br> BIOLOGY FOR ENGINEERS (BBT-100) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer briefly.
a) Enlist the characteristics exhibited by living beings.
b) Define biodiversity and mention its types.
c) Highlight the special features of a plant cell.
d) Distinguish between in-situ and ex-situ bioremediation with examples.
e) Which metals are found in acid mine drainage?
f) Why is 'O' blood group called universal donor?
g) Identify the functions of muscle tissue.
h) What are hormones, give any two examples with their functions.
i) Distinguish between blood and plasma.
j) Enumerate the major types of biological data?
[CO-1] [L-1] $\mathbf{2 \times 1 0}$

## PART-A

Q. 2 a) Elaborate upon the five kingdom classification of living organisms. [CO-2] [L-2] 10
b) Describe the structure of a prokaryotic cell.
[CO-2] [L-2] 10
Q. 3 a) Illustrate the life cycle of a microbial biofilm.
[CO-2] [L-3] 10
b) Evaluate the applications of microbes in environmental cleaning.
[CO-2] [L-5] 10
Q. 4 a) Broadly classify lipids and give examples of each class.
[CO-3] [L-4] 10
b) Illustrate various levels of structural organization of proteins.
[CO-3] [L-3] 10

## PART-B

Q. 5 a) Categorize human tissues mentioning their salient features and functions.
[CO-3] [L-4] 10
b) Explain the path of food in gastro-intestinal tract and mention the function of each part.
[CO-3] [L-2] 10
Q. 6 a) Demonstrate the ABO system of blood groups in humans.
[CO-4] [L-2] 10
b) Analyze the role of body fluids and electrolytes in maintaining homeostasis.
[CO-4] [L-4] 10
Q. 7 a) Elaborate the process of flow of information within a biological system.
[CO-4] [L-6] 10
b) Assess the importance of computational methods in biological data analysis.
[CO-4] [L-5] 10

# End Semester Examination, Dec. 2022 OPEN ELECTIVE - COMMON FOR ALL BRANCHES ELECTRIC MOBILITY (OPEN ELECTIVE) (BAU-OE-001) 

Time: 3 hrs.
Max Marks: 100
No. of Pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer in brief:
a) Calculate air resistance at 30 Kmph if the air resistance at 10 kmph is W .
[L-3]
b) A car has a weight of 7000 N Calculate rolling resistance if constant of rolling resistance is 0.20 .
c) List five electric two wheeler manufacturers in Indian Market [L-1]
d) India's first Electric car company "Reva" founder was $\qquad$ .
e) Draw two EV configurations based on Drive train Configuration.
f) Where are ADC and DAC used?
[CO-2][L-2]
g) Differentiate between energy density and power density of battery.
h) Write the chemical reaction that takes place in Li ion battery.
i) Explain the significance of SOH .
j) Name four companies who are installing battery charging stations in India.
[CO-1] [L-1]

## $2 \times 10$

## PART-A

Q. 2 Discuss major challenges faced by electric mobility in India.
[CO-2][L-2]
Q. 3 Ankita wants to design electric scooty having gross vehicle weight of 198 kg . The other values considered for design are $\mathrm{Kr}=0.02$, gradient angle $=30^{\circ}$, radius of wheel $=6$ inches, transmission gear ratio $=4$. The bike achieves max speed of $40 \mathrm{~km} / \mathrm{hr}$ in 5 seconds. Calculate power and torque requirement of the motor for the designed scooty?
[CO-4]
[L-4] 20
Q. 4 Compare DC Brushed, DC Brushless, Induction, Synchronous, Switched Reluctance Motor on following parameters.
a) Power to weight ratio
b) Torque Speed
c) Efficiency
d) Cost of Controllers
d) Cost of Motors.
[CO-5][L-5] $5 \times 4$

## PART-B

Q. 5 a) Compare SCR, IGBT and MOSFET along with their applications. [CO-3][L-3] 10
b) How modern controllers adjust speed and acceleration of EVs?
Q. 6 a) Li-ion batteries are not suitable for countries like India. Evaluate the statement with facts.
b) Enlist advantages and disadvantages of lead acid batteries.
[CO-2] [L2] 5
Q. 7 a) As an entrepreneur you want to open battery charging station in a city. Design your strategy before setting your unit.
[CO-6] [L-6] 10
b) Compare different levels of EV Chargers.

## 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester <br> EMERGING AUTOMOTIVE TECHNOLOGIES (BAU-DS-721)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Name the different types of electrolytes used in Fuel Cell.
[CO- 2] [L-1]
b) Define the function of the constantly variable transmission system.
[CO-1] [L-1]
c) What is the function of the variable valve timing?
[CO- 2] [L-1]
d) Explain Regenerative braking systems.
[CO- 2] [L-2]
e) How is ultra-capacitor beneficial for the electric automobile?
[CO- 2] [L-2]
f) Define the term brand management.
g) What is meant by the hydrogen storage system?
[CO- 2] [L-2]
h) What is the use of actuators in the Automotive Industry?
[CO- 1] [L-2]
i) Define hybrid electric vehicles.
[CO- 2] [L-2]
j) Explain globalization and regionalization in context to automotive Industry.

