B. Tech. – Second Semester APPLIED PHYSICS-II (PH-201A)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

2×10

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 2d $\sin\theta = n\lambda$. 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?

<u>PART-A</u>

- 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 Å. Determine the spacing of planes having Miller indices as (222).
- Q.3 a) Derive an expression for Hall coefficient. The carrier concentration in n-type semiconductor is 10²¹per m³.Calculate the value of Hall coefficient. **10**
 - 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. **10**

- Q.5a) Discuss in brief the diamagnetic materials and derive an expression for magnetic
dipole moment of an atom.**10**
 - 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. **12**
- Q.7a) 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

B. Tech. – Second Semester 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? **2×10**

PART-A

Q.2	a) b) c)	Derive an expression for interplanar spacing between two parallel planes in a simple cubic crystal. What are defects in crystals? Explain types of point defects. Derive Bragg's law for X-ray diffraction. Why X-rays are used to detect crystal structure?	
Q.3	a) b)	What is Hall effect? Derive an expression for Hall coefficient.10Discuss any two of the following process for crystal growth.10i) Czochralski method10)

- 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

<u>PART-B</u>

- 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. 20
- 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.
 10
- Q.7 a) What are nanomaterials? Discuss the different approaches in building nanomaterials.
 - b) What are carbon nanotubes? Describe two methods for fabrication of carbon nanotubes.
 10
 - c) Discuss the applications of nanomaterials.

6

4

B. Tech. – Second Semester 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?

2×10

<u>PART-A</u>

- Q.2 a) What is hcp structure? Show that c/a ratio for an ideal hcp structure is $\sqrt{\frac{8}{3}}$. **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.

. .

6

- 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

6

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

c) What are antiferromagnetic materials and ferromagnetic materials?

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

M. Sc. (Microbiology) – Third Semester **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'.

[CO1-6, L2] **2x10**

<u>PART-A</u>

- 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**

<u>PART-B</u>

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 M.Sc. – Third Semester 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.	[CO-3] [L-1]
g)	List the public health concern disease of India.	[CO-3] [L-1]
h)	Compare two mode of virus entry into the host.	[CO-2] [L-5]
i)	Explain the invasion mechanisms.	[CO-1] [L-2]
j)	Define Host-pathogen interactions.	[CO-1] [L-1] 2x10

<u>PART-A</u>

Q.2	Compare the different bacterial pathogenesis mechanisms which bacter the host cell.	ia use to infect [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 in host cells.	teract with the [CO-1] [L-4] 20
	<u>PARI-B</u>	
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.7a) Illustrate the viral pathogenesis.[CO-2] [L-2] 10b) Discuss the host immune response.[CO-2] [L-6] 10

M. Sc. (Microbiology) - Third Semester 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.
 - 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] [CO-1] [L-1]
 - d) Differentiate between mycelium and Hyphae.
 - e) Enlist the difference between toxin and toxoids.
 - f) Determine the characteristics of MRSA.
 - q) Enlist the ways by which bacteria become resistant to antibiotics.
 - h) Illustrate the precaution from the collection of patient's samples to the diagnostic lab. [CO-5] [L-4] [CO-3] [L-2]
 - i) Describe toxoid vaccine.
 - 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

- a) Discuss the names of skin microbiota and the importance of normal bacterial and Q.2 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**
- Discuss in detail about Prions. Describe its types and the disease caused by it. Q.3

[CO-1] [L-5] **20**

[CO-1] [L-1]

[CO-2] [L-1]

[CO-2] [L-3]

[CO-2] [L-1]

UNIT-II

a) Discuss the factors that influence the effectiveness of antimicrobial drugs. Q.4

[CO-2] [L-3] **10**

[CO-3] [L-2] **5x4**

- b) Illustrate the mechanism of action and the therapeutic use of tetracycline. [CO-2] [L-4] **10**
- Describe on the strategy for laboratory diagnosis for bacterial, fungal and viral Q.5 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.
- Evaluate different strategies for designing of vaccine. Discuss the types of vaccine Q.7 available for covid -19 virus. [CO-3] [L-5] **20**

M. Sc. (Microbiology) - Third Semester

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]
 - [CO-1] [L-3] c) How gram-positive cell wall is different from gram negative cell wall?
 - d) Differentiate between mycelium and Hyphae.
 - e) Enlist the difference between toxin and toxoids.
 - f) Determine the characteristics of MRSA.
 - q) Enlist the ways by which bacteria become resistant to antibiotics.
 - h) Illustrate the precaution from the collection of patient's samples to the diagnostic lab. [CO-5] [L-4] [CO-3] [L-2]
 - i) Describe toxoid vaccine.
 - i) Summarize the safety factors concern that is associated with attenuated vaccine. Give an example of attenuated vaccine. [CO-3] [L-5] 2x10

UNIT-I

- a) Discuss the names of skin microbiota and the importance of normal bacterial and 0.2 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**

[CO-1] [L-1]

[CO-2] [L-1]

[CO-2] [L-3]

[CO-2] [L-1]

UNIT-II

a) Discuss the factors that influence the effectiveness of antimicrobial drugs. Q.4

[CO-2] [L-3] **10**

b) Illustrate the mechanism of action and the therapeutic use of tetracycline.

[CO-2] [L-4] 10

Describe on the strategy for laboratory diagnosis for bacterial, fungal and viral Q.5 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**

M.Sc. (Microbiology) - First Semester CLINICAL BIOCHEMISTRY (MS-MB-101)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-3] [L-3]

[CO-3] [L-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) Describe the properties of water that account for its surface tension, viscosity, liquid
 - state at ambient temperature and solvent power. [CO-1] [L-2] [CO-2] [L-3]
 - b) Maltose is a reducing sugar. Explain.
 - c) How does ATP hydrolysis help thermodynamically unfavourable reactions?
 - d) TCA cycle is known as the metabolic hub, why?
 - 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] [CO-6] [L-2] 2×10
- i) Briefly describe two disorders of lipid metabolism.

PART-A

Determine the pH of the buffer solution when the buffer solution is made from 0.4M Q.2 CH₃COOH and 0.6M CH₃COO⁻? The acid dissociation constant of CH₃COOH is 1.8×10⁻

[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**

- Analyze the process of cellular respiration with the help of diagrams. Q.5 [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**
- Ammonia is a highly toxic by-product of metabolism. Describe the mechanism by Q.7 which it is produced and removed by humans. [CO-6] [L-2] 20

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.
 - 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.
 - e) Summarize the functions of stem cell banking.
 - f) Evaluate the conditions for the activation of notch signaling pathway. [CO-4] [L-5] [CO-5] [L-5]
 - g) Enlist the applications of stem cell therapy.

i) Enlist different types of diabetes.

- 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]

[CO-1] [L-1]

[CO-2] [L-3]

[CO-5] [L-2]

[CO-6] [L-1] 2x10

UNIT-I

- a) Illustrate the stem cell niche environment and its impact on cell differentiation. Q.2
 - [CO-1] [L-4] **10**
 - b) State about the miRNA and explain its function in the stem cell differentiation.

[CO-1] [L-1] **10**

- a) Discuss the epigenetic regulation of chromatin which are important for Q.3 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 [CO-4] [L-3] **15** impact in the formation of cancer stem cells.
 - 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**

a) Evaluate different sources of stem cells and consideration factors the use of stem Q.7 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. [CO-6] [L-2] ${\bf 10}$

M.Sc. (Biotechnology and Microbiology) – Third Semester 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.
 - 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]

[CO2] [L1]

[CO2] [L4]

- d) Protein purification is normally carried out at temperatures near 0°C. Why?
- e) How can one inactivate the degradative enzymes that pose a threat to purified protein?
- f) What are Coupled enzymatic reactions?
- g) Differentiate between salting in and salting out.
- 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] **2x10**

<u>PART-A</u>

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



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] **20**



Q.4 The figure below shows the Ramachandran Plots of protein X for general (all amino acids), amino acid 1 and 2.0bserve 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?





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?



[[]CO6] [L5] **20**

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? [CO4] [L6] 20
- 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**

M. Sc. (Biotechnology) – Third Semester 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:

		2x10
j)	Define feedback inhibition of enzyme activity.	[CO-6] [L-6]
i)	Describe the physical and chemical properties of enzymes.	[CO-4] [L-5]
h)	What are nutraceuticals? Give examples of any four nutraceuticals.	[CO-4] [L-4]
g)	List four factors affecting food spoilage.	[CO-5] [L-5]
		[CO-5] [L-5]
f)	Write a short note on the utilization of food waste for the production of	valuables.
e)	Name any two microbes production amylase.	[CO-3] [L-3]
d)	Describe the lock and key mechanism of enzyme actions.	[CO-3] [L-1]
c)	Draw Lineweaver Burk Plot.	[CO-2] [L-1]
b)	What are artificial enzymes?	[CO-4] [L-1]
a)	List two methods of detecting food-born microorganisms.	[CO-1] [L-1]

<u>PART-A</u>

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 preserva	tion. [CO-3] [L-2] 20

Q.4 Write a detailed note about fermented food products. [CO-3] [L-4] **20**

<u>PART-B</u>

- Q.5 Explain various classes of enzymes.
- Q.6 Describe the various application of catalase, oxidase, amylase and protease in food industry. [CO-4] [L-2] **20**
- Q.7a) 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**

[CO-1] [L-2] **20**

M.Sc. – Third Semester **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] [I	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	L-1]
e)	What is Oilzapper Technology?	[CO-2] [l	L-1]
f)	What are the risks associated with genetically modified organisms (GMC)s)?	
		[CO-2] [l	L-1]
g)	Enlist various problems arising from overexploitation of natural resource	s.	
		[CO-2] [l	L-1]
h)	What do you mean by environmental site assessment?	[CO-4] [I	L-1]
i)	Discuss the threats to biodiversity.	[CO-2] [l	L-1]
j)	Classify the indicators of sustainable development.	[CO-6] [I	L-2]
		2	x10

PART-A

. . ..

Q.2	a) What are the main water quality parameters? Why is it important quality?b) Describe the process and operation of a trickling filter bioreactor.	to test water [CO-1] [L-2] 15 [CO-3] [L-1] 5
Q.3	What are bioreactors? Describe the different methods used for tertiary treatment.	y waste water [CO-2] [L-1] 20
Q.4	a) Explain the possible mechanisms of metal-microbe interactions.b) Summarize the various toxic influences of metals on microbial cell.	[CO-4] [L-2] 10 [CO-4] [L-2] 10
	<u>PART-B</u>	
Q.5	a) Describe the concepts and principles of bioremediation using microb constraints.b) Explain the in situ technologies for Bioremediation.	es. Discuss its [CO-3] [L-3] 10 [CO-5] [L-2] 10
0.6	a) What are hyperaccumulators? Discuss their role in Phytoremediation.	
	b) What are protected areas? Differentiate between in situ and ex situ of Biodiversity.	[CO-5] [L-1] 10 u conservation [CO-4] [L-2] 10
Q.7	a) How biopiracy is different from bioprospecting? Explain with suitableb) Compare the different models of sustainable development.	examples. [CO-5] [L-3] 10 [CO-6] [L-4] 10

M.Sc. (Biotechnology) and M. Sc (Microbiology) - Third Semester **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]
 2x10

<u>UNIT-I</u>

Q.2	a) Summarize the method of protoplast isolation from plant tissue.b) Evaluate the factors affecting embryo culture.	[CO-1] [L-4] 10 [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**
 - <u>UNIT-II</u>

Q.4	a) Demonstrate the structure of Ti plasmid of Agro bacterium tu	mefaciens.
		[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**

[CO-5] [L-6] **10x2**

<u>UNIT-III</u>

- Q.6 Discuss transgenic strategies to introduce in plants
 - a) Insect resistance.
 - b) Herbicide resistance.
- 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**

M. Sc. – Second Semester BIOPROCESS TECHNOLOGY (MS-BT-202)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

2×10

- 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?

<u>PART-A</u>

- 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**

<u>PART-B</u>

- 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**

M.Sc. – First Semester 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?

[CO1] [L2]

j) For mutually exclusive outcomes, the sum of probability is_____?

[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

[CO3] [L5] **20**

Q.4 The following are the cystatin C levels (mg/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 (mg/L)	Creatining	e (mmol/L)
1.78	4,69	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			

[CO4] [L5] **20**

<u>PART-B</u>

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:

	Qua			
Score	Poor (P)	Average (A)	Superior (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:

	Alzhein	ner's Diagi	nosis?
Test Result	Yes (D)	No (D)	Total
Positive (T)	436	5	441
Negative (\overline{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.

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

[CO3] [L6] **20**

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	

M. Sc. – First Semester

BIOANALYTICAL TECHNIQUES (MS-BT-104)

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 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. 2×10

<u>UNIT-I</u>

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 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**

<u>UNIT-II</u>

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**

<u>UNIT-III</u>

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**

M.Sc. Biotechnology – First Semester **BIOMOLECULES (MS-BT-103)**

Time: 3 hrs.

Max Marks: **100** *No. of pages: 1*

[CO-3] [L-2]

[CO-4] [L-1]

[CO-5] [L-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) Describe the condition under which a buffer is most effective. [CO-1] [L-2]
 - b) State the second law of thermodynamics.
 - 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 Cd²⁺ and Hg²⁺ 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.
 - i) Summarize the significance of glycolysis.
 - 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**

- 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.

2×10

<u>PART-A</u>

- 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**

<u>PART-B</u>

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 M. Sc. – First Semester 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?

2×10

<u>PART-A</u>

- 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**

- Q.5Explain 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 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] **4×5**

<u>PART-A</u>

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**

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Γ

Q.4 Enumerate the important factors to be kept in consideration while designing a supply chain.