## PART-A

Q. 2 Illustrate the need to switch to alternative mobility source development to use for future cars.
[CO-3] [L-3] 20
Q. 3 a) Select an alternative energy system that produces electrical energy through a chemical reaction and does not impact the environment. [CO-4] [L-6] 10
b) Select fuel cell systems that generate energy from other conventional sources, and through the electrolysis process, watersplit into oxygen and hydrogen fuel.
[CO-3] [L-6] 10
Q. 4 a) Examine the function of the gasoline fuel injection system and how it enhances the engine's performance.
[CO-3] [L-4] 10
b) Analyze the function of variable valve technology and state how to improve the performance of the engine.
[CO-3] [L-4] 10

## PART-B

Q. 5 Analyze the best architecture for an electric hybrid with comparison among series-parallel architecture and series architecture.
[CO-4] [L-5] 20
Q. 6 Categories the lead-acid batteries based on construction, absorption voltage and float voltage range.
[CO-5] [L-4] 20
Q. 7 a) Integrate the function of the microcontroller to improve the performance of automobiles.
[CO-3] [L-4] 10
b) Select and explain the appropriate suspension system with a diagram for commercial vehicle.
[CO-6] [L-6] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester HYBRID AND ELECTRIC VEHICLE (BAU-DS-702)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following questions:
a) Why is electromagnetic torque necessary for an electric motor?
b) Enlist the permanent magnet materials.
[CO-1][L-1]
c) Interpret hybridness to hybrid vehicles. [CO-2][L-1]
d) Write the formula for battery energy and desire run time.
[CO-1][L-3]
e) Enlist the drive cycle are used by other countries.
[CO-1][L-2]
f) Define 'rolling Resistance'.
[CO-2][L-1]
g) State Aero dynamics drags.
[CO-1][L-1]
h) What is meant by hybrid vehicles?
[CO-1][L-1]
i) Enlist source of energy for HEV.
[CO-2][L-1]
j) Highligh the torque coupling.
[CO-2][L-1] 2x10

## PART-A

Q. 2 Select the best possible way of combining the power flow to meet the driving requirement for HEV. Explain with details.
[CO-6][L-6] 20
Q. 3 a) Describe the four mode of operation of Multi Quadrant DC-DC Converters II.
[CO-2][L-2] 10
b) Illustrate the principle of Step-Up Operation for Boost Converter with circuit diagram.
[CO-4][L-4] 10
Q. 4 a) Measure the control parameters of permanent magnet motor drives.
[CO-4][L-6] 10
b) Integrate the techniques to enhance hybrid vehicle performance
[CO-3][L-4] 10

## PART-B

Q. 5 Propose a design principal for Hybrid Electric Vehicles-1(HEV-1).
[CO-4][L-5] 20
Q. 6 a) Evaluate the control parameters by fuzzy logic based control model. How will it enhance the performance of electric and hybrid vehicles?
b) Design a brake system for electric and hybrid electric vehicles.
Q. 7 Design a HEV with a Primer giving details of power requirements, vehicle mass and componenet sizing.

# End Semester Examination, Dec. 2022 

# B. Tech. - Seventh Semester <br> HYBRID AND ELECTRIC VEHICLE (BAU-DS-702) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) Define 'rolling resistance'.
b) Highlights the torque coupling.
[CO-1][L-1]
c) Explain Aero dynamics drags
[CO-1][L-1]
d) Enlist sources of energy for HEV.
[CO-2][L-2]
e) What is meant by hybrid vehicles?
[CO-1][L-1]
f) Enlist the drive cycle used by other countries.
[CO-1][L-1]
g) Why is electromagnetic torque necessary for an electric motor?
[CO-2][L-2]
h) Write the formula for battery energy and desire run time.
[CO-2][L-2]
i) Enlist the permanent magnet materials.
[CO-2][L-1]
j) Interpret hybridness to hybrid vehicles.

$$
[C O-2][L-1] \mathbf{2 \times 1 0}
$$

## PART-A

Q. 2 Select the best possible way of combining the power flow to meet the driving requirement for HEV. Explain with details.
[CO-6] [L-6] 20
Q. 3 a) Describe the four mode of operation of multi quadrant DC-DC converters II.
[CO-2] [L-2] 10
b) Illustrate the principle of step-up operation for boost converter with circuit diagram.
[CO-4] [L-4] 10
Q. 4 a) Analyze the control parameter and configuration of Switched Reluctance motor.
[CO-5] [L-4] 10
b) Integrate the techniques to enhance hybrid vehicle performance. [CO-3] [L-4] $\mathbf{1 0}$

## PART-B

Q. 5 Propose a design principle for Hybrid electric vehicles-1(HEV-1).
[CO-4] [L-5] 20
Q. 6 a) Design a brake system for electric and hybrid electric vehicles. [CO-6] [L-5] 10
b) Examine a regenerative braking system for electric and hybrid electric vehicles. How it will enhance the performance?
[CO-4] [L-4] 10
Q. 7 Explain design of HEVs with details of power requirements, vehicle mass and components sizing.
[CO-6] [L-5] 20

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester

VEHICLE MAINTENANCE (BAU-DS-701/AU-603)
Time: 3 hrs.
Max. Marks:

## 100

No. of
pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) An engine stops working, which type of maintenance we shall consider and why?
[CO-1][L-2]
b) Explain the importance of a Warranty claim settlement form.
[CO-2][L-3]
c) How circlips are inserted in a piston?
[CO-2][L-2]
d) Discuss how the oil galleries are cleaned. [CO-2][L-3]
e) Highlight the ignition timing steps?
[CO-3][L-1]
f) What could be the possible causes of engine starting problem related to fuel supply?
[CO-3][L-2]
g) Why clutch plate and pressure plate replaced in a pair? [CO-4][L-1]
h) Why synchronizer rings are used in a constant mesh gear box?
[CO-5][L-2]
i) Why a particular wheel after puncture needs to be balanced?
[CO-6][L-3]
j) How tyre is retreated or re-manufactured?
[CO-6][L-4] 2x10

## PART-A

Q. 2 a) What are the various workshop documents and records, which a service station needs to maintain.
[CO-1][L-3,4] 10
b) Explain important criteria for a service system layout planning.
[CO-2][L-3] 10
Q. 3 Explain with a neat sketch the following special tools used in a workshop:
a) High pressure car washing machine.
[CO-2][L-3] 10
b) Tyre Changer.
[CO-2][L-3] 10
Q. 4 Why resurfacing of cylinder head is required? Explain step-by-step procedure for resurfacing of cylinder head.
[CO-3][L-4] 20

## PART-B

Q. 5 Examine the various symptom and possible faults in diesel injection system. Discuss about the procedure for testing and cleaning of petrol injectors. [CO-4][L-5] $\mathbf{2 0}$
Q. 6 a) Explain general symptoms and possible faults in manual transmission. [CO-5][L-2] 10
b) How to rectify a clutch hard pedal problem?
[CO-5][L-3] 10
Q. 7 a) What is the significance of brake bleeding? How it is conducted? [CO-6][L-6] $\mathbf{1 0}$
b) What is the requirement of wheel alignment for proper steering geometry?
[CO-6][L-6] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Sixth Semester

## AUTO REFRIGERATION AND AIR CONDITIONING (BAU-DS-641)

Time: 3 hrs.

Max Marks: 100
No. of pages: 3

Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.

Special Instruction:

1. Students are allowed to use blank Psychrometric chart.
2. Students are allowed to use steam tables.
Q. 1 a) Refrigerants are designated as $\mathrm{R}-11, \mathrm{R}-134, \mathrm{R}-729$ and $\mathrm{R}-1150$. Determine their chemical formula.
[CO-1,2] [L-3]
b) What will be the designations of following refrigerants?
i) Water
ii) Carbon dioxide
iii) Air
iv) Ammonia
v) $\mathrm{SO}_{2}$
[CO-1,2] [L-3]
c) Compare the performance of following aircraft refrigeration systems using DART:
i) Simple air refrigeration system
ii) Boot Strap
iii) Boot Strap Evaporative
iv) Regenerative air cooling system
v) Reduced Ambient air
d) Represent the following cycles on a T-S diagram:
i) Boot Strap aircraft refrigeration system
ii) Regenerative air cooling system
e) A refrigerating system works on a vapor-compression cycle. How will the work
output and efficiency of such a system change if its condenser pressure is increased? Discuss the effect with the help of a p-h diagram.
f) Represent the process of heating and humidification on psychrometric chart.
[CO-5] [L-3]
g) What do you understand by the term ventillation Air?
[CO-5] [L-1]
h) What do you understand by the terms "dry bulb temperature" and "wet bulb temperature"?
[CO-4] [L-1]
i) If the volume of moist air with $50 \%$ relative humidity is isothermally reduced to onethird of its original volume then what will be the change in relative humidity of moist air?
j) What is the function of following components in VARS?
i) Absorber.
ii) Generator.

## PART-A

Q. 2 a) In an aircraft refrigeration system, air enters the compressor at $0.1 \mathrm{MPa}, 4^{\circ} \mathrm{C}$ and is compressed to 0.3 MPa , with an isentropic efficiency of $72 \%$. The air is then cooled to $55^{\circ} \mathrm{C}$ at constant pressure and is then expanded in a turbine to 0.1 MPa with an isentropic efficiency of $78 \%$. The lower temperature air absorbs a cooling load of 3TR at a constant pressure before returning to the compressor. Assuming air to be an ideal gas, find:
i) COP.
ii) net power input.
iii) mass flow rate in $\mathrm{kg} / \mathrm{s}$.
[CO-1,2] [L-5] 10
b) Derive an expression for COP for an air refrigeration system working on Reverse

Brayton cycle (Bell Coleman cycle).
Q. 3 a) A regenerative air cooling system is used for an air plane to take 20 tonnes of refrigeration load. The ambient air at pressure 0.8 bar and temperature $10^{\circ} \mathrm{C}$ is
rammed isentropically till the pressure rise to 1.2 bar. The air bled off the main
compressor 4.5bar is cooled by the ram air in the heat exchanger whose effectiveness is $60 \%$. The air from the heat exchanger is further cooled to 60 ${ }^{\circ} \mathrm{C}$ the regenerative heat exchanger with a portion of the air bled after expansion in the
cooling turbine. The cabin is to be maintained at a temperature of $25^{\circ} \mathrm{C}$ and a
pressure of 1 bar. If the isentropic efficiencies of the compressor and turbine are
$90 \%$ and $80 \%$ respectively.
Determine:
i) Mass of the air bled from cooling turbine to be used for regenerative cooling.
ii) Power required for maintaining the cabin at the required condition.
iii) COP of the system.

Assume the temperature of air leaving to atmosphere from the regenerative heat exchanger as $100^{\circ} \mathrm{C}$.
[CO-2,3] [L-5] 12
b) With the help of a neat sketch, describe Boot Strap Evaporative type aircraft refrigeration system. Also represent the cycles on a T-S diagram. $\quad[\mathrm{CO}-2,3][\mathrm{L}-3] 8$
Q. 4 a) In a simple VC cycle following are the properties of refrigerant at various points.

At Compressor inlet, specific enthalpy $=183.2 \mathrm{~kJ} / \mathrm{kg}$, specific volume $=0.0767$ $\mathrm{m} 3 / \mathrm{kg}$

At compressor discharge, specific enthalpy $=222.6 \mathrm{~kJ} / \mathrm{kg}$, specific volume $=0.0614$
$\mathrm{m} 3 / \mathrm{kg}$.
At condenser exit, specific enthalpy $=84.9 \mathrm{~kJ} / \mathrm{kg}$, specific volume $=0.0083$ m3/kg

The swept volume for the compressor is 1.5 L and volumetric efficiency is 80\%.
speed, $\mathrm{N}=1600 \mathrm{rpm}$, find:
i) Power input to compressor in kW .
ii) Refrigeration capacity in kW.
b) Draw vapour compression refrigeration system. Represent the VCRS on T-S and

P-h diagram.