- 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**

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'. [CO-3] [L-4] d) Discuss 'innovation'. [CO-1] [L-2] e) Discuss 'sound plan'. [CO-5] [L-3] f) Define 'perception'. [CO-6] [L-4] g) Compare the management of American, Japanese and Indian. [CO-3] [L-3] h) Discuss 'decision tree'. [CO-2] [L-5] i) What are the major principles of organization? [CO-6] [L-4] j) Briefly discuss nature and scope of management. [CO-5] [L-5] 2×10

<u>PART-A</u>

- 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? [CO-2,3] [L-4] **20**

<u>PART-B</u>

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.b) Interpret: conflict management.	[CO-3,5] [L-4] 10 [CO-3,5] [L,3] 10
Q.7	a) Discuss factors that favor incremental innovation.b) Define and differentiate between creativity and innovation.	[CO-1,6] [L-2] 10 [CO-1,6] [L-3] 10

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.
 2×10

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	
								20)

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	416	184	600
Not using fertilizers	64	336	400
Total	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 χ^2 for one degree of freedom=3.84). **20**

Q.4 Two random samples were drawn from two normal populations and their values are:

Sample A:	66	6	7 75	76	82	84	88	90	92			
Sample B:	64	6	6 74	78	82	85	87	92	93	95	97	
Test whether	the	two i	nonulatio	ns have	the	same	variance	at	the 5%	, lev	el of	

Test whether the two populations have the same variance at the 5% level of significance. (F=3.36 at 5% level for v1=10 and v2=8) 20

<u>PART-B</u>

Q.5 Explain briefly the various methods of determining trend in a time series. Explain the merits and demerits of each method.
 20

Q.6	Describe the term 'Forecasting'. Explain various types of forecasting in detail.	20
Q.7	Write short notes on:	
	a) Moving average (MA) model. b) Chain rule of forecasting.	10×2

End Semester Examination, Dec. 2022 M. Tech. – First Semester WORK STUDY AND ERGONOMICS (MME-101)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-1] [L-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?
 - 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] **4×5**

<u>PART-A</u>

- 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**

<u>PART-B</u>

- 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.

[L-4][CO-5] **4×5**

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'.

in India.

- 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.

<u>PART-A</u>

- 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**

2x10

<u>PART-B</u>

- 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

[

M. Tech. – First Semester RESEARCH METHODOLOGY AND IPR (M-MC-100)

Time: 2 hrs.

Max Marks: 50

[CO-2] [L-2]

[CO-3] [L-2]

[CO-5] [L-3]

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.
 - 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.
 - d) Why are patents necessary?
 - e) "IPR is an instrument of development" give at least two points to justify this.

[CO-4] [L-3] **2×5**

<u>PART-A</u>

- 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] **5×2**
- Q.4 Discuss problems encountered by researchers in India. [CO-1] [L-4] **10**

- 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**

M. Tech. – First Semester DISASTER MANAGEMENT (M-MC-003)

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 <i>any two</i> 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. 	[CO-1] [L-2] [CO-5] [L-2] [CO-3] [L-1] [CO-2] [L-1] 5×2
	<u>PART-A</u>	
Q.2	Elaborate the man-made disasters with their causes.	[CO-6] [L-2] 10
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
	<u>PART-B</u>	
Q.5	How would you determine risk with the help of remote sensing?	[CO-3] [L-5] 10
Q.6	Discuss the concept of Community-Based Disaster Management (CBDN	1) in detail. [CO-4] [L-2] 10
Q.7	Analyze the programs of disaster mitigation in India.	[CO-5] [L-4] 10
M. Tech. – First Semester DISASTER MANAGEMENT (M-MC-003)

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:

 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.	(CO-2) (L-1)
, C	2 ¹ /2×4

<u>PART-A</u>

Q.2	Elaborate the natural disasters with their causes.	(CO-6) (L-2) 10
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) 10

<u>PART-B</u>

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) 10
Q.7	Summarize the emerging trends in disaster mitigation.	(CO-2) (L-2) 10

End Semester Examination, Dec. 2022 M. Tech. – First Semester STRESS MANAGEMENT BY YOGA (M-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**. Marks are indicated against each question.
- Q.1 What is Ashtang yoga? What are the different types of Asthang yog? Explain each briefly. **10**

<u>PART-A</u>

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
	<u>PART-B</u>	
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

B. Tech. (Industry Integrated) - Seventh semester QUALITY ENGINEERING (MII-704)

Time: 3 hrs.

Note:	Attempt FIVE questions in all; Q.1 is compulsory . Attempt any TWO questions from PART-B . Marks are indicated a question.	<i>lestions from</i> against each
Q1.	 Answer the following in briefly: a) Define 'Fish bone diagram'. b) Write down the dimensions of quality. c) Define 'Probability'. d) Write down various symbols used in flow chart & their significance. e) Define 'Pareto Chart'. f) Define 'MTTF'. g) Define 'Acceptance sampling'. h) Define 'TQM'. i) Draw Maslow's Hierarchy of Needs. j) Write down 6 C's of Total quality Management. 	{L1} {L2} {L1} {L2} {L1} {L2} {L1} {L2} {L1} {L2} {L1} {L2} 2x10
	<u>PART-A</u>	
Q.2	Discuss Statistical Quality Control and 7 QC tools.	{L1, L3} 20
Q.3	Explain Sampling Inspection process, its advantages and imitations.	{L3,L5} 20
Q.4	Discuss various statistical tools in quality Control.	{L2, L6} 20
Q.5	<u>PART-B</u> Discuss failure Mode and effect analysis in detail, along with its procedu with examples.	ure, benefits {L5, L6} 20

- Q.6 Discuss Quality circle and its role in meeting individual needs. {L3, L4} **20**
- Q.7 Discuss Generic Strategy Model for Implementing TQM Systems. {L4, L5} 20

Max Marks: **100** *No. of pages: 1*

B.Tech. (Industry Integrated) - Seventh Semester SURFACE ENGINEERING (MII-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 questions:	
	a) Define Lays and flaws in surface structures.	{L1}
	b) Define 'induction hardening'.	{L2}
	c) Define 'cyaniding process'.	{L1}
	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'.	{L1}
	i) Define 'Alkaline Cleaning'.	{L1}
	j) Name some chemical cleaning processes.	{L2} 2x10
	<u>PART-A</u>	
Q.2	Explain Diffusion coating process.	{L2, L3, L4} 20
Q.3	Explain Carburizing process and its advantages.	{L3, L4} 20
Q.4	Explain Electroless plating process, its characteristics, properties and	d applications. {L5, L6} 20
	<u>PART-B</u>	

- Q.5Explain Metal Flame spray coating process.{L3, L4}20
- Q.6 Explain Laser beam hardening technique and its process parameter. {L2, L5} 20
- Q.7 What are the methods for tool coatings, explain Diamond coating and its advantages? {L3, L4, L5} ${\bf 20}$

B.Tech. (Industry Integrated) - Seventh Semester SURFACE ENGINEERING (MII-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 questions:	
	a) Define Lays and flaws in surface structures.	{L1}
	b) Define 'induction hardening'.	{L2}
	c) Define 'cyaniding process'.	{L1}
	 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'.	{L1}
	i) Define 'Alkaline Cleaning'.	{L1}
	j) Name some chemical cleaning processes.	{L2} 2x10
	<u>PART-A</u>	
Q.2	Explain Diffusion coating process.	{L2, L3, L4} 20
Q.3	Explain Carburizing process and its advantages.	{L3, L4} 20
Q.4	Explain Electroless plating process, its characteristics, properties and	d applications. {L5, L6} 20
	<u>PART-B</u>	

- Q.5Explain Metal Flame spray coating process.{L3, L4}20
- Q.6 Explain Laser beam hardening technique and its process parameter. {L2, L5} 20
- Q.7 What are the methods for tool coatings, explain Diamond coating and its advantages? {L3, L4, L5} ${\bf 20}$

B-Tech. (Industry Integrated) - Seventh semester **PRESS TOOLS-II (MII-702)**

Time: 3 hrs.

Note:	Attempt FIVE questions in all; Q.1 is compulsory . Attempt any TWO question PART-A and TWO questions from PART-B . Marks are indicated agains question.	ns from st each
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 	g:
	 iii) Neither of the two b) Identify single action draw tool: i) Die Block up – punch down 	{CO1.L1}
	 ii) Punch up – Die Block down iii) Neither of the two c) The maximum allowable percent reduction in third draw tool: 	{CO1.L1}
	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 c) If the finish of chaot is too smooth it can lead to following problem: 	{CO2.L2}
	i) crack ii) Wrinkle iii) spring back	{CO2.L2}
	f) In Erichsen test, the punch keeps travelling down until the following happe	ens:
	 i) sheet gets clamped ii) Sheet gets drawn iii) sheet cracks g) In ironing operation, choose the correct condition: i) Part thickness decreases ii) Part thickness does not change 	{CO3.L1}
	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:	((()))
	 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.L 	1} 2x10
	<u>PART-A</u>	
		_

- Q.2a) Make the diagram of a single action Draw tool and explain in detail.{CO1.L1} 10b) 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.L220

<u>PART-B</u>

Max Marks: **100** *No. of pages: 2*

Q.5	a) Draw the diagram of downward restriking tool.b) Explain the design principles of a restriking tool.	{CO4.L1} 10 {CO4.L1} 10
Q.6	a) Explain the purpose of an angular Cam tool with diagram.	{CO5.L1} 10

- b) Describe a horizontal cam with the help of a diagram. {CO5.L1} **10**
- Q.7 Describe the sequence of operations with brief explanation of the manufacturing of press tools. {CO6.L1} **20**

B-Tech. (Industry Integrated) - Seventh semester **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.

	DADT A	
	j) Define 'Path and trajectory'.	{L1} 2x10
	 Define 'Cartesian space trajectory planning'. 	{L1}
	h) Define 'Optic sensors'.	{L2}
	g) What are safety sensors?	{L1}
	f) Differentiate between the 'sensor' and 'transducer'.	{L2}
	e) Explain the function of a piezoelectric sensor.	{L1}
	d) Give some examples of tool as robot end effector.	{L2}
	c) What is a mechanical gripper?	{L1}
	b) Sketch a robot and name its parts.	{L2}
	a) Define 'Laws of Robotics'.	{L1}
Q.1	Answer the following in briefly:	

<u> PAKI-A</u>

Q.2	Describe the evolution of Robots and robotics.	{L2, L4} 20
Q.3	Discuss application of robots in Material Handling.	{L3, L5} 20
Q.4	Explain Industrial applications of robots.	{L4, L6} 20

PART-B

- Describe the classification of sensors and the factors to be considered for its selection. Q.5 {L2, L3, L5} **20**
- Q.6 Explain various steps in Trajectory Planning. {L3, L4} 20
- Explain architecture of robotic vision system along with stationary and moving Q.7 camera. {L3, L5} **20**

M. Tech. – Third Semester **OPERATIONS RESEARCH (M-ID-003)**

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

(CO-4) (L-3)

(CO-1) (L-3) 8

- 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.
 - c) Differentiate between slack and surplus variables in Linear Programming Problems. (CO-2) (L-2)
 - d) The expected time (t_e) of a PERT activity in terms of optimistic time (t_o), pessimistic time (t_p) and most likely time (t_l) is given by _____. (CO-1) (L-2) (CO-3) (L-1)
 - e) Discuss the elementary graph theory in short.
 - 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) 2x10

PART-A

- 0.2 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.
- Q.3 Use the Big M method to solve the following problem:

$z = -2x_1 - 3x_2$	
$x_1 + x_2 \ge 2$	
$2x_1 + x_2 \le 10$	
x ₁ + x ₂ <u><</u> 8	
x₁ ≥ 0; x₂ ≥ 0	(CO-2,3) (L-4) 20
	$z = -2x_1 - 3x_2$ $x_1 + x_2 \ge 2$ $2x_1 + x_2 \le 10$ $x_1 + x_2 \le 8$ $x_1 \ge 0; x_2 \ge 0$

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

Activity (i – 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

- 8
- 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

<u>PART-B</u>

- 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

10

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	1	2	3	4	5	6
Turning	3	12	5	2	9	11
Threading	ß	б.	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 $A+B+C \ge 15$ and $\forall A, B and C \ge 0$.

OR

(CO-4) (L-5) **20**

Solve the Game through Graphical Method whose pay off matrix is:

		В		
		II	II	IV
A	(X1) I	3	-3	7
	(X2) II	5	4	-6

(CO-4) (L-5) 20

M.TECH. - Third Semester

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** [CO-3] [L-4] **10**
 - b) Describe the importance of Business Analysis.
- 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**
- a) Consider the vector "x" with the values {4, 4, 5, 6, 7, 2, 9}.Calculate the mean, Q.3 sum, max, min, variance of the vector 'x". [CO-4] [L-4] **10** [CO-2] [L-2] 10

b) Find a Linear Regression equation for the following dataset

x	2	4	6	8
У	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

				Operatio			Total Cu	AcqCostP	BasketSiz	ProfitPer	OwnStor	CiniinePr		StoruSog
StoreCod	Storehame	StoreType	Location	gCost	Staff Cnt	TotalSales	stomers	ercust		cust		esence	Tenure	ment
STR101	Electronics Zone	Electronincs	Delhi	21	60	160	110	3.9	2.62	16.45	0	1	4	4
STR102	Apparel Zone	Apparel	Deihi	21	60	160	110	3.9	2.875	17.02	D	1	4	4
STR103	Super Bazar	Super Markot	Delhi	22.8	40	108	98	3.85	2.32	18.61	1	1	4	1
STR104	Super Market	Super Market	Deihi	21.4	60	258	110	1.04	3,215	19.44	1		3	1
STR105	Central Store	Super Markat	Delhi	18.7	80	360	175	3.13	3.44	17.02	0		3	2
STR106	Apparel Zone	Apparel	Delhi	18.1	60	225	105	2.76	3.46	20.22	19	.0	3	1
STR107	Fashion Bazar	Apparel	Delhi	14.3	80	360	245	3.21	3.57	13.84	D	4	з	4
STR108	Digital Bazar	Electronincs	Delhi	24.4	40	146.7	62	3.63	3.19	20	1	0	4	2
STR109	Electronics Zone	Electronincs	Chennal	22.8	40	140.8	95	3.92	3.15	72.9	1	0	4	2
STR110	Apparel Zone	Apparel	Chennai	19.2	60	167.5	123	3.92	3.44	18.3	1		4	4
STRILL	Super Bater	Super Market	Chennai	17.8	60	167.5	123	3.92	3.44	18.9	i	0	4	4

Q.5 Elaborate various forecasting techniques with suitable examples.

The sales of a n	nagazine in a stall fo	or the previous 10 mo	nths are give	en below.
Month	-	Sales	-	
Jan		30		
Feb		25		
March		35		
April		25		
Mav		20		
June		30		
Julv		35		
August		40		
September		30		
October		45		
Calculate the sir	mple exponential sm	noothing taking $g = 0.3$	3 for the abo	ove data.
	······································			[CO-2] [L-3] 20
a) Explain the rb) Create a DecInformation	ole of Information (cision Tree for the fo gain.	Gain in Decision Trees ollowing data having 3	3 features ar	[CO-5] [L-4] 10 nd 2 classes using [CO-5] [L-4] 10
х	Y	Z	С	
1	1	1	Ι	
1	1	0	Ι	

	0 1	0 0	1 0	II II	[[
Q.7	a) Describe Em b) What do yo analysis?	bedded business int ou mean by Data	elligence. Quality? How	quality of dat	a is	[CO-1] [L-2] 10 ensured during [CO-1] [L-2] 10
Q.8	Explain the follo	wing:				

Explain the following:

Q.6

- a) Visual data recoveryb) Data journalism

[CO-4] [L-4] **20**

M. Tech. – Third Semester

HUMAN RESOURCE MANAGEMENT (M-HM-ID-001)

3 hrs.	Max Marks: 100 <i>No. of pages: 1</i>
Attempt FIVE questions in all; Q.1 is compulsory . Attempt any T from PART-A and TWO questions from PART-B . Each question marks.	WO questions carries equal
 Answer <i>any four</i> out of the following: a) Recall the roles and responsibilities of HR managers. b) Discuss the concept of job analysis. c) List the benefits of Induction. d) Discuss the purposes of Training. e) Outline the objectives of Performance Management System. f) Discuss Turnover as a separation process. 	(CO-1) (L-1) (CO-1) (L-2) (CO-3, 4) (L-1) (CO-1) (L-2) (CO-5) (L-1) (CO-5) (L-2) 5x4
<u>PART-A</u>	
Comprehend the challenges of HRM.	(CO-5) (L-4) 20
Illustrate the process of Human Resource Planning.	(CO-2) (L-3) 20
Recall the sources of Recruitment with its importance in the organization PART-B	on. (CO-5) (L-1) 20
Discuss the process of designing a training program.	(CO-5) (L-2) 20
How would you design and determine a compensation structure?	(CO-6) (L-6) 20
Discuss the following: a) VRS. b) Layoff. (CO-5) (L-2) 10x2
	 3 hrs. Attempt FIVE questions in all; Q.1 is compulsory. Attempt any T from PART-A and TWO questions from PART-B. Each question marks. Answer any four out of the following: a) Recall the roles and responsibilities of HR managers. b) Discuss the concept of job analysis. c) List the benefits of Induction. d) Discuss the purposes of Training. e) Outline the objectives of Performance Management System. f) Discuss Turnover as a separation process. Comprehend the challenges of HRM. Illustrate the process of Recruitment with its importance in the organization program. How would you design and determine a compensation structure? Discuss the following: a) VRS. b) Layoff.

M. Tech. - Third Semester

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] 10b) 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 845L/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.
 - b) Explain regenerative circuit with application of drill machine. [CO-3] [L-1] **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**

M. Tech. – First Semester MOBILE ROBOTS (MEEIR-156)

Time:	Max Marks: 100	
Note:	Attempt FIVE questions in all; Q.1 is compulsory . Marks are indice each question.	cated against
Q.1	 a) Briefly explain the use of robots in <i>(any two):</i> i) Defence sector. ii) Space exploration. iii) Commercial robots. b) Compare different types of legged robots. 	CO-1] [L-1] 5×2 [CO-1] [L-3] 10
Q.2	Analyze the positioning of standard wheeled robot in a local and gl frame. Explain the different constraints used.	obal reference [CO-1][L-4] 20
Q.3	a) Classify different types of sensors used in mobile robots.b) Evaluate the use of ground based beacons in robot perception.	[CO-2] [L-3] 10 [CO-2] [L-5] 10
Q.4	a) Evaluate the working of different blocks of robot architecture.b) Compare different types of locomotion systems used in mobile robot	[CO-3] [L-5] 10 s. [CO-4] [L-3] 10
Q.5	a) Compare localization based navigation and programmed solutions.b) Explain the different challenges faced in robot localization.	[CO-4] [L-3] 8 [CO-4] [L-6] 12
Q.6	a) Compare different algorithms used for path planning by a robot.b) Explain path planning and obstacle avoidance in a robot.	[CO-3] [L-2] 10 [CO-3] [L-2] 10
Q.7	a) Explain the different steps involved in image processing.b) Evaluate the importance of transformation of a digital image.	[CO-5] [L-1] 10 [CO-5] [L-3] 10
Q.8	a) Explain different fields related with computer vision used by robots.b) Describe the various functions occurring in computer vision system.	[CO-5] [L-2] 10 [CO-5] [L-2] 10

End Semester Examination, Dec. 2022 M. Tech. (A & R) – First Semester

COMPUTER AIDED MODELING AND DESIGN (MEEIR-151)

Time:	3 hrs.	Max Marks: 100
Note:	Attempt FIVE questions in all; Q.1 is compulsory . Marks are ind each question.	dicated against
Q.1	a) Give the general configuration of a CAD computer system.b) CAD helps in integrating CAM. Justify this statement.	10 10
Q.2	 a) A square is having A(2,1), B(6,1),C(5,5) and D(2,5) and is roclockwise direction keeping point B fixed. Find the final coordinates b) What is the need for concatenation of transformations? Explain we be 	tated at 60° in s. 10 vhat care should
	taken in such cases.	[CO-2] [L-3,2] 10
Q.3	a) Distinguish between interpolation and approximation approaches u curves.b) Explain the basic curve fitting techniques.	used in design of 10 [CO-3] [L-3,2] 10
Q.4	 a) State the properties of stiffness matrix. b) A vertically hanging bar is to be modeled by FEM. It is discrete elements. It is subjected to a load of 10 kN at its end. If e considered to be having length of 300mm, formulate the global stift 	10 etized in to four each element is ffness matrix. [CO-5] [L-1,4] 10
Q.5	The following differential is available for physical phenomenon $AE \frac{d2}{dx}$ the boundary condition $\frac{dy}{dx}$ at Y(0) is 0. $\frac{dy}{dx}$ at X = L is 0	$\frac{y}{2} + q_0 = 0$. With
	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. **10**
 - 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**

M. Tech. (A & R) – First Semester

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.2a) 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 [CO-2] [L-3,4] 5
- Q.3 a) Enumerate the operation of brushless DC motor and its control mechanism.

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] **10×2**

[[]CO-3] [L-3,2] **10**

M. Tech. – First Semester

INDUSTRIAL AUTOMATION (MEEIR-101A)

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) b)	What is the use of industrial automation? Describe three levels of industrial automation? [CO-1] [L-1,2] i) What is the basic principle of PLC?
	c) d) e)	 ii) Explain three types of PLCs. iii) How PLC is used in industrial automation? What's the difference between DCS, SCADA, and PLC system? Write any four strategies for automation and process improvement. [CO-2] [L-2] Explain material handling and its advantages. [CO-3] [L-1] 4×5
Q.2	a) b)	What is automated manufacturing system? Explain in detail types of automated manufacturing system along with features and characteristics.[CO-3] [L-1,2] 15 List the advantages and disadvantages of automation.[CO-11][L-1] 5
Q.3	a) b)	List different PLC programming languages. Explain any one with example. [CO4][L2] 10 Explain basic structure of PLC using block diagram. [CO-4] [L-1,2] 10
Q.4	a) b)	Construct ladder diagram for the logical expression: y=AB+BC+CD[CO-2] [L-2] 10Explain different types of sensors used in automation.[CO-5] [L-5] 10
Q.5	a) b)	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 Discuss the steps in PLC scanning process. [CO-4] [L-2] 10
Q.6	a) b)	Describe industrial automation components. Explain the role of engineers in automation.[CO-2] [L-2,3] 10 [CO-2] [L-4] 10Compare DCS with PLC.[CO-2] [L-4] 10
Q.7	a) b)	 What are the various types of timers and counters used in PLC? [CO-4] [L-2] 10 Write a PLC ladder diagram for the following motor sequence: i) Start button starts motor M1. ii) After 10 sec M1 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 VLSI DESIGN VERIFICATION AND TESTING (MEC-257)

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

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 M. Tech. – First Semester

WIRELESS AND MOBILE COMMUNICATION (MEC-102)

Time	: 3 hrs.	Max Marks: 100
Note	Attempt FIVE questions in all; Marks are indicated against each que	istion.
Q.1	 a) Draw the architecture of GSM for Communication and explain e detail. b) Categorize the different types of techniques used to improcapacity of a cellular system 	each subsystem in [CO-1] [L-2] 10 ve coverage and [CO-2] [L-3] 10
Q.2	 a) Define multiple access and discuss various types of multiple access detail. b) In US-AMPS , 416 channels are allocated to various cellula Channel between them is 30 KHz with the guard band of 10KHz. Calculation given to each operator. 	cess techniques in [CO-3] [L-2] 15 or operators. The late the spectrum [CO-3] [L-3] 5
Q.3	 a) Calculate the path loss and power received in a free space propation b) Determine the fraunhofer distance for an antenna with maximum 1mtr and operating frequency of 900 MHz. If antenna has unit path loss. 	gation model. [CO-4] [L-3] 15 num dimension of cy gain , calculate [CO-4] [L-4] 5
Q.4	a) Illustrate the concept of adaptive equalizer in communicatio receiver.b) Compare various diversity techniques in communication system.	n system at the [CO-4] [L-3] 10 [CO-4] [L-5] 10
Q.5	a) Discuss IS-95 system architecture in detail.b) Illustrate the concept of Forward Link operation in CDMA (IS-95)	[CO-5] [L-2] 8 . [CO-5] [L-4] 12
Q.6	a) Differentiate between various 3G standards.b) Summarize evolution of 5G in detail.	[CO-5] [L-2] 10 [CO-5] [L-3] 10
Q.7	 a) Define frequency reuse concept. Prove that C=MS, Where `M' time the cluster is replicated and `S' is the number of duplex cha use. 	is the number of nnels available for
	b) Analyze different types of small scale fading in detail.	[CO-2] [L-3] 10 [CO-4] [L-4] 10
08	a) Consider global system for mobile user which is a TDMA/EDD	system that uses

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) b)	Explain in detail ATM structure with its layers. How is it diffenetwork? List the advantages of using ATM.	rent fro [CO-3] [CO-1]	m ISI [L-3] [L-2]	DN 10 10
Q.3	a) b)	Design the selective reject ARQ protocol and how is it different fro protocol. What is flow control and how it is provided in internet?	m stop [CO-2] [CO-3]	and w [L-5] [L-2]	vait 10 10
Q.4	a) b)	Classify various types of congestion control Algorithm in TCP/IP. Let the size of congestion window of TCP connection in two cases Case 1: Timeout occur Case 2: 3 ACK received is 32 Kb. The RTT of a connection is 100ms and MSS = 2Kb.	[CO-1] where The tin	[L-3] ne tak	10
		(msec) by TCP connection to get back to 32 Kb congestion window respectively.	/ is [CO-2]	a [L-5]	nd 10
Q.5	a) b)	Design the architecture of MPLS with its protocol. Compare and contrast the differences between IPV4 and IPV6.	[CO-1] [CO-2]	[L-6] [L-3]	10 10
Q.6	a) b)	Discuss various methods of providing QOS in a network. What is resource reservation protocol and where it is used.	[CO-3] [CO-3]	[L-2] [L-3]	10 10
Q.7	a) b)	Elaborate different packet classification algorithm. Categorize the taxonomy for different software based packet classi	[CO-3] fication. [CO-2]	[L-1] [L-2]	10 10
Q.8	a) b)	 How IP switching is different from MPLS switching? Calculate the bandwidth delay product for the following networks: i) T1 (1.5 Mbps). ii) Ethernet (10Mbps). iii) T3(45 Mbps). Assume a round trip time of 120 ms. 	[CO-2] [CO-3]	[L-5] [L-6]	10 8
	c)	List the merits of using MPLS label switching.	[CO-2]	[L-2]	2

M. Tech. – First / Third Semester

ADVANCED COMMUNICATION NETWORKS (MEC-101)

Time:	3 h	nrs.	Max Marks: 100
Note:	At	tempt FIVE questions in all; Marks are indicated against each questi	NO. OF PAGES: 1 ion.
Q.1	a) b)	Elaborate in detail TCP/IP reference model and how it is different fr Discuss in detail various protocols that work in application layer.	om OSI model. [CO-1] [L-2] 10 [CO-2] [L-2] 10
Q.2	a) b)	Draw the architecture of ATM. How it is different from ISDN networ Mention the role of each layer in ATM.	k. [CO1][L2] 10 [CO-2] [L-1] 10
Q.3	a) b)	How the inefficiency of stop and wait protocol is overcome in protocol? How the flow control is provided in internet?	sliding window [CO-3] [L-3] 10 [CO-2] [L-2] 10
Q.4	a) b)	Classify various types of congestion control Algorithm in TCP/IP. Let the size of congestion window of TCP connection in two cases v Case 1: Timeout occur	[CO-3] [L-2] 10 where
		Case 2: 3 ACK received is 32 KB. The RTT of a connection is 100 2KB. The time taken (msec) by TCP connection to get back to 32 window is and respectively.	Oms and MSS = 2 KB congestion [CO-3] [L-5] 10
Q.5	a) b)	Compare and contrast the differences between IPV4 and IPV6. Why MPLS is called layer 2.5 technology? Design the architecture of	[CO-3] [L-2] 10 f MPLS. [CO-3] [L-3] 10
Q.6	a)	Differentiate between diffserv and intserv. Illustrate the framework	of diffserv.
	b) c)	How latency is different from throughput. Mention different features of resource reservation protocol.	[CO-2] [L-4] 10 [CO-2] [L-2] 5 [CO-2] [L-1] 5
Q.7	a) b)	Discuss in detail leaky bucket algorithm with its properties. Calculate the bandwidth delay product for the following networks: i) T1 (1.5 Mbps) ii) Ethernet (10Mbps) iii) T3 (45 Mbps)	[CO-3] [L-3] 10
		Assume a round trip time of 100ms.	[CO-3] [L-6] 10
Q.8	a) b)	Illustrate the method of implementation of packet classification algo Categorize the taxonomy for different software based packet classif	orithm. [CO2] [L-5] 10 ication.
			[CO-2] [L-3] 10

End Semester Examination, Dec. 2022 B. Tech. – Third Semester 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., m<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.