## PART-B

Q. 5 a) Derive an expression for the maximum C.O.P of vapor absorption system.
[CO-4] [L-3] 10
b) The operating temperatures of a single stage vapour absorption refrigeration system
are: generator: $90^{\circ} \mathrm{C}$; condenser and absorber: $40^{\circ} \mathrm{C}$; evaporator: $0^{\circ} \mathrm{C}$. The system has a refrigeration capacity of 100 kW and the heat input to the system

160 kW . The solution pump work is negligible.
i) Find the COP of the system and the total heat rejection rate from the system.
ii) An inventor claims that by improving the design of all the components of the
system he could reduce the heat input to the system to 80 kW while keeping the refrigeration capacity and operating temperatures same as before. Examine the validity of the claim.
[Co-4] [L-5]
Q. 6 a) Moist air with a DBT of 40 CC has a relative humidity of $50 \%$ and atmospheric pressure is bar. The saturation pressure of vapour at 40 oC is 7.38 kPa and saturation pressure of vapour at $150^{\circ} \mathrm{C}$ is 4.758 bar.

Find specific humidity.
Moist air as stated above is compressed to 5.05 bar and its corresponding DBT is $150^{\circ} \mathrm{C}$, then what will be the relative humidity of the compressed air?
[CO-5,6] [L-4] 10
b) Derive an expression for conditioning line equation for mixing of air streams.
[CO-5] [L-3] 10
Q. 7 In an air conditioning space 50 kg dry air per second of fresh air at $45^{\circ} \mathrm{C}$ (DBT) and $30 \% \mathrm{RH}$ is introduced into the room at $25^{\circ} \mathrm{C}$ (DBT) and $50 \% \mathrm{RH} .450 \mathrm{kgda} / \mathrm{s}$ of re-circulated air is mixed with outside air and this mixed air then flows over a cooling coil with ADP of $12^{\circ} \mathrm{C}$ and coil BPF is 0.15 .
Determine the conditions at the outlet of cooling coil, room sensible heat, room latent heat, cooling load of the coil and condensate rate. Use the following table:

| $\mathrm{T}\left({ }^{\circ} \mathrm{C}\right)$ | 12 | 25 | 45 |
| :--- | :--- | :--- | :--- |
| Pvs (bar) | 0.014016 | 0.03166 | 0.09584 |

# End Semester Examination, Dec. 2022 

# B. Tech. - Sixth Semester <br> AUTOMOTIVE COMPONENTS DESIGN (BAU-DS-601) 

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from Part-A and TWO questions from Part-B. Each question carries equal marks.
Q. 1 a) Enlist various types of bearing.
[CO-3] [L-1]
b) What are the desired properties of a good lubricant?
[CO-3] [L-1]
c) Define endurance limit? [CO-1] [L-1]
d) What is meant by spring rate and spring index?
[CO-2] [L-1]
e) Enlist type of stress induced in helical extension spring. [CO-2] [L-1]
f) Define the function of cylinder liner.
g) Explain the functions of piston ring?
[CO-5] [L-2]
h) What are the methods of reducing stress concentration?
[CO-1] [L-1]
i) Define the module and pitch circle diameter of gears.
[CO-4] [L-1]
j) Enlist types of force acting on connecting rod.

## PART-A

Q. 2 a) A circular bar of 500 mm length is supported freely at its two ends. It is acted upon by a central concentrated cyclic load having a minimum value of 20 kN and a maximum value of 50 kN . Determine the diameter of bar by taking a factor of safety of 1.5 , size effect of 0.85 , surface finish factor of 0.9. The material properties of bar is given by: ultimate strength of 650 MPa , yield strength of 500 MPa and endurance strength of 350 MPa .
[CO-1] [L-3] 10
b) Derive the expression for Goodman criteria for combination of stresses under reversal axial loading for ductile materials.
[CO-1] [L-3] 10
Q. 3 a) A line shaft is driven by means of a motor placed vertically below it. The pulley on the line shaft is 1.5 metre in diameter and has belt tensions 5.4 kN and 1.8 kN on the tight side and slack side of the belt respectively. Both these tensions may be assumed to be vertical. If the pulley be overhang from the shaft, the distance of the centre line of the pulley from the centre line of the bearing being 400 mm , find the diameter of the shaft. Assuming maximum allowable shear stress of 42 MPa .
[CO-2] [L-3] 15
b) A helical spring is made from a wire of 6 mm diameter and has outside diameter of 75 mm . If the permissible shear stress is 350 MPa and modulus of rigidity $84 \mathrm{kN} / \mathrm{mm} 2$, find the axial load which the spring can carry and the deflection per active turn.
[CO-2][L-3] 5
Q. 4 The following data is given for a hydrostatic thrust bearing:

Thrust load $=500 \mathrm{kN}$
Shaft speed $=720 \mathrm{rpm}$
Shaft diameter $=500 \mathrm{~mm}$
Recess diameter $=300 \mathrm{~mm}$
Film thickness $=0.15 \mathrm{~mm}$

Viscosity of lubricant $=160$ SUS
Specific gravity $=0.86$

## Calculate:

a) Supply pressure.
b) Flow requirement in liters/min.
c) Power loss in pumping.
d) Frictional power loss.
[CO-3] [L-5] 5×4