A	B	C	D	Capacity	Ans:					
						Α	В	C	D	Capacity
6	6	6	4	310	Х					
4	2	4	5	100	Y					
5	6	7	8	290	7					
150	130	120	300	700	Requirement					
	A 6 4 5 150	A B 6 6 4 2 5 6 150 130	A B C 6 6 6 4 2 4 5 6 7 150 130 120	A B C D 6 6 6 4 4 2 4 5 5 6 7 8 150 130 120 300	A B C D Capacity 6 6 6 4 310 4 2 4 5 100 5 6 7 8 290 150 130 120 300 700	A B C D Capacity Ans: 6 6 6 4 310 X X 4 2 4 5 100 Y Z 5 6 7 8 290 Z Z 150 130 120 300 700 Requirement	A B C D Capacity Ans: 6 6 6 4 310 X X 4 2 4 5 100 Y Z 5 6 7 8 290 Z Requirement	A B C D Capacity 6 6 6 4 310 4 2 4 5 100 5 6 7 8 290 150 130 120 300 700	A B C D Capacity 6 6 6 4 310 4 2 4 5 100 5 6 7 8 290 150 130 120 300 700	A B C D Capacity 6 6 6 4 310 4 2 4 5 100 5 6 7 8 290 150 130 120 300 700

- 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**

<u>PART-A</u>

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 $Q_A(x, y, z) = x^2 + 3y^2 + 2z^2$. 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 concepts (CO3,L2,L3) **10**

$$x_1+x_2+x_3=3$$

- $x_1+x_2+0.5x_3=1.5$

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

	and a second	Ware Houses				
		W ₁	W2	W3	W4	Capacity
	F ₁	10	30	50	10	7
<u>.</u>	F ₂	70	30	40	60	9
Factory	F ₃	40	80	70	20	18
	Demand	5	8	7	14	

(CO4 L3,L5) **10** (CO4 L3,L5) **10**

b) Formulate as an LPP, laying its objective function and constraints.

<u>PART-B</u>

- Q.5 a) Describe a Hessian matrix and mention any two usages. (CO3 L2,L3) **10**
 - 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 = (2x)(2y)(2z) = 8xyz

(CO3 L2,L3) 10

Q.6a) 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 city1 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. (CO6 L1,L2) 10

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

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) b)	What do you understand by Mobility in Mobile Computing? Discuss and Detail the factors to be considered when de applications?	[CO-5] [L-4] 10 veloping mobile [CO-3] [L-4] 10
Q.2	a) b)	How to Build a Text-to-Speech App? How is data stored and retrieved in Android?	[CO-3] [L-2] 10 [CO-4] [L-3] 10
Q.3	a)	Discuss the purpose of using 'Intent' in Android and its working with	th an example. $\begin{bmatrix} 0 & -4 \end{bmatrix} \begin{bmatrix} 0 &$
	b)	How to set an Alarm in an Android application? Explain with the he	[CO 1] [L 1] 10 elp of Code. [CO-2] [L-2] 10
Q.4	a)	What are location-based services in mobile application development	nt? [CO-4] [I -5] 10
	b)	Describe Multimedia Mobile Agents and Peer-to-Peer Architecture i	[CO-5] [L-4] 10
Q.5	a)	Explain performance based best practices to develop an Android a	pplication.
	b)	List and explain various Location Based Services that works with A	[CO-2] [L-3] 10 [CO-2] [L-3] 10
Q.6	a) b)	What are the new trends in mobile application development? Which model is used for developing a mobile application? Explain i	[CO-5] [L-4] 10 ts architecture. [CO-2] [L-4] 10
Q.7	a)	Describe the impacts of Internet of Things (IoT) on mobile comput	ting techniques.
	b)	How Wireless Communications might affect the Development and of the Internet of Things (IoT)?	[CO-1] [L-2] 10 Implementation [CO-2] [L-3] 10
Q.8	a) h)	Why do mobile applications fail? What are the usage models for synchronization in mobile application	[CO-4] [L-4] 10
	5)	what are the usage models for synchronization in mobile application	[CO-3] [L-4] 10

M. Tech – First Semester

DISTRIBUTED SYSTEMS (MCS-125)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-3][L-4] 20

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. b) Critically examine the concept of layered query processing. [CO-2][L-3] 10
 Q.3 State the significance of semantic integrity control in DDBS.
- 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.
- 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.7a) 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] **10×2**

65/4

End Semester Examination, Dec. 2022 M. Tech. - First Semester 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) b)	Explain the difference between a Validation Set and a Test Set? Compare different kernels in SVM.	[CO-2] [L-2] 10 [CO-5] [L-3] 10
Q.2	a) b)	Enumerate in detail, the various data encoding schemes. What does Bokeh offer to a data scientist? Discuss it in detail.	[CO-2] [L-2] 10 [CO-4] [L-2] 10
Q.3	a) b)	Describe the concept of 'Naive' in a Naive Bayes. Assume the following dataset as given below: $\{(2,2), (4,4), (5, (9,9), (0,6), (6,0)\}$ Use K-Means with K=3, for a single iteration. We clusters and what are their centroids?	[CO-3] [L-2] 10 ,5), (6,6), (7,7), /hat are the new [CO-2] [L-3] 10
Q.4	a) b)	Illustrate the working of ROC curve. Discuss how does data cleaning play a vital role in the technique/process.	[CO-4] [L-4] 10 data analysis [CO-3] [L-3] 10
Q.5	a) b)	Differentiate between univariate, bivariate and multivariate analysi How Machine learning programming is used to optimize the per- science? Explain in detail.	s. [CO-4] [L-4] 10 erformance data [CO-5] [L-5] 10
Q.6	a) b)	Construct confusion matrix and compute accuracy, precision an FP=10 FN=5 TP=100. What is entropy and information gain in decision tree algorithm?	d recall. TN=50 [CO-5] [L-5] 10 [CO-3] [L-2] 10
Q.7	a) b)	Define 'logistic regression'. State an example when and where ye applied logistic regression. List and explain the various ways to treat outlier values.	ou have recently [CO-3] [L-2] 10 [CO-3] [L-2] 10
Q.8	a) b)	How will you define the number of clusters in a clustering algorith example. Explain reinforcement learning with the help of an example.	m? Support with [CO-3] [L-2] 10
			[CO-3] [L-2] 10

M. Tech. – First Semester MACHINE LEARNING (MCS-121)

Time: 3 hrs.

Max Marks: **100** *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
+	т	Т
+	т	Т
=	т	F
+	F	F
=	F	Т
-	F	Т

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: A1= (2, 10), A2= (2, 5), A3= (8, 4), A4= (5, 8), A5= (7, 5), A6= (6, 4), A7=(1, 2), A8=(4, 9). Suppose initial seeds are A1 A4 and A7 Bun the k-means algorithm for 2 enochs. At the end

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.7a) Discuss back propagation and its benefits in deep learning.[CO-3][L-2] 10b) 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 MACHINE LEARNING (MCS-121)

Time: 3 hrs.

Max Marks: 100

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
+	Т	Т
+	Т	Т
=	Т	F
+	F	F
=	F	Т
-	F	Т

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: A1= (2, 10), A2= (2, 5), A3= (8, 4), A4= (5, 8), A5= (7, 5), A6= (6, 4), A7=(1, 2), A8=(4, 9), Supr

A3= (8, 4), A4= (5, 8), A5= (7, 5), A6= (6, 4), A7=(1, 2), A8=(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 ADVANCED DATA STRUCTURES (MCS-102)

Time: 3 hrs.

Max Marks: 100

[CO-1] [L-1] **10×2**

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 $h_2(k) = 1 + (k \mod 11)$ [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.
- 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. < 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: A E C F D E F
 Sequence 2: B A C G D G B F
 [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.
- Q.7 a) Write down the Huffman encoding algorithm and solve the following.

Characters	Frequencies
А	10
E	15
Ι	12
0	3
U	4
S	13
Т	1

[CO-6] [L-2] 10

- b) Explain the insertion algorithm for Red-Black tree with a suitable example.

[CO2][L2] **10**

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:

$$f(x) = \begin{bmatrix} k(x^2 + x); & \text{if } 0 \le x \le 1 \\ 0; & \text{else} \end{bmatrix}$$

Find the cumulative distribution function (CDF).[CO-1] [L-3] 15b) 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.
 - b) Suppose a simple graph G on n vertices has at least (((n-1)(n-2))/2) +2edges. Prove that G has a Hamilton cycle, for n≥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**

[CO-2] [L-4] **10**

- b) Write the algorithm for graph coloring. How the chromatic number in graph is calculated. [CO-3] [L-3] **10**
- 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. [CO-1] [L-2] **10**
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.
- a) State the different forms of a typical bridge structure. Q.1 [CO-1] [L-2] [CO-1] [L-2]
 - 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

- 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

:7 m

- 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

<u>PAR</u>T-B

a) With the help of a neat sketch, illustrate the various shapes of abutments. Q.5

[CO-4] [L-3] **5**

: 2.5 m

:8 m

: 1.3 m

[CO-3] [L-6] **20**

- 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 :8 m
 - Width at GL
 - Width at Bearing Level
 - Length of Pier
 - Maximum mean velocity of current : 3.2 m/s

	Class AA wheeled vehicle	[CO-4] [L-4] 15
Q.6	Illustrate the following with the help of neat sketches:a) Elastomeric bearings.b) Fixed bearings.c) Expansion bearings.	[CO 5] [I 2] 20
	c) Expansion bearings.	[CO-5] [L-5] 20
Q.7	a) Summarize the importance of "bridge inspection".b) Compare the different degrees of damage in a bridge structure.	[CO-6] [L-2] 10 [CO-6] [L-2] 10

• M 25 grade of concrete

M. Tech. – Second Semester

INTELLIGENT TRANSPORTATION SYSTEM (MCE-TE-202)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-1] [L-1]

[CO-2] [L-2]

[CO-3] [L-2]

[CO-4] [L-2]

[CO-4] [L-2]

[CO-5] [L-2]

[CO-1] [L-2]

[CO-3] [L-2]

[CO-4] [L-2]

[CO-1] [L-1]

2×10

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?
 - b) How does digitalization fit into the wider transport policy?
 - c) What user services are offered by ITS?
 - 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.
 - i) List out the benefits of electronic payment.

<u>PART-A</u>

- 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**

<u>PART-B</u>

- 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.6a) 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.	[CO-4] [L-3]
	g)	State the disadvantages of having a multiple gauge system.	[CO-1] [L-3]
	h)	Why track drainage is important?	[CO-3] [L-2]
	i)	Differentiate between absolute and automatic block system.	[CO-5] [L-2]
	j)	Enlist various measures normally taken to improve the track for it to ac	commodate

[CO-5] [L-2] 2×10

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**

- What are various types of track stresses induced in a rail section? Explain briefly how Q.3 these are evaluated? [CO-2] [L-3] **20**
- What is the ballast? Why is it used in the railway track? Describe the various types of Q.4 ballasts used. [CO-3] [L-3] 20

PART-B

- Draw a neat sketch of a right-hand turnout taking off from a straight broad gauge Q.5 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

high speeds?

- 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**

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.

		[CO-1][L-1]
b)	Explain the classification of trip ends.	[CO-2] [L-2]
c)	Explain classification of roads.	[CO-2] [L-2]
d)	Enlist the various growth factor methods of trip distribution.	[CO-4] [L-1]
e)	Explain the purpose of modeling.	[CO-3] [L-1]
f)	What are the assumptions behind user equilibrium assignn	nent for network
	modeling?	[CO-3] [L-1]
g)	Draw a flow chart for the system engineering process of transpor	tation 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 technique	s used for traffic
	assignment.	[CO-5] [L-2]
j)	List various types of transportation survey.	[CO-6] [L-1] 2x10

<u>PART-A</u>

- 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**

[CO-3] [L-2]**10**

E

- 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.

<u>PART-B</u>

- 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.

	t ^v _{ij}	t ^{walk} ij	t ^t ij	F _{ij}	ф _{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:

А	1000	
В	2250	
С	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	Х	Y
А	15	20
В	15	10
С	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**

M. Tech. – First Semester

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

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

[CO-1] [L-1]

[CO-2] [L-2]

[CO-2] [L-2]

[CO-4] [L-1]

[CO-3] [L-1]

[CO-1] [L-1]

[CO-5] [L-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 the process problem solving and transportation planning.
 - b) Explain the advantages of Post-card guestionnaire survey.
 - 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?
 - f) What are the assumptions behind user equilibrium assignment for network modeling? [CO-3] [L-1]
 - q) Discuss the relation between transport and socio-economic activities.
 - h) Define all or nothing assignment technique.
 - i) Explain the term "traffic assignment" and different techniques used for traffic assignment. [CO-5] [L-2]
 - i) Show the relation between speed, density and flow using graphs. [CO6] [L-1] 2×10

PART-A

- a) What do you understand by urban transportation planning. Also write the different Q.2 components of a transportation system. [CO-1] [L-2] **10** [CO-2] [L-1] 10
 - b) Explain the travel demand forecasting process.
- 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.

Househol				
	1	2	3	4
Trips	1	3	5	7
Per	3	4	6	8
day (y)	3	3	7	6
Σγ	7	10	18	21

[CO-3] [L-3] **10**

<u>PART-B</u>

- Q.5 a) Write down the factors influencing the choice of mode.
 - 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.



[CO-4] [L-3] **10**

[CO-4] [L-2] 10

- 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.

[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

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.	[CO-5] [L-2]
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
- j) Explain various types of queue disciplines of Queuing theory. [CO-3] [L-1] **2×10**

<u>PART-A</u>

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.

No of vehicles
0
11
30
105
233
216
68
24
0

[CO-2] [L-3] 10

[CO-3] [L-3]

- 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.4a) 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**

81/4

<u>PART-B</u>

- 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 km/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**

End Semester Examination, Dec. 2022

M. Tech. – Second Semester **DESIGN OF ADVANCED CONCRETE STRUCTURES (MCE-SE-207)**

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-3] [L-1]

[CO-1] [L-2]

[CO-6] [L-1]

[CO-1] [L-2]

[CO-2] [L-4]

[CO-5] [L-1]

[CO-3] [L-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.
 - b) Summarise the geophysical sources of building load.
 - c) Define a framework for design of corbels.
 - d) When will you consider the use of shear walls?
 - [CO-2] [L-3] 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 [CO-4] [L-4]
 - f) List the various classifications of cross section as per plastic analysis.
 - q) Illustrate the parameters influencing the design of deep beams.
 - h) Differentiate between buckling and crippling.
 - i) Explain fatigue loadings with regards to structural failure.
 - j) What do you understand by "stress concentration" associated with structural steel?

[CO-5] [L-2] 2×10

PART-A

- Q.2 a) Detail an overview of performance based design highlighting its advantages over [CO-1] [L-3] 10 other design philosophies.
 - 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**
- Design a simply supported transfer girder of 5.5 m length loaded from two columns at Q.3 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
- Enunciate the different classifications of shear walls with proper detailing. Draft a note Q.4 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
- Elaborate the various chemical compositions of structural steel. Explain the different Q.6 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

M. Tech. – Second Semester STRUCTURAL DYNAMICS (MCE-SE-202)

Time: 3 hrs.

Max Marks: 100

[CO-2] [L-2]

[CO-6] [L-2]

[CO-4] [L-2] **20**

- 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.
 - b) Illustrate two examples of structures modeled as SDOF system. [CO-4] [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? [CO-2] [L-2]
- e) Illustrate with a figure half power bandwidth.
- f) Compute the natural frequency and time Period of an SDOF system of mass 2000kg and stiffness of 30kN/m. [CO-1] [L-3]
- 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.
- i) Derive briefly time history at storey level for a three DOF system. [CO-5] [L-2]
- j) Derive briefly total response at floor for a three storeyed building as in response spectrum analysis.
 [CO-6] [L-2] 2×10

<u>PART-A</u>

- Q.2 Develop expression for response of damped SDOF system to free vibration. [CO1][L2] 20
- Q.3 Discuss briefly Duhamel's integral.
- 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**

<u>PART-B</u>

- 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 3.0m X 3.0m plan area, floor to floor height as 3m, Column Dimension as 230mm X 230mm and thickness of slab as 100mm. 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

[CO-2] [L-1]

[CO-2] [L-2]

[CO-3] [L-1]

[CO-3] [L-2]

[CO-4] [L-2]

[CO-5] [L-3]

[CO-5] [L-2]

[CO-6] [L-1]

2x10

- 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. [CO-1] [L-2]
 - c) Define the concept of "Smart Structures".
 - d) List the two factors which are considered at the stage of "Data Retrieval".
 - e) Define the function of Embeddable Optic Sensors.
 - f) List two example of sensors used in Structural Health Monitoring.
 - g) With proper notations, explain the concept of "Design Wind Pressure".
 - h) Define the term: Seismology.
 - i) List the various "Scales" for measuring the Intensity of Earthquake.
 - j) Elaborate the importance of "Hinge Formation" in structural analysis.

<u>PART-A</u>

- 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**

[CO-3] [L-2] 5x4

- 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.

<u>PART-B</u>

- 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

STRUCTURAL HEALTH MONITORING (MCE-SE-107)

Time: 3 hrs.

g) h) i) j)

Max Marks: 100

No. of pages: 1

[CO-2] [L-1] [CO-2] [L-2]

[CO-3] [L-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] [CO-1] [L-2]
 - b) Elaborate the objectives of structural health monitoring.
 - c) Define the concept of "Smart Materials.
 - d) State the necessity of structural health monitoring.
 - e) Define the function of Weldable optic sensors.
 - f) Justify the significance of "sensor system" in structural health monitoring.

	[CO-3] [L-2]
Classify the different wind zones of India.	[CO-4] [L-2]
List the various tectonic plates in the world	[CO-5] [L-1]
What do you understand by the term "retrofitting"?	[CO-6] [L-2]
Elaborate the importance of "P – delta" effect in structural analysis.	[CO-6] [L-2]
	2×10

<u>PAR</u>T-A

- Write a well detailed note on "factors leading to degradation". Q.2 [CO-1] [L-2] 20
- Q.3 a) With the help of neat sketch, explain the classifications of SHM systems. [CO2] L3] 10 b) In context with components of SHM system, elaborate the phase of "acquisition of data". [CO-2] [L-3] **10**
- Summarize the different ways in which responses in a SHM system are assessed in Q.4 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
- a) Elaborate:"The theory of elastic rebound". Q.6 [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

M. Tech. – First Semester

DESIGN OF INDUSTRIAL STRUCTURES (MCE-SE-104)

Time: 3 hrs.

Max Marks: 100

[CO-3] [L-2]

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".
 - [CO-4] [L-2] q) 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] 2×10

PART-A

The Design a Gantry Girder to check whether ISMB 600 with ISMC 300 on Q.2 compression flange is adequate to carry moment and shear force. The data are as follows:

Electrically operated crane capacity = 200 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 kN/m. [CO-1] [L-6] **20**

- a) Draft a detailed procedure for the design of portal frames. [CO-2][L-4] **10** Q.3
 - 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.
- Design a rectangular steel bunker of 16m length and 6m width supported on 8 Q.4 columns to store coal of bulk density 8 kN/m3 and angle of internal friction 350. (Assume other data as required).

[CO-2] [L-3] **10**



[CO-3] [L-5] **20**

<u>PART-B</u>

- 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 3.5m and the foundation rest on medium soil (bearing capacity 200kN/m2). Brickwork lining is 10cm 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.
- Q.7 Design a prestressed steel tank for the following data:
 - a) Capacity= 85000 Litres.
 - b) Height of tint container = 2.5 m.
 - c) Bottom of tank bearer above G.L. = 9 m.
 - d) Size of prestressed plates = 1.25 m x 1.25 m.
 - e) Horizontal acceleration = 6%.
 - f) Design wind pressure= 930 N/m^2 .

[CO-6] [L-5

M. Tech. – First Semester

ADVANCED SOLID MECHANICS (MCE-SE-102)

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

[CO-2] [L-2] [CO-2] [L-1]

[CO-4] [L-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) 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"?
 - d) Discuss "Hydrostatic Components".
 - 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".
 - h) With the help of neat sketch, explain "Prandtl's Membrane Analogy". [CO-6] [L-2]
 - A 30 cm I-beam with flanges and web 1.25 cm thick, is subjected to a torque of 50000 kgf.cm (4900 Nm). Find the maximum shear stress and the angle of twist per unit length. [CO-5] [L-2]
 - j) Explain the relevance of 'Von Mises Yield Criterion' in solid mechanics. [CO-6] [L-2]

2x10

<u>PART-A</u>

- 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.3a) 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: $\sigma_x = 70$ MPa; $\sigma_y = -36$ MPa; $\sigma_z = 60$ MPa; $\tau_{xy} = \tau_{yz} = \tau_{zx} = 0$. **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) Plan a mechanism to obtain a relation for the differential equation of equilibrium [CO-3] [L-5] **10** with proper assumptions.

<u>PART-B</u>

- 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." [CO-5] [L-3] **20**
- Q.7 a) Discuss "Haigh's Theory".
 - 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.

[CO-6] [L-2] **5**

15

M. Tech. – First Semester ADVANCED SOLID MECHANICS (MCE-SE-102)

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

[CO-1] [L-2]

[CO-2] [L-2] [CO-2] [L-1]

[CO-3] [L-1]

[CO-4] [L-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 basic assumptions considered in "Theory of Elasticity". [CO-1] [L-2]
 - b) Summarize the concept of "Deviatoric Components".
 - c) What do you understand by "Orthonormality"?
 - d) Discuss "Stress Invariants".
 - e) Discuss the importance of Poison's Ratio.
 - f) What is Airy's Stress function based on?
 - g) A cylindrical bar of 7cm diameter is subjected to a 3400 N-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". [CO-6] [L-2]
 - 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] **2×10**

<u>PART-A</u>

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.3a) 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: $\sigma_x = 70$ MPa; $\sigma_y = -36$ MPa; $\sigma_z = 60$ MPa; $\tau_{xy} = \tau_{yz} = \tau_{zx} = 0$. [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 BM which is a ruction of "x". Assume that $\sigma_z = \tau_{zx} = \tau_{zy} = 0$ and that $\tau_{xy} = 0$ @ the top and bottom, and further that $\sigma_y = 0$ @ bottom. Using the differential equation of equilibrium, determine τ_{xy} and σ_y . Compare these with the values given in elementary strength of materials. [CO-3] [L-4] **10**

<u>PART-B</u>

- Q.5 With proper mathematical expressions, justify the significance of Airy's Function while analysis of solid sections. [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.*" [CO-5] [L-3] **20**
- 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 ADVANCED STRUCTURAL ANALYSIS (MCE-SE-101)

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

[CO-1] [L-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:



b)	What do you understand about Degree of Freedom?	[CO-1] [L-	-21
c)	Write a note on Force Vector.	[CO-1] [L-	-1]
d)	Explain about Stiffness method for Large frames	[CO-2] [L-	-1]
e)	Enlist the properties of Stiffness matrix.	ĪCO-31 ĪL-	-21
f)	What do you understand about element and Global Stiffness matrice	es? [CO-3] [L-	-2]
ý)	Write down the steps for Finite Element Analysis.	ÎCO-51 ÎL-	-31
h)	Define an arch. How an arch differ from a Beam?	CO-41 [L-	-21
i)	Give a brief note on "Nodes".	CO-41 L-	-21
j)	Describe the Linear Element. [C	0-5] [L-2] 2 ×:	10

<u>PART-A</u>

- Q.2 a) Explain the fundamental relationships for structural analysis.
 b) Compare Global and Local coordinate system.
 CO-1] [L-2] 10 [CO-1] [L-2] 10
 Q.3 a) Compare stiffness and Flexibility methods of analysis.
 b) What do you understand by "Beam on Elastic Foundation"?
- Q.4 Two Steel bars AB and BC, each having a cross-sectional area of 20 mm², 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 E=200kN/mm².

[CO-3] [L-4] **20**

<u>PART-B</u>

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** determinacy of the rigid-jointed building frame

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.

[CO-2] [L-2] **5×4**

Q.7 An axial load $P=200\times10^3$ 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.



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.
- Answer the following in briefly: Q.1
 - 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]
 - [CO-6] [L-2] 2x10 j) List and explain the desirable properties of a bituminous mix.

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) ABC 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 1251.5g in air and 720.6g in water. [CO-2] [L-3] **10**
- a) For soft soil which type of stabilization would you recommend? Explain in detail. Q.4
 - [CO-3] [L-4] **10**
 - b) Explain the material specification, construction method and quality control checks for wet mix macadam. [CO-3] [L-3] 10

PART-B

- a) Explain various types of emulsions used in bituminous pavement. Under which Q.5 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	[[[-1]]
<i>u</i>)		
b)	Why float test is carried out for bituminous materials.	[CO-2] [L-2]
c)	Describe various types of natural aggregates.	[CO-1] [L-1]
d)	Why bitumen has become a popular binding material?	[CO-2] [L-3]
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.	[CO-5] [L-2]
h)	Define the term "bituminous concrete".	[CO-3] [L-3]
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] 2×10

<u>PART-A</u>

- 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:

Sieve size	Percentage passing			Required gradation	
	20 mm	10 mm	6 mm	Dust	% Passing
20 mm	89.5	100	100	100	91-100
13.2 mm	5.8	98.5	100	100	56-80
4.75 mm	0.75	2.7	57.23	100	38-54
2.36 mm	0.4	0.85	17.02	74.05	28-42
300 microns	0.1	0.35	0.8	25	7-21
75 microns	0.05	0.1	0.05	1.5	2-8
	Sieve size 20 mm 13.2 mm 4.75 mm 2.36 mm 300 microns 75 microns	Sieve size 20 mm 20 mm 89.5 13.2 mm 5.8 4.75 mm 0.75 2.36 mm 0.4 300 microns 0.1 75 microns 0.05	Sieve size Percentage 20 mm 10 mm 20 mm 89.5 13.2 mm 5.8 4.75 mm 0.75 2.36 mm 0.4 300 microns 0.1 75 microns 0.05	Sieve size Percentage passing 20 mm 10 mm 6 mm 20 mm 100 mm 100 13.2 mm 5.8 98.5 100 4.75 mm 0.75 2.7 57.23 2.36 mm 0.4 0.85 17.02 300 microns 0.1 0.35 0.8 75 microns 0.05 0.1 0.05	Sieve size Percentage passing 20 mm 10 mm 6 mm Dust 20 mm 89.5 100 100 100 13.2 mm 5.8 98.5 100 100 100 4.75 mm 0.75 2.7 57.23 100 2.36 mm 0.4 0.85 17.02 74.05 300 microns 0.1 0.35 0.8 25 75 microns 0.05 0.1 0.05 1.5

[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**

<u>PART-B</u>

- 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. [CO-4] [L-3] **10**
- 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**

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] [CO-3] [L-2] d) What is quality assurance? 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] q) 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] i) What is water extinguisher? [CO-5] [L-5] 2×10

<u>PART-A</u>

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] 10b) 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**

<u>PART-B</u>

- 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] 10
 b) What changes are included in the "Safety and Health Audit Recognition Program (SHARP)" construction safety system? [CO-5] [L-4] 10
- Q.7a) 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**

M. Tech. – First Semester CONSTRUCTION CONTRACT MANAGEMENT (MCE-CM-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) 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?	[CO-4] [L-3]
g) Give the purpose of contract dispute resolution.	[CO-5] [L-2]
h) List any two essential elements of an arbitration agreement.	[CO-6] [L-2]
i)	Give any two benefits of labour codes.	[CO-6] [L-2]
j) Differentiate between living wage and starvation wage.	[CO-5] [L-2]
		2×10

<u>PART-A</u>

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 of	examples.
			[CO-1] [L-4] 10

Q.3	Discuss the following contracts with their advantages, disadvant	ages 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**

<u>PART-B</u>

- 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

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?	[CO-3] [L-1]
g)	What is the cost slope?	[CO-1] [L-1]
h)	What is resource allocation?	[CO-5] [L-1]
i)	Explain the fundamental of earthwork.	[CO-5] [L-2]
j)	List various types of depreciation.	[CO-6] [L-1] 2×10

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**

- a) In a construction project events have been identified as A to M, A is the start Q.4 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 [CO-3] [L-2] 5
 - b) Explain the various types of events in the network.

PART-B

In the network as shown, the three times viz. optimistic time, most likely time and the Q.5 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. [CO-6] [L-3] 10
 b) Define objectives of project evaluation. Also describe the different evaluation methods [CO-6] [L-4] 10
- 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**

M. Tech. – First Semester

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.

- d) Justify sulphate resisting cement used contemporarily.
- 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.
- j) What are the immediate and time dependent losses in prestressed concrete?