## PART-B

Q. 5 A helical cast steel gear with $30^{\circ}$ helix angle has to transmit 35 kW at $1500 \mathrm{r} . \mathrm{p} . \mathrm{m}$. If the gear has 24 teeth, determine the necessary module, pitch diameter and face width for $20^{\circ}$ full depth teeth. The static stress for cast steel may be taken as 56 MPa . The width of face may be taken as 3 times the normal pitch. What would be the end thrust on the gear? The tooth factor for $20^{\circ}$ full depth in volute gear may be taken as $0.154-\left(912 / \mathrm{T}_{\mathrm{E}}\right)$, where TE represents the equivalent number of teeth.
[CO-4] [L-5] 20
Q. 6 Design a cast iron piston for a single acting four stroke engine for the following data:
Cylinder bore $=100 \mathrm{~mm}$; Stroke $=125 \mathrm{~mm}$; Maximum gas pressure $=5 \mathrm{~N} / \mathrm{mm}^{2}$; Indicated mean effective pressure $=0.75 \mathrm{~N} / \mathrm{mm}^{2}$; Mechanical efficiency $=80 \%$; Fuel consumption $=0.15 \mathrm{~kg}$ per brake power per hour ; Higher calorific value of fuel $=42 \times 103 \mathrm{~kJ} / \mathrm{kg}$; Speed $=2000$ r.p.m. Any other data required for the design may be assumed.
[CO-5] [L-5] 20
Q. 7 Determine the dimensions of cross-section of the connecting rod for a diesel engine with the following data:
Cylinder bore $=100 \mathrm{~mm}$ Length of connecting rod $=350 \mathrm{~mm}$ Maximum gas pressure $=4 \mathrm{MPa}$ Factor of safety $=6$

## End Semester Examination, Dec. 2022

## B. Tech. - Fifth Semester <br> AUTO ELECTRICAL AND ELECTRONICS (BAU-DS-501)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) What is the function of an Ignition coil?
[CO-1 L2]
b) What is the significance of Ballast Resistance?
[CO-1 L3]
c) Explain what happens during the charging of a lead-acid battery. [CO-2 L1]
d) Discuss the potential of Silver Zinc batteries usage in Automobiles? [CO-2 L3]
e) Why does Armature Reaction happen?
[CO-3 L3]
f) Discuss how the electronic engine management system works? [CO-4 L3]
g) Illustrate plug fouling in relation to spark plugs.
[CO-5 L4]
h) What is the significance of cable colors?
[CO-5 L4]
i) What is mutual and self-inductance?
[CO-6 L2]
j) What is a wiring harness?

> [CO-6 L3] 2x10

PART-A
Q. 2 Design a wiring diagram of an Automobile Ignition System with a distributor for a four-cylinder petrol engine. Explain each associated component in detail. [CO1L6] 20
Q. 3 An LMV car manufacturer is completing deal for his cars with vendor 1 supplier of Lead Acid Battery and vendor 2 supplier of Nickel-cadmium battery. How will you convince the manufacturer to select the right vendor for LMV as per chemical reactions, physical constructions, P/W ratio etc?
[CO-2L4] 20
Q. 4 Discuss how an alternator differs from a generator. What are the general defects that usually occur in an alternator? Analyze the causes for such defects and recommend suitable remedies.
Q. 5 A vehicle needs to be upgraded to BS6 norms. A manufacturer recommends changes in terms of electronic sensors that should be used. List out different sensors that you recommend to be used in an automobile. Explain the sensor for oxygen concentration and throttle position.
[CO-4][L5] 20
Q. 6 An engine needs to be upgraded to run at more rpm. After thorough research, it was decided to advance the timing as engine rpm increases. What could be the reason for doing so? In addition, with a neat sketch explain what advance mechanism will you recommend and why?
[CO-5L5] 20
Q. 7 Design circuit diagrams for a Electric Horn and Wipers for an automobile. [CO5L6] 20

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester ROCKET PROPULSION (BAE-DS-723)

Time: 3 hrs.
Max Marks: $\mathbf{1 0 0}$
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Define specific impulse and its significance.
[CO-1][L-1]
b) Why Liquid rockets are preferred during take-off of a Launch vehicle.
[CO-1][L-2]
c) State Saint Robert's Law.
[CO-2][L-2]
d) Sketch a Schematic diagram of solid rocket, mentioning its parts.
[CO-2][L-2]
e) What is the requirement of different grain shapes in solid rockets?
[CO-3][[L-2]
f) Enlist few applications of solid rockets.
[CO-3][L-1]
g) Classify liquid propellants based on specific impulse.
[CO-4][L-2]
h) Sketch schematic diagram of a Mono Propellant rocket.
[CO-4][L-2]
i) Define Thrust Vectoring.
[CO-5][L-2]
j) Enlist few advantages of Electric Propulsion.
[CO-6][L-2] 2x10

## PART-A

Q. 2 a) Using necessary assumptions formulate Tsiolkovsky Rocket equation?
[CO-1] [L-3] 10
b) A rocket of total mass 100 Ton, having a payload of 1 Ton. The Engines produce C= $2700 \mathrm{~m} / \mathrm{s}$, Structural Mass is $10 \%$ of total Mass. Estimate the velocity increment for the following cases.
Case 1: Assume a Single Stage Rocket
Case 2: A three Stage rocket in which Propellant Mass and Structural mass are equally shared.
[CO-1] [L-4] 10
Q. 3 a) Write a short note on Buming Mechanism of Composite Propellants. [CO-2 ] [L-3] 10
b) With necessary assumptions derive expression for equilibrium pressure in a solid rocket.
[CO-2] [L-3] 10
Q. 4 The initial burning surface area of a cylindrical propellant grain of outer diameter 300 mm has the configuration of a square hole of dimensions 150 mm . The length of the grain is 400 mm and the grain is inhibited from burning at the ends. If the propellant has a burn rate law given by $a=5 \mathrm{~mm} / \mathrm{s}, \mathrm{n}=0.3$, Determine:
a) Initial equilibrium pressure in the rocket chamber.
b) Maximum Chamber Pressure.
c) Web Thickness.
d) Propellant Sliver.
[CO-3] [L-
4] 20

## PART-B

Q. 5 a) With the help of a neat diagram explain staged combustion cycle. [CO-4] [L-3] $\mathbf{1 0}$
b) Explain with neat sketches different techniques used for achieving Thrust Vector Control.
Q. 6 a) With the help of neat diagram explain types of Injectors used in Liquid Rockets.
b) Write a short note on 'Nozzle cooling techniques'.
b) Write a short note on 'Nozzle cooling techniques'.
Q. 7 a) With the help of a schematic diagram explain the working of Arcjet and Resistojet.
b) Write a short note on VASIMR.