[CO-1] [L-3] **2×10**

[CO-2] [L-2]

[CO-3] [L-3]

[CO-3] [L-3]

<u>PART-A</u>

- 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**

4.75mm 2.36mm 1.18mm 600µm 150µm IS sieve size 10mm 300µm 75µm 100 92 74 55 23 12 9 7 Percentage 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) <u>Stipulation for Proportioning Concrete Ingredients:</u>
 - a) Characteristic compressive strength required in the field at 28 days grade : M $_{\rm 40}$
 - 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) <u>Test data of material:</u> 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 Applysic
 - c) Sieve Analysis: Fine aggregates : Confirming to Zone II of Table 4 IS – 383. [CO5][L6] **20**

<u>PART-B</u>

- 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**

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	An	swer 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.	[CO-6] [L-1]
			2x10

<u>UNIT-I</u>

- 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

<u>UNIT-II</u>

- 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**

<u>UNIT-III</u>

- Q.6 Explain therapeutic cloning? Describe the steps involved with clean and labelled diagram. [CO-5] [L-3] 20
- Q.7 a) Explain the gene therapy and its application in hemopoietic disorder.
 - b) Illustrate different types of stem cell line. How Stem cell line is differed from primary cell line.
 [CO-6] [L-4] 10

 [CO-6] [L-4] 10
 [CO-6] [L-4] 10

M. Tech. (Biotechnology) - First Semester 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]
 b) 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] 2×10

<u>UNIT-I</u>

- 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**

<u>UNIT-II</u>

- 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. [CO-6][L-4] **20**

<u>UNIT-III</u>

- 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**
M. Tech. (Biotechnology) – First Semester FOOD MICROBIOLOGY (M-BT-121)

Time: 3 hrs.

Max Marks: 100 No. of pages: 1

[CO-2] [L-2]

[CO-3] [L-2]

[CO-3] [L-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 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.
 - e) Explain food infections and food intoxications with examples.
 - 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] [CO-3] [L-2] h) What are artificial sweeteners? [CO-1] [L-2]
 - i) What food safety measures should be adopted for street foods? [CO-2] [L-2] 2×10
 - j) Explain GM foods briefly.

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

- Write short notes on the following: Q.6
 - 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 [CO-3] [L-4] **10** [CO-3] [L-4] **10** in our food supplies.
 - b) Discuss some harmful effects of food adulterants.

M. Tech. (Biotechnology) – First Semester **APPLIED BIOINFORMATICS (M-BT-102)**

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-1] [L-2] 10

[CO-1] [L-1] 10

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. [CO-3] [L-1] d) Explain Basic operators in Perl programming. [CO-1] [L-1] e) What do you mean by Maximum likelihood? [CO-6] [L-1] 4×5

PART-A

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

PART-B

- a) Apply Fasta algorithm on pair of sequence to show global alignment. [CO4] [L6] 10 Q.5 b) Using Perl programming transcribe DNA into RNA. [CO-2] [L-2] **10**
- a) How UPGMA method helps in phylogenetic analysis? Q.6 [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 [CO-5] [L-3] **5**
 - b) Show difference between sequence repeats and inversion.

M. Tech – First Semester **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 Prokarvotes? [CO-2] [L-2]
 - d) Compare the process of translation initiation in prokaryotes and eukaryotes.
 - e) Is it possible to clone a gene without a vector? Explain.
 - f) List the various types of nucleases that are used in biotechnology and give examples. [CO-3] [L-2]
 - q) 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] [CO-3] [L-2]
 - i) List the ingredients of a PCR mix.
 - j) Compare the sanger sequencing method with the next-generation sequencing methods. [CO-5] [L-2] **2×10**

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**

[CO-2] [L-2]

[CO-5] [L-2]

- 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

- How would you use lacZ alpha complementation for selecting clone of your interest, Q.5 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. [CO-3] [L-5] **20**

M. Tech – First Semester 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.
 - e) Is it possible to clone a gene without a vector? Explain. [CO-2] [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.
 - 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.
 - j) Compare the sanger sequencing method with the next-generation sequencing methods. [CO-5] [L-2] 2×10

<u>PART-A</u>

- Q.2a) Compare the A, B and Z forms of DNA.[CO-4] [L-2] 10b) 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**

[CO-3] [L-2]

[CO-3] [L-2]

- 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**

<u>PART-B</u>

- 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. [CO-3] [L-5] **20**

B. Tech. – Fourth Semester 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 $\frac{dy}{dx} + xy = 0$	3
b) Find the Laplace Transform of $f(t) = e^{-2t} \sin t$	<i>ut</i> . 3
c) Find the Eigen values and Eigen vectors of	$A = \begin{bmatrix} 2 & 1 \\ 0 & -1 \end{bmatrix}.$
d) Find the Fourier series of $f(x) = 1 c < x < c + 2$	2 <i>l</i> . 3
e) Write down auxiliary equation for Lagrange'	s method for $xp + yp = 1$. 3
f) Find the Fourier Transform of $f(t) = 2t$	3
g) Form a differential equation from $y = mx + c$	2. 2

PART-A

Q.2 a) Solve
$$\frac{d^2y}{dx^2} + 9y = e^x + \cos 4x$$
. [CO-1] [L-3] **10**

b) Solve
$$\frac{dy}{dt} = 2x$$
, $\frac{dx}{dt} = 2z$, $\frac{dz}{dt} = 2y$ [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:

$$(D^2 - 4D + 1)x = \cos t$$
 with $x = 2 \frac{dx}{dt} = -1$ at $t = 0$ [CO-2] [L-3] **10**

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

<u>PART-B</u>

Q.5 a) Expand f(x) = |sin x| as a Fourier series in the interval -π < x < π [CO-4] [L-2] 10
b) Express f(x) = x² in half range sine series in the range 0 < x < π. [CO-4] [L-3] 10
Q.6 a) Using Method of Separation of Variables solve the equation:

$$\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u \text{ Given that } u = 6e^{-3x} \text{ when } x = 0.$$
 [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^{-at} . b) State and Prove Convolution theorem for Fourier Transform.
- [CO-5] [L-3] **10** [CO-5] [L-2] **10**

End Semester Examination, Dec. 2022 B. Tech. – Third Semester

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 + iy, 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.

<u>PART-A</u>

Q.2 a) If
$$\frac{\sin(A+iB) = x+iy}{\cos^2 B}$$
 prove that
 $\frac{x^2}{\cosh^2 B} + \frac{y^2}{\sinh^2 B} = 1$ 6
b) Determine the analytic function $f(z) = u+iv$,
where, $u(x, y) = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$ 7
c) Evaluate $\iint \frac{e^z}{(z-1)(z-2)} dz$, where c is the circle $|z| = 3$ by Cauchy's integral formula. 7
Q.3 a) Expand $\frac{1}{z^2 - 3, z + 2}$ in the region $1 < 1z1 < 2$ in Laurent's series. 6
b) Evaluate the following integral by Cauchy's Residue Theorem: $\iint_{C} \frac{12z - 7}{(z-1)^2(2z+3)} dz$; where $C: |z+i| = \sqrt{3}$. 7
c) Evaluate the following real integral: 7

$$\int_{0}^{2\pi} \frac{d\theta}{1 - 2p\sin\theta + p^{z}}, \text{ where } p^{2} < 1.$$

Q.4 a) State and prove convolution theorem for Fourier Transform.

10

b) Find the finite Fourier, cosine Transformof

PART-B

- a) In a bolt factory, there are four machines A, B, C, D manufacturing 20%, 15%, Q.5 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? 10
 - b) Six dice are thrown 729 times. How many time do you expect at least three dice to show five or a six? 10

 $f(x) = \left(1 - \frac{x}{\pi}\right)^2, \ 0 \le x < \pi$

- a) One type of aircraft is found to developed engine trouble in 5 flights out of a total Q.6 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? 10
 - b) Fit a Poisson distribution to the following data and test the goodness of fit.

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:

Х	1	2	3	4	5
Y	14	27	40	55	68

10

Х 2 3 0 1 4 5 6 f 5 2 275 72 30 7 1

10

10

10

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 dig a) 4	nit of the sum of first b) 6	111 whole numbers? c) 5	d) 0	[CO-2] [L-1]
Q.2	<i>If the unit digit of (</i> <i>a) 1</i>	(433×456×43N) is (N b) 8	I+2), then what is the v c) 3	alue of N? d) 6	, [CO-1][L-1]
Q.3	In which position fr a) 81 st	rom the right is the fi b) 82 nd	irst non-zero digit presel c) 83 rd	nt in 334!. d) 84 th	? [CO-3] [L-1]
Q.4	Find the highest po a) 22	wer of 72 in 100! b) 24	c) 25	d) 27	[CO-1] [L-1]
Q.5	<i>What is the remain</i> a) 0	der when 4^ ⁹⁶ is divi b) 2	ided by 6? c) 3	d) 4	[CO-2] [L-1]
Q.6	Find the remainder a) 0	when 1! + 2! + 3! + b) 2	-4! + 5! + 10 c) 5	00! is divid d) 8	ded by 14. [CO-1][L-1]
Q.7	Evaluate: 5 × (2 × a) 134	34) ÷ 6 + 7 – 8. b) 145	c) 150	d) None	of these
Q.8	<i>The arithmetic mea Find the numbers. a) 133 and 17</i>	n between two num b) 63 and 87	bers is 75 and their geo. c) 3 and 147	metric me d) 73 ar	an is 21. [CO-1][L-1] nd 77
Q.9	Kanmani ranked six those who passed a five failed in it. Hov a) 35	teenth from the top an examination. Six l v many boys were th b) 45	and twenty ninth from a boys did not participate b pere in the class? c) 50	the botton in the con d) 55	n among npetition and [CO-2] [L-1]
Q.10	<i>The sum of three n a) 2,6 and 18</i>	umbers in a GP is 26 b) 2,6 and 20	5 and their product is 21 c) 4,6 and 18	6. Find the d) 6,18	e numbers. and 20 [CO-2] [L-1]
Q.11	What is the greates a) 193	st number which divid b) 183	des 639, 1065 and 1491 c) 223	exactly? d) 213	[CO-3] [L-1]
Q.12	In a queue of childi When they intercha the left. Then, what a) 8 th	ren, Arun is fifth from ange their places ame t will be Suresh's pos b) 14 th	n the left and Suresh is . ong themselves, Arun be sition from the right? c) 15 th	sixth from ecomes th d) 16 th	the right. irteenth from [CO-2] [L-1]
Q.13	Find the side of the meters 44cm long a a) 56 cm	e largest square slab and 3 meters 74 cm . b) 42 cm	which can be paved on broad. c) 38 cm	the floor o d) 34 cm	of a room 5 [CO-3][L-1] n
Q.14	<i>If x and y are two c then x + y =?</i> <i>a) 2</i>	digits of the number b) 3	653xy such that this nul c) 4	mber is di d) 5	visible by 80, [CO-3] [L-1]

Q.15	Without any stoppa km/h, and with stop km/h. How many m	nge, a person travels ppages he covers the pinutes per hour doe	<i>a certain distance at ar e same distance at an a s he stop?</i>	n average . verage spo	speed of 42 eed of 28 [CO-3] [L-1]
	a) 14 minutes	b) 15 minutes	c) 28 minutes	d) None	of these
Q.16	<i>The average of 17 t that of the last nine a) 11.8</i>	numbers is 10.9. If t numbers is 11.4, th b) 11.4	the average of first nine ne middle number is: c) 10.9	numbers (d) 11.7	is 10.5 and [CO-1] [L-1]
Q.17	Find the highest po a) 30	wer of 24 in 100! b) 32	c) 35	d) 38	[CO-1] [L-1]
Q.18	<i>Given: log ₈ (5) = b</i> a) (1+2b)/2	b. Express log ₄ (10) b) (1+3b)/3	in terms of b. c) (1+3b)/2	d) (1+2	[CO-1] [L-1] b)/3
Q.19	Amit started walkin left, then turned rig a) North or South	g positioning his bac ht and towards the b) East or West	k towards the sun. Afte left again. In which dire c) North or West	r some tin ction is he d) Souti	ne, he turned going now? h or West [CO-1] [L-1]
Q.20	Sum of first 25 tern common difference	ns in AP is 525, sum ? b) 4/25	of the next 25 terms is $(2) 6/25$	725, what	t is the [CO-2] [L-1]
	a) 0/2J	<i>U) 7/23</i>	() 0/25	u) 1/2J	
Q.21	How many three dig a) 260	git numbers are divis b) 280	sible by 5 or 9? c) 200	d) 180	[CO-2] [L-1]
Q.22	Sundar runs 20 m t the right and runs 9 left and runs 12 m of Sundar facing?	owards East and tur 9 m. Again he turns t and finally he turns t	ns to right and runs 10 to right and runs 5 m. A to right and 6 m. Now to	m. Then h fter this h o which di	e turns to e turns to rection is [CO-3] [L-1]
	a) East	b) West	c) North	d) Soutl	ני בין ניים און
Q.23	Suraj has a certain runs thereby increa innings?	average of runs for solutions	<i>12 innings. In the 13th 1 5 runs. What is his aver</i>	innings he age after i	scores 96 the 13th [CO-1] [L-1]
	a) 48	D) 64	C) 36	a) 72	
Q.24	If the 3rd and the 9 this AP is zero.	Oth terms of an AP a	re 4 and -8, respectively	, then wh	ich term of [CO-2] [L-1]
	a) 7 ⁿ	b) 4"	c) 5"	d) 6"	
Q.25	<i>Solve for x such tha a) 2</i>	at log ₂ 32 + log ₂ 16 b) 4	$f = (log_2 x)^2$ c) 6	d) 8	[CO-2] [L-1]
Q.26	pqr is a three digit i (q+r)*p?	natural number such	h that pqr=p!+q!+r!. Wh	hat is the I	/alue of [CO-3] [L-1]
	a) 1296	b) 3125	с) 19683	d) 9	
Q.27	A woman going wit between them. The uncle is the same." a) Mother and Son	h a boy is asked by a women replied, "My How is the lady rela	another woman about to v maternal uncle and the ted with that boy?	he relation e uncle of	nship his maternal [CO-1] [L-1]

122/4

c) Grandmother and Grandson

d) None of these

Q.28The 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 3,800b) Rs 3,500c) Rs 3,400d) 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.30Pointing 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) Brothera) Brotherb) Grandsonc) Cousind) 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) Trueb) False

- Q.32 Being busy:
 - 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.
 - 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

- 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 includea) Getting a good nights sleepb) Procrastinatingc) Having free timed) Being Flexible
- [CO-2] [L-1]

[CO-2] [L-1]

[CO-1] [L-1]

[CO-2] [L-2]

- *Q.37 Stress management is about learning*
 - 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*
- [CO-1] [L-1]

- c) Both '1' and '2' are true
- d) None of the above

Q.38	Which of the following are the ba	[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 awarenessb) Self esteemc) Self conceptd) 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 [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: [CO-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? [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 _____.
 - a) Simple
 - b) Short
 - c) Secure
 - d) Specific

[CO-1] [L-1]

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? [CO-1] [L-1]

- 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

[CO-2] [L-1]

B. Tech. – Sixth Semester MACHINE DESIGN-II (M-607)

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 '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?