# End Semester Examination, Dec. 2022 

## B. Tech. - Seventh Semester

## BASICS OF COMPUTATIONAL FLUID DYNAMICS (BAE-DS-721/AE827)

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following:
a) Differentiate between Compressible and Incompressible Flow?
b) Estimate Convective and Temporal Acceleration of Fluid Particle
[CO-1] [L-3]
c) What are Hyperbolic and Parabolic Equations?
[CO-2] [L-3]
d) Illustrate Crank Nicolson form of Implicit Scheme
[CO-3] [L-1]
e) Differentiate between K-Epsilon and K-Omega Models

PART-A
Q. 2 Illustrate with the help of a neat sketch continuity equation of fluid flow for a steady and incompressible flow.
[CO-1] [L-4] 20
Q. 3 With necessary assumptions derive Euler's equation for fluid flow motion and also state its importance in flow dynamics.
[CO-2] [L-4] 20
Q. 4 Illustrate first order difference formula using forward differencing, backward Differencing and Central Differencing.
[CO-3] [L-4] 20

## PART-B

Q. 5 Consider a steel rod that is subjected to a temperature of $100^{\circ} \mathrm{C}$ on the left end and $25^{\circ} \mathrm{C}$ on the right end. If the rod is of length 0.05 m , use the explicit method to find the temperature distribution in the rod from Time, $\mathrm{t}=0$ Seconds and $\mathrm{t}=9$ seconds. Use $\Delta x=0.01 \mathrm{~m}, \Delta t=3$ seconds.
Given $\mathrm{k}=54 \mathrm{~W} / \mathrm{m}-\mathrm{k}, \rho=7800 \mathrm{~kg} / \mathrm{m}^{3}, \mathrm{C}=490 \mathrm{~J} / \mathrm{kg}-\mathrm{K}$. The initial temperature of rod is $20^{\circ} \mathrm{C}$.
Q. 6 Illustrate Metrics and Jacobian Transformation using Cramer's Rule.
[CO-5] [L-5] 20
Q. 7 Write short notes on:
a) Eddy Viscosity and Eddy Diffusivity.
b) Mixing Length Model and Reynolds Stress Model.

# End Semester Examination, Dec. 2022 <br> B. Tech. - Sixth Semester AIRCRAFT DESIGN (BAE-DS-601) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 a) What do you understand by "Aircraft Design". Differentiate between "design requirements and "design parameters".
b) List out key design parameters during initial design process.
c) Explain the concept of flight regime and flight envelope listing out important envelopes in use by the aviator/ designer.
d) Briefly explain the concept of airworthiness and its application in civil and military aviation.
e) With suitable sketches, differentiate between the mission profiles for a typical transport and combat aircraft.
$[C O-1,3,4][L-1,5] 4 \times 5$

## PART-A

Q. 2 a) Derive an expression for maximum take-off weight of an aircraft. [CO-1] [L-2] 5
b) Provide with neat sketches different types of wing configurations and relative advantages/disadvantages.
[CO-1] [L-1] 5
c) Analytically analyse (use appropriate equations) the trend in wing loading during take-off and landing.
[CO-1] [L-3] 10
Q. 3 a) Plot the combined V-n diagram for the following acrobatic aircraft and determine its maximum load factors. The required data are given as follows:

- Wing Area $=30 \mathrm{~m}^{2}$
- Mass $=4600 \mathrm{~kg}$
- Cruise Velocity $=400$ knot at $10,000 \mathrm{ft}$
- Aspect Ratio $=8$
- Lift Curve Slope $=7.2$ / radian
- $C_{L \max }=2$ and -1.2
[CO-2] [L-4] 14
b) Briefly explain the Schrenck's curve with necessary equations and sketches.
[CO-2] [L-3] 6
Q. 4 a) With necessary equation, write a short note on wing drag estimation.
[CO-3] [L-3] 10
b) Explain in detail different structural elements of a wing and provide details about how the load is transferred in a wing.
[CO-3] [L-4] 10


## PART-B

Q. 5 a) What are the steps involved in estimating the centre of gravity of an aircraft? During the experiment of aircraft weighing, the load cells readings of nose and main wheel of the under sketched aircraft are $2,322 \mathrm{Kg}$ and $3,540 \mathrm{Kg}$ respectively, estimate the centre of gravity of the given aircraft.

[CO-4] [L-5] 10
b) With neat sketches provide details about wing fuselage jointing methods for high wing configuration?
[CO-4] [L-2] 5
c) Write a short note on "Sandwich Materials"
Q. 6 a) What is oleo pneumatic struct explain with a neat sketch?
[CO-5] [L-2] 5
b) With the help of sketches explain different landing gear configurations with its advantages and disadvantages?
[CO-5] [L-2] 10
c) What is the importance of uplink and downlink in retraction mechanism of landing gears? Justify your answer with neat sketch.
[CO-5] [L-3] 5
Q. 7 a) Explain with the aid of schematic diagram the possible locations of engines and how the centre of gravity affects the pitch rate of an aircraft? [CO-6] [L-4] 10
b) As a designer how can tail of an aircraft be placed for stall control and spin recovery?
[CO-6] [L-3] 5
c) Explain the sizing procedures for horizontal and vertical tail with necessary equations?
[CO-6] [L-2] 5

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester

AIRCRAFT SYSTEMS (BAE-DS-503)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following:
a) Explain the requirement of Flight control systems.
[CO-1][L-1]
b) Differentiate between Push-Pull Rod and cable pulley system.
[CO-1][L-1]
c) Define Pascal's Law and its application in Aircraft. [CO-2][L-2]
d) Classify types of Pneumatic Systems.
[CO-2][L-2]
e) Differentiate between AVGAS and AVTUR.
[CO-3][[L-1]
f) Gravity Feed System are used in High Wing Aircraft. Why?
[CO-3][L-2]
g) Explain the need of Cabin Pressurization.
[CO-4][L-2]
h) List the types of Safety Valves used in Fuselage.
[CO-5][L-2]
i) List the types of Ice formation to be considered.
[CO-6][L-2]
j) What is Chemical Oxygen?
[CO-5][L-2] 2x10

## PART-A

Q. 2 a) Explain the different control surfaces used in Primary and secondary controls for a civil transport and Fighter jets.
[CO-1] [L-3] 10
b) With the aid of neat sketch explain Auto Pilot system used in a modern civil transport aircraft.
[CO-1] [L-
3] 10
Q. 3 Illustrate with neat sketches the operation of a modern Hydraulic system and explain in detail functions of each and every component.
[CO-2] [L-3] 20
Q. 4 a) With the help of a neat sketch explain the working of fuel feed system used in a modern airliner.
[CO-3] [L3] 12
b) Write a short note on Fuel Dumping System.
[CO-3] [L-
3] 8

## PART-B

Q. 5 Explain the Air Conditioning system used in a Modern Airliner with the help of a neat sketch.
[CO-4] [L-3] 20
Q. 6 Explain a typical Oxygen system of your choice used in a modern Airliner. [CO-5] [L-3] 20
Q. 7 a) Explain types of fire detection systems used in a modern airliner. [CO-6] [L3] 10
b) Explain in detail Anti-Icing and De-icing system used in a modern airliner. [CO-6] [L3] 10

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester

## AIRCRAFT STRUCTURES (BAE-DS-502)

Time: 3 hrs.
Max Marks: 100
No. of pages: 2
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following Questions
a) Define 'Neutral Axis'.
[CO-1][L-1]
b) Differentiate between Symmetrical and Unsymmetrical Bending.
[CO-1][L-1]
c) Define 'Slenderness Ratio of a Column'. [CO-2][L-2]
d) Illustrate state of stress in a matrix form.
[CO-3][L-2]
e) State Saint Venant's Principle.
[CO-3][[L-1]
f) Define 'Stress Concentration factor K'.
[CO-3][L-2]
g) Differentiate between Elements and Nodes.
[CO-4][L-2]
h) What is Discretization?
[CO-4][L-2]
i) What is the requirement of idealization of structures?
[CO-5][L-2]
j) Differentiate between statically determinate and Indeterminate structures.
[CO-5][L-2] 2x10

## PART-A

Q. 2 With the help of neat diagram and using necessary assumptions derive the expression for bending stress for an unsymmetrical section also obtain the equation to estimate the inclination of neutral axis.
[CO-1] [L-3] 20
Q. 3 Derive the expression for critical load when a column is fixed at both ends. [CO2][L3] 20
Q. 4 a) Derive equilibrium equations for a 3-dimensional stress system with necessary assumptions.
[CO3]
[L3]
b) State of stress at a point is given as follows:

$$
\begin{array}{lc}
\sigma_{x x}=X^{3} Y Z+X^{2} Y^{2} & T_{x y}=X^{2} Y Z \\
\sigma_{y y}=3 Y^{2} Z+Y Z & T_{y z}=X Y^{2} Z \\
\sigma_{z z}=X^{2} Y^{2} Z^{2}+X Z & T_{x Z}=X Y Z^{2}
\end{array}
$$

Find whether the equilibrium conditions are satisfied or not at points. (3,-4,2)

## PART-B

Q. 5 a) Write a short note on Finite Element Method and its applications.
b) Using necessary assumptions derive stiffness matrix for a one dimensional bar element.
[CO-4]
[L-4] 12
Q. 6 Estimate the shear flow distribution for the idealized section given in the figure. Assume that shear load is applied through the shear centre of the section.
[CO-5] [L-4] 20

Q. 7 Calculate the forces in the members in the truss shown in the figure below. All the members have same cross sectional area and Young's Modulus, E.

[CO-6] [L-3] 20

# End Semester Examination, Dec. 2022 

## B. Tech. - Fifth Semester

GAS DYNAMICS (BAE-DS-501)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following in briefly:
a) Differentiate between 'Supersonic' and 'Hypersonic Flows'.
[CO-1][L-1]
b) Plot the variation of pressure across a C-D Nozzle.
[CO-1][L-1]
c) Define 'Shock wave'.
[CO-2][L-2]
d) How flow properties varies across a Normal shock wave?
[CO-2][L-2]
e) Define 'Shock Polar'.
[CO-3][[L-1]
f) How Expansion Waves are formed?
[CO-3][L-2]
g) Define 'Critical Mach Number'.
[CO-4][L-2]
h) Define 'Drag Divergence Mach Number'.
[CO-4][L-2]
i) Define the 'significance of Transonic Flow'.
[CO-5][L-2]
j) Differentiate between 'Nozzles' and 'Diffusers'.
[CO-6][L-2] 2x10