<u>PART-A</u>

- Q.2. a) A forged steel bar, 50 mm in diameter, is subjected to a reversed bending stress of 250 N/mm² The bar is made of steel 40C8 (Sut = 600 N/mm^2). Calculate the life of bar for a reliability of 90%. Assume, ka = 0.44, kb = 0.85, ke = 0.897 **10**
 - b) Explain modified Goodman diagram for components subjected to fluctuating axial or bending stresses.
 10
- Q.3 a) A rotating shaft 40mm in diameter, is made of steel FeE 580 (Syt = 580 N/mm²). It is subjected to a steady torsional moment of 250 N-m and bending moment of 1250 N-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 50kw 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 N/mm^2) and the factor of safety is 4. Calculate the inside and outside diameters of the shaft. Assume Ssy = 0.5Syt. **10**
- Q.4 a) What are the applications of multi-leaf spring? Explain the objective of nipping of leaf spring.6
 - 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 N/mm². Design the spring and calculate:
 - i) Write diameter.
 - ii) No. of active coils.
 - iii) Mean coil diameter.

2×10

10

iv) Required spring rate and actual spring rate if spring index = 6, and G = 81370 N/mm². **14**

<u>PART-B</u>

Q.5	 a) A single-row deep groove ball bearing has a dynamic load capacity of 4050 operates 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 	00 N 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.	12 8
Q.6	a) Derive an expression for beam strength of gear teeth.b) Explain various causes of gear tooth failure.	10 10
Q.7	a) Explain the design considerations of casting.b) Explain the design considerations of machining.	10 10

B. Tech. — Fifth/Sixth Semester CAD / CAM (M-602)

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. Each question carries equal marks.

- 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 aovernina?
 - d) Define synthetic curves.
 - e) What do you mean by fixed zero and floating zero?
 - f) What are canned cycles?
 - a) Write the steps of reflection matrix when axis of reflection is y=mx.
 - h) How is automation Implemented.
 - i) Explain numerical control system.
 - i) Define 'ruled surface'.

2x10

PART-A

Q.2 a) Find the reflection matrix when axis of reflection is y = 3x + 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 P₂ (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) and (10,8)

8

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

5x2

PART-B

- a) Explain the coordinate system types and also explain the coordinate system used Q.5 in NC with it G code. 10 10
 - b) What is automation? What are the levels of automation?

10

Q.6 a) From a shaft of 25mm diameter, make a stepped shaft with dimension as shown in the figure below. Take speed 3000rpm and feed = 30mm/min.



- b) MRPI and MRPII.
- c) CAPP.
- d) Part classification and coding.
- e) MPS.

4×5

B. Tech. – Seventh Semester

NETWORK PROGRAMMING AND ADMINISTRATION (IT-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 auestion.
- Answer the following in brief: Q.1
 - 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?
 - q) Differentiate between authentication and authorization.
 - h) What is a router?
 - i) What is the function of a firewall?
 - i) Discuss the client stub.

PART-A

- a) A block of address is granted to a midsize organization. One of the address from a Q.2 block is "180.190.120.64/28". Answer the following:
 - Define the term "Default mask". Specify the default mask for the associated i) 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.
 - 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.
- 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. 10 5
 - b) Specify the role of "Select () and Poll ()" functions in socket programming.
 - c) Explain ECHO service with respect to TCP and UDP.
- 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

- a) What is dynamic port mapping? Write RPC port algorithm. Q.5 10
 - b) Compare the pros and cons of local procedural call and remote procedural call. 10

2×10

10

3

5

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

B. Tech. – Fourth Semester JAVA PROGRAMMING (IT-402)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

2×10

5

5

- 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.

<u>PART-A</u>

- 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 **10**
- Q.3 a) Write an applet to display an image.
 - b) What are the two ways to execute an applet? Explain.
 - c) Create a user-defined exception named check argument to check the number of arguments passed through comment line. If the number of arguments is less than five, throw the check argument exception, else print the addition of all the five numbers.
- 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 a university such that the courses selected would be displayed.
 10

<u>PART-B</u>

- Q.5 a) What is remote method invocation? Write steps to set up remote method invocation. 10b) 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. 10
 b) What is multithreading? Explain complete life cycle of a thread. Write a program to show the concept of multithreading. 10
- Q.7 a) Discuss the JDBC drivers.

5

5×2

b)	What	is	the	difference	between	statement,	prepared	statement,	and	callable
	staten	nen	nt?							5
c)	Write	a p	rogra	am to conne	ect to a da	tabase and	retrieve the	e data.		10

End Semester Examination, Dec. 2022 B. Tech. – Seventh Semester HUMAN RESOURCE MANAGEMENT (HM-822)

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. 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. 5×4 PART-A a) What are the various functions of HRM? What is its strategic importance? 10 Q.2 b) Discuss the evolution of HRM and what is futuristic HRM going to be. 10 a) Distinguish between recruitment and selection. 8 Q.3 b) Explain the processes of recruitment and selection in detail. 12 a) Explain the process of HR planning. What factors affect HRP? 12 Q.4 b) How is forecasting of manpower carried out? 8 PART-B How would you design and administer a training programme? Q.5 20 What is performance management system? Demonstrate the process of performance Q.6 management system. 20

Q.7 a) Evaluate the role of human resource in knowledge industry.
 b) Discuss the role of human resource in mergers and acquisitions.
 10

Max Marks: **100** *No. of pages: 1*

End Semester Examination, Dec. 2022 B. Tech. – Eighth Semester 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. 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.

5×4

<u>PART-A</u>

- 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. 20

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. b) Discuss the role of HR in mergers and acquisitions. 	10 10

b) Discuss the role of HR in mergers and acquisitions.

End Semester Examination, Dec. 2022 B. Tech. — Sixth Semester

SPANISH (HM-608)

Time: 1½ hrs. Marks: **50**

pages: 3

Max

No. of

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



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?: _____
- c) ¿A qué se dedica Sergio González?:
- d) ¿Cuántos años tiene Ángela?: _____
- e) ¿Cómo es la casa de Sergio?: _____
- f) ¿Qué significa grande?: _____
- g) ¿Qué es el número de teléfono? ______

Q.3 Mira al dibujo y responde a las preguntas.

(L3) **8**

(CO2)

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?

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_____ de Colombia.
 - b) Ellos ______ profesor.
 - c) Vosotras ______ amigas.
 - d) Él _____un alumno serio.
 - e) Tú y yo _____ de India.
 - f) Ella _____ mi madre.
 - g) Tú _____ muy guapo.
 - h) Susana y María _____ muy simpáticas.
 - i) Usted _____ muy inteligente.

j) Yo ______ de California.

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

(CO4)(L3) **5**

Convert the following sentences into plural form.

- a) La silla_____
- b) La rosa _____
- c) El hombre_____
- d) La camisa_____
- e) El bolígrafo _____
- f) El dedo _____
- g) La hermana _____

Q.7 **Completa con el artículo indeterminado.**

(CO4)(L4) **5**

Complete with indefinite article.

- a) _____ estudiante
- b) _____ móvil
- c) _____ mesas
- d) _____ sillas
- e) _____ chico
- f) _____ hermana
- g) _____ bolso
- h) _____ mapas
- i) _____ libros
- j) _____ teléfono

B. Tech. — Fifth Semester **SPANISH (HM-608)**

Time: 1½ hrs. Marks: 50 pages: 2 Note: Attempt ALL questions are compulsory. Marks are indicated against each Q.1 Escribe las preguntas de siguientes respuestas. Given below are some answers, you have to write the Spanish que the answers. (14) 5 a) a)				
pages: 2 Note: Attempt ALL questions are compulsory. Marks are indicated against each Q.1 Escribe las preguntas de siguientes respuestas. Given below are some answers, you have to write the Spanish que the answers. (L4) 5 a)	Time:	1½ Ma	2 hrs. Irks: 50	Max
pages: 2 Note: Attempt ALL questions are compulsory. Marks are indicated against each Q.1 Escribe las preguntas de siguientes respuestas. Given below are some answers, you have to write the Spanish que the answers. (L4) 5 a)				No. of
 Q.1 Escribe las preguntas de siguientes respuestas. Given below are some answers, you have to write the Spanish quitte answers. (L4) 5 a) 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 M mi familia y tengo 15 años. Soy estudiante de idiomas en un co 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) ¿Qué significa buenos dias? Q.3 Conjuga los verbos y traduce: Conjugate the verb & translate: (L3) 5 a) Ellos(estudiar) español. b) Yo(bailar) en la fiesta. c) ¿ (vivir) tú en Madrid? d) Vosotros(vivir) tú en Madrid? d) Vosotros(viajar) a Perú cada año. 	Note:	pa <u>.</u> Att	ges: 2 tempt ALL questions are compulsory . Marks are indicated aga	ainst each question.
 Soy de India. Soy de India. Tengo 20años. Estoy bien. 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 M mi familia y tengo 15 años. Soy estudiante de idiomas en un co 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 (estudiar) español. b) Yo (bailar) en la fiesta. c) ¿ (hoblar) francés. e) Nosotros (hoblar) francés. e) Nosotros (viajar) a Perú cada año. 	Q.1	Es Giv the (L4 a)	cribe las preguntas de siguientes respuestas. ven below are some answers, you have to write the Sj e answers. ŧ) 5	panish question to (CO2)
 c) Tengo 20años. c)		h)	Soy de India.	
 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 M mi familia y tengo 15 años. Soy estudiante de idiomas en un co 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 (estudiar) español. b) Yo (bailar) en la fiesta. c) ¿ (vivir) tú en Madrid? d) Vosotros (viviajar) a Perú cada año. 		c)	Tengo 20años.	
 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 M mi familia y tengo 15 años. Soy estudiante de idiomas en un co 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 (estudiar) español. b) Yo (ballar) en la fiesta. c) ¿ (vivir) tú en Madrid? d) Vosotros (viajar) a Perú cada año. 		d)	Estoy bien.	
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 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?		gra	ande que se llama Escuela de St. Peters. iHasta pronto! (CO1) (L2) 5	en un colegio muy
 b) iDónde vive ella y con quién? c) iCuántos años tiene? d) iA qué se dedica ella? e) iQué significa buenos dias? Q.3 Conjuga los verbos y traduce: Conjugate the verb & translate: (L3) 5 a) Ellos (estudiar) español. b) Yo (bailar) en la fiesta. c) i (tvir) tú en Madrid? d) Vosotros (hablar) francés. e) Nosotros (viajar) a Perú cada año. 		a)	¿Cómo se llama la chica?	
 c) čCuántos años tiene? d) čA qué se dedica ella? e) čQué significa buenos dias?		b)	¿Dónde vive ella y con quién?	
 d) <i>i</i>A qué se dedica ella? e) <i>i</i>Qué significa buenos dias?		c)	¿Cuántos años tiene?	
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 a) Ellos (estudiar) español. b) Yo (bailar) en la fiesta. c) ¿ (vivir) tú en Madrid? d) Vosotros (hablar) francés. e) Nosotros (viajar) a Perú cada año. 	Q.3	Co Co		(CO6)
	(L3) 5	a)	onjuga los verbos y traduce: onjugate the verb & translate:	()

Q.4	Como se dice las siguiente Write the correct english r	es palabras en ing name in front of S	lés. panish.	(CO4)
(L5) 5			•	, , , , , , , , , , , , , , , , , , ,
	a) Libro			
	 D) Doctor c) Español 			
	d) Mi nombre es	· · · · · · · · · · · · · · · · · · ·		
	e) Buenos días		_	
Q.5	Escribe los números en ing	glés.		
	Write the numbers in Engl	ish.		(CO2)
(L6) 5				
	Eg. Ques. $2 + 2 = $?			
	a) $3+4 =$?	
	b) 5+ 0 =		?	
	c) 8 + 1 =		_?	
	d) $9-6 =$		_? 	
	e) 0 + 4 =		f	
Q.6	Cambia las palabras a Sing	gular. Change the	words to singula	r (CO1)
(L3) 5				
	a) coches			
	b) Libros			
	c) Niños			
	d) Botellas			
	e) Mesas			
Q.7	Traduce las siguientes fras	ses. (Translate the	e below lines).	(CO2)
	a) Hola! Mi nombre es Privan	shi.		
	b) Soy estudiante.			
	c) Nombre de mi colegio es N	4RU		
	d) Vivo en India			
	e) Soy médico en el hospital		· · · · · · · · · · · · · · · · · · ·	
	f) Yo tengo 21 anos		······································	
	 b) Mi cologio os grando 			
	i) Mi madre se llama Sanjana			
	j) Mi padre se llama Rohit	·		
Q.8	Elige el significo correcto	de la caja para la box for the below	s palabras siguie (words)	
	(L6) 10			(000)
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 GERMAN (HM-607)				
Time:	1½ hrs.			Max		
	ма	rks: 50	No.	of		
Note:	pag Att	ges: 4 tempt ALL questions are compulsory . Marks are indicated against each	questic	n.		
Q.1 (L3,4) Q.2 (L1) 4	Ve 5	rbinden Sie die Sätze.	(CO3))		
	[F ¢ z.b	orm the sentences using correct modal verbs.] kann/er/Schwimmen/gut/sehr- Er kann sehr gut Schwimmen.				
	a)	Kann/gut/spielen/kann/Gitarre				
	b)	Keinen/Tee/möchte/er/trinken.				
	c)	Du/sollst/Medikamente/nehmen				
	d)	Will/nach/Deutschland/Tina/fahren.				
	e)	für /die/muss/Prüfung/Peter/studieren.				
	Schreiben Sie die bestimmten Artikel im Akkusativ.		(CC	13)		
	[W	Irite the indefinite articles in accusative.]				
	a)	Steffi braucht Farbenstift. (der/den/die)				
	b)	Vera sucht rote Tasche. (die/den/der)				
	c)	Die kinder spielen in Garten. (der/die/den)				
	d)	Buch ist sehr interessant. (das/die/der)				
	e)	Ich trinke nicht Cola. (der/die/das)				
	t)	wir mochten Hamburger essen. (den/der/die)				
	g)	Kannst du mir Lineal geben? (die/das/der)				
	n)	Genen Sie noch in Schule? (den/die/das)				

Q.3 Ergänzen Sie die konjugierte Verben.

(CO3)

(L3, 4) **5**

[Fill in the conjugated verbs.]