## PART-A

Q. 2 Derive relation between area and velocity. How the flow can be accelerated from subsonic to supersonic flow regime?
[CO-1][L-
4] 20
Q. 3 Derive Rankine-Hugonoit Equation and explain its significance.
[CO-2] [L-3] 20
Q. 4 Derive $\Theta-\beta-M$ relations for Oblique shock waves with necessary assumptions.
[CO-3][L-4] 20

## PART-B

Q. 5 a) Write a Short note on Whitcomb's Area Rule.
b) Derive Velocity potential equation for subsonic compressible flow over an airfoil.
[CO-4][L-
3] 10
Q. 6 Using small perturbation theory estimate drag for a Supersonic Airfoil.
[CO5] [L4] 20
Q. 7 a) Write a short note on 'Supersonic Nozzle design'.
b) Using Taylor's Series of Expansion illustrate finite difference technique in forward difference

# End Semester Examination, Dec. 2022 

B. Tech. - Third Semester

BASICS OF AERONAUTICAL ENGINEERING (BAE-DS-301)
Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Each question carries equal marks.
Q. 1 Answer the following in briefly:
a) State the working principle of an Aerostat. [CO-1][L-1]
b) Differentiate between 'Aircraft' and 'Spacecraft'. [CO-1][L-2]
c) Differentiate between 'Geometric' and 'Geopotential Altitude'. [CO-2][L-2]
d) Enlist any four High Lift devices. [CO-2][L-2]
e) Why staging of rockets is required? [CO-3][L-2]
f) Define 'Propellants'.
g) Differentiate between 'Elasticity' and 'Plasticity'. [CO-4][L-2]
h) Which are the common parts of an aircraft where composites are used?
i) Explain functions of Gyroscope for an aircraft.
j) Which are the primary flight control surfaces of an Aircraft?

## PART-A

Q. 2 a) Explain classification of Aircraft.
[CO-1] [L-3] 10
b) Write a brief note on Launch Vehicle.
Q. 3 a) Illustrate the importance of Hydrostatic equation in Aerodynamics. [CO-2] [L-3] $\mathbf{1 0}$
b) What is requirement of International standard atmosphere? Derive equation for Temperature ratio for Gradient Layer.
[CO-2] [L-4] 10
Q. 4 a) Using neat sketches explain the working of a Turbofan Engine
[CO-3] [L-3] 10
b) Explain the working of Liquid Rocket with the help of a neat Sketch. [CO-3] [L-3] 10

## PART-B

Q. 5 Explain the construction of V-n Diagram and also explain its significance. [CO4][L-3] 20
Q. 6 Explain the working of Air Speed Indicator and Altimeter with neat diagram.
[CO-5] [L-3] 20
Q. 7 Explain the operation of a typical Hydraulic System with the help of a Layout.
[CO-6] [L-3] 20

# End Semester Examination, Dec. 2022 

# B. Tech. - Seventh Semester <br> BIG DATA ANALYTICS (BCS-DS-730) 

Time: 3 hrs.
Max Marks: 100
No. of pages: 1
Note: Attempt FIVE questions in all; Q. 1 is compulsory. Attempt any TWO questions from PART-A and TWO questions from PART-B. Marks are indicated against each question.
Q. 1 Answer the following questions:
a) Which Apache system deals with ingesting streaming data to Hadoop. Also, discuss its functionality.
b) List out any two characteristics of stream processing language.
c) Explain the importance of Rack Awareness.
d) Differentiate between SQL and NoSQL Database.
e) What is a column-oriented database and which column-oriented runs on top of HDFS?
f) What is the purpose of Zookeeper in the Hadoop ecosystem?
g) What does commodity Hardware in the Hadoop world mean?
h) Illustrate the significance of partition in Hive.
i) List out any four data analysis tools used in Business Intelligence.
j) Discuss the key aspects of YARN.

## PART-A

Q. 2 a) Discuss the five ' $V$ ' that contribute to the efficiency of Big Data Analytics. Also, discuss the various benefits and drawbacks of Big Data.
[CO-1] [L-2] 10
b) Acknowledge the effectiveness of the Big Data life cycle in weather forecasting.
[CO-1] [L-2] 10
Q. 3 a) Illustrate the functionality of Map Reduce. Write a program to count the number of distinct elements in a Data-stream.
b) Extend examples to demonstrate the importance of HDFS and its subsequent components in Big Data Analytics.
[CO-3] [L3] 10
Q. 4 a) In Jaql, what does lazy evaluation imply? Describe how the sort and the join operators help in big data handling.
[CO-4] [L-2] 10
b) Demonstrate the roles of Hive and Pig. Create a program that performs statewise temperature analysis to demonstrate the difference between Hive and Pig.
[CO-4] [L-4] 10

## PART-B

Q. 5 a) Emphasize the purpose of data analysis and reporting in business and how "Live Exploration", "Direct Batch Reporting", and "Indirect Batch Direct Reporting" play an important role in data analysis and reporting. [CO-5] [L-3] 10
b) Mention all of R's limitations and explain how Big R overcomes them.
Q. 6 a) Stream Operators cannot be deployed to an instance; discuss how Processing Elements (PEs) overcome this limitation in this view. Also, discuss the steps required for the Stream Processing Language to work. [CO-6] [L-2] 10
b) Summarize the importance of Adaptor, Utility, and Relational operators in Stream Processing Language. Also, provide appropriate examples. [CO-6] [L-3] 10
Q. 7 a) Demonstrate the importance of Windowing. Mention the various policies that were implemented during windowing.
[CO-6] [L-3] 10
b) Show the effectiveness of the debugger, job scheduler, and aggregator in stream processing.


[^0]:    b) What are carbon nanotubes? Describe two methods for fabrication of carbon nanotubes.
    c) Discuss the applications of nanomaterials.