- c) _____ Winter fliegt Maria nach Deutschland.
- d) _____ 11 Uhr geht sie in die Klasse..
- e) _____ Samstag habt ihr frei.

Q.7 Schreiben Sie die Gegenteile von den folgenden Adjektiven. (CO3,5) (L1, 4) 3

[Write the opposites of the given adjectives.]

				billig, groβ, kurz, hell, unbequem,uninteressant			
	a)	lang	х				
	b)	teuer	x				
	c)	bequem	x				
	d)	klein	x				
	e)	dunkel	x				
	f)	interessa	ant x				
Q.8	Erg (L3 [Fi	gänze: ha 3,4) 5 III in the l	atten od blanks u	er waren. sing past tense.]			(CO3)
	a)	Maria		im Kino.		[hatte/war]	
	b)	Ich		keine Zeit gestern.		[hatte/war]	
	c)	Das Kon	zert	toll?		[hatte/war]	
	d)		du	viel Spaβ letztes mal?		[hattest/wars	st]
	e)	Wann		er Pause?		[hatte/war]	
Q.9 (L3,4)	Se 4 [Fi	tzen Sie II the sej	die Tren parable v	nbare Verben in der ric verbs in the correct for	htigen Forn m.]	n ein!	(CO3)
	a)		dı	u deine CD's	?		
		[mitbring	en]				
	b)	Ihr		_ neues Auto	·		[einkaufen]
	c)	Tina		ihre Freundin			[anrufen]
	d)	Das Konz	ert	um 23 Uhr			[anfangen]
Q.10 (L1, 4)	We) 4	elches Bi	ld ist das	5?			(CO3,5)
	[T	ranslate	the follo	wing words.]			





(L3, 5) **5**

[Write any 5 sentences about your friend]

End Semester Examination, Dec. 2022 B. Tech. — Sixth Semester

FRENCH (HM-606)

Time: 1¹/₂ hrs.

Marks: 50

pages: 5

Note: Attempt ALL questions are compulsory. Marks are indicated against each question.

Section A **CompréhensionÉcrite**

Q.1 Lisez le passage et répondez aux questions.

(CO5) (L5)

(Read the passage and answer to the questions)

Bonjour Louise, 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 l'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)

Décrivez la maison de Julien en 2-3 lignes? i.)

Max

No. of

Le 18

Qu'est-ce que Julien fait le matin ? ii.)

B. Dites vrai ou faux :

5

(True or False)

- i.) Julie habite à Paris.
- ii.) Julien étudie le français.
- iii.) Julien adore L'Italie
- iv.) Julien est en vacances à Rome.
- v.) La maison de Julien est grande.

Section-B 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)

Section-C Grammaire

Q.3 **Complétez avec les adjectifs possessifs (mon,ma,ton,ta....).** (CO5) (L5) **5**

(Complete with possessive adjectives)

- a) Ils finissent _____ devoir.
- b) Nous sommes dans _____ classe.
- c) Elle invite _____ parents.
- d) Tu fais ______ travail.
- e) Je regarde _____ professeur.

Q.4 Complétez avec les adjectives.

(CO1) (L1) **6**

(Complete with the adjectifs)

- a) La table est_____(red)
- b) La télè est_____(big)
- c) Le dictionnaire est_____(thin)
- d) Le mur est_____(pink)
- e) Ils ont des crayons _____(black)
- f) La fille est _____ (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	fém	inin.	
-----	--------	----	-----	-------	--

(CO2) (L2) **5** (Make these sentences feminine.)

a) Le mécanicien est intelligent.

b) Ils sont anglais.

c) Le professeur est sympathique.

d) Il est belge.

e) L'architecte est gros.

Q.7	Complétez avec les prépositions donné (CO4) (L2) 6 (Complete with the given prepositions) Près de, avant , sous, à droite de, devan entre	es. nt,
	a) Nous faisons nos devoirs	le dîner. (before)
	b) La table est	du lit. (in front of)
	c) Il y a une forêt	ma maison. (near)

d) L'armoire est_____les tableaux (between)

- e) Le chat est_____la chaise.(under)
- f) Lapis cine_____l'hôtel. (on the right of)

Q.8 Conjuguez les verbes.

(L6,1) **6** (Conjugate the verbs)

- a) J' ______ la petite fille.(regarder)
- b) Vous ______ demain.(voyager)
- c) Les filles ______ anglais.(parler)
- d) Nous _____au cricket.(jouer)
- e) Ils _____ dans la salle de bains. (Se laver)
- f) Tu _____ à 7h ? (Se promener)

Section-D Culture and Civilisation

Q.9 **Réliez les colonnes.**

(CO6) (L1) **5** (Match the Columns)

Colonne A

Colonne B

Answers

Les Pyrénées Le camembert Dior La Seine Le Bordeaux

Un fromage Un vin Une montagne Un parfum Un fleuve (CO3)

(CO2)

End Semester Examination, Dec. 2022

B. Tech. — Fifth Semester SPANISH (HM-508)

Time:	1½ hrs.	М	ax	
	Marks: 50	No	2.	of
	pages: 4			

Note: Attempt ALL questions are compulsory. Marks are indicated against each question.

Q.1 ¿Cómo se dice en inglés? [Write the correct English names in front of Spanish?]

- (L4) **21/**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 = 4Ans. Dos + dos = cuatro

a)	4+2 = 6	?
b)	22+ 12= 34	?
c)	6 + 2 = 8	?
d)	11 + 10 = 21	?
e)	14 + 35 = 49	?

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)	<u>.</u>
	b)	
	c)	·
	d)	·
	e)	
Q.5	Cambia las palabras a plural. [Change the words to plural]	(CO5)
(L4)	21/2	
	Eg. Mesa = <u>Mesas</u>	
	f) silla	
	g) Amiga	
	h) Niño	
	i) colegio	
	j) Chico	
Q.6	Contesta las siguientes preguntas. [Answer the following questions in	Spanish]
		(CO)
		6) (L2) 5
	a) ¿Cómo estás?	
	b) ¿Dónde vives?	
	·	
	c)	
	·	
	Me llamo María.	
	d) ¿Cuál es tu profesión/ A qúe te dedicás?	
	e) ¿De dónde eres?	

Q.7 Busca los errores en las siguientes frases. [Find the error in the below sentences.]

(CO6)

(L4) **21/2**

- 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]	(CO1) (L1)
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
n)	Es un colegio muy famoso
o)	Soy un estudiante serio
p)	Yo tengo 20 anos
q)	Nombre de amigo es Navneet
r)	Mi colegio es bonito

- s) Susana habla español _____
- t) Mi padre se llama Rohit _____

Q.10~ Escribe el nombre del miembro de la familia. [Write the name of the family member]

(CO6) (L2) **2½**

- a) Madre de mi madre es mi _____
- b) Hijo de mi tío es mi_____
- c) Esposo de mi madre es mi_____
- d) Hija de mi padre es mi _____
- e) Hijo de mi abuelo es mi_____

Q.11 Lee las frases y corrígelas. [Read the sentences and correct it. Write no error in case of no error found]. (CO2) (L6) 21/2

- a) Este lápiz es de Juan.
- b) Aquella Bolso es Negro.
- c) Ese chica es mi amiga.
- d) Esta mesa es nuevo.
- 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]

(LΟ	6)	()	L6) :	5	
•			•				

Quién	Cómo	Cuántos	Dónde	Cuál
-------	------	---------	-------	------

- a) ¿_____ es tu madre?
- b) ¿______ vives?
- c) ¿_____ es tu número de teléfono?
- d) ذ_____ estás?
- e) ¿_____ estudiantes hay?

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester GERMAN (HM-507)

Time: $1\frac{1}{2}$ hrs.

Max Marks: 50 No. of pages: 4

Note: *ALL* are *compulsory*. Marks are indicated against each guestions:

Q.1 Lesen Sie dieTexte und antworten Sie die Fragen! (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
 - iii) Wirtschaft
- b) Wie alt ist Maike?
 - i) 19 Jahre
 - iii) 21 Jahre
- c) Wo wohnt Maike?
 - i) Sie wohnt in Lübeck.
 - iii) Sie wohnt in Berlin.
- d) Was kauft Ricarda am liebsten?
 - i) Essen und Trinken
 - iii) neue Schule
- e) Wohin gehen sie gern abends?
 - i) Kaffee trinken
 - iii) Einkaufen

- ii) Medizin iv) Jura
- ii) 20 Jahre
- iv) 22 Jahre
- ii) Sie wohnt in Hamburg.
- iv) Das steht nicht im Text
- ii) Schmuck
- iv) Filme
- ii) Eis essen
- 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?

157/4

- i) 3
- iii) 5
- b) Wo wohnt die Familie?
 - i) in einem Garten
 - iii) in einer Wohnung
- c) Haben sie Kinder?
 - i) nein
 - iii) ja, ein Kind
- d) Arbeitet die Mutter?
 - i) Ja, abernurhalbtags
 - iii) Nein, sie ist Hausfrau
- e) Wer gehört noch zur Familie?
 - i) eine Katze
 - iii) Oma und Opa
- Q.2 Beantworten Sie,bitte! (Answer the following):

A. Übersetzen Sie auf Englisch. (Translate into English)

ii) 4

- iv) 6
- ii) in einer Stadt
- iv) in einem Haus
- ii) ja, zwei Kinder
- iv) ja, drei Kinder
- ii) Ja, sie arbeitet von 9 bis 17 Uhr
- iv) Davon steht nichts sim Text
- ii) ein kleiner Hund
- iv) Onkel und Tante
- [L1, 6] 1×10

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.

[L1, 4] **5**

(Who is this?)

B. Wer ist das?



i) Sie ist _



ii) Er ist _____

[L6] **2**

	C.	Welches Wort passthier? (Fill in the blank with suitable (ist/bin/wohne/mein/in/meine/hei Servus, Name ist	e word iβt/in/v Rolanc	l in German.) vohnt/E-mail addres I Maurer. Ich	se) 30	jahre a	ılt. Ich
		in Linz. Linz liegt _		Osterreich	Fre	eundin_	
		Anna. Sie in Pasing. Das	s liegt	Munche	n. Ihre 1	Telefonn	ummer
		0897654323 Meine _		ist <u>rolan</u>	d.maurer	@gmail.	<u>com</u> .
							[L6] 5
	D.	Beantworten Sie die folgende (Answer the following questic i) Wann ist dein Geburtstag?	n Frag ons)	gen!			
		ii) Heute ist Montag. Morgan ist?					_
		iii) Wie heiβt dein Freund?					- [1] 2]
	3					<u> </u>	[LI, 3]
	(i) ii) iii) iv) v)	Lehrer Ball Freundin Kuli Frau					[L 5] 5
Q.4	Er (Fi (s i) ii) iii) iv) v)	gänzen Sie die richtige verben. ill in the blanks with appropria ein/kaufen/schenken/spielen/ Er zwei Kilo Zweibe Was du dein Tina eine Cola ur Sie die Tante von Tina Mein Freund gern Bas	te ver /bring In. e Mutt nd eine und M sketbal	' b forms.) en) er zum Geburtstag? e Limonade mit. arx.			[L2] 5
Q.5	Er (F a) b)	gänzen Sie. ill in the blank with the approp When does the Oktoberfest start? i) early November Famous eatable in Oktoberfest is?	oriate ' ii)	information abour	t Germa	any):	
	c)	i) Wurstchen Capital of Germany is	ii)	Ginger Heart Bread			
	,	i) Wien	ii)	Berlin			

d)	The famous river of Germany is	
-	i) Rhein	ii) Hudson
e)	Lara kommt aus	Sie spricht Deutsch.
-	i) Polen	ii) die Schweiz

Schreiben Sie über eins der folgendenThemen. (Write on any one of the topics given below in 60-80 words.) Q.6

- i) Mein Hobbyii) Meine Familie

[L1, 2] **5**

_



End Semester Examination, Dec. 2022

B. Tech. — Fifth Semester FRENCH (HM-506)

Time: 1½ hrs. Marks: **50** Max

No. of

pages: 4 Note: Attempt **ALL** questions are **compulsory**. Marks are indicated against each question.

<u>Section-A</u> 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 4. Fils-Sons
- 2. Mari-husband 5. 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?

Section B EXPRESSION ÉCRITE

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

Décrivez votre ami(e) (Describe your friend)

<u>Section - C</u> <u>Grammaire</u>

Q.3 Conjuguez les verbes.

(CO3,4) (L2) **5**

(Conjugate the verbs)

- a) Je ______ le film anglais.(Regarder)
- b) Ils _____ en vacanes. (Aller)
- c) Elle _____ Indienne. (Être)
- d) Tu ______ en Inde? (Habiter)
- e) Nous ______ le gateau au chocolat.(Faire)

Q.4 Quelle heure est-il ?

(CO3) (L1) **5**

(What time is it ?)

a) 07:45:			
b) 06 :30 :			
c) 02 :55 :-			
d) 04 ·10 ·-			
a) 07:10:			
e) 03:05:			·
Q.5 Complétez avec les r	ombres ordinaux		
(CO2) (L3) 5 (Complete with ordi	nal numbers)		
a) Samedi est le	jo	ur de la semaine.	
b) Septembre est le _	r	nois de l'année.	
c) Mai est le	mois	s de l'année.	
d) Lundi est le	jour	de la semaine.	
e) Jeudi est le	jour d	de la semaine.	
Q.6 Remplissez les bland (CO2) (L3) 4 (Fill the blanks)	cs :		
a)	est le troisiè	me jour de la semaine.	
b)	est le onzièr	ne mois de l'année.	
c)	est le deuxiè	eme mois de l'année.	
d)	est le septiè	me jour de la semaine.	
Q.7 Complétez avec les a (L4) 2½ (Complete with defin	articles définis. nite articles -le, la	n, l', les)	(CO4)
a) J'adore	glace et	bonbons.	
b) Nous regardons	télévisi	on.	
c) étudia	nt est dans la classe	2.	
d) Il aime	gâteau.		
Q.8 Complétez avec les a (L4) 2¹/2	articles indéfinis :		(CO4)

(Complete with indefinite articles – un, une, des)

a) Elle a stylo	
b) Ce sont ga	rçons.
c) J'ai trous	se.
d) Il a chapea	u.
e) Nous avons c	rayons.
Q.9 Traduisez en français (CO5) (L4) 4 (Translate into french)	:
a) It is cold	
b) It's hot	
c) It's raining.	
d) It's pleasant.	
(Translate the wor a) Enchantée :- b) À Demain :- c) Bonne Chance :- d) Merci beaucoup :-	rds)
B) Complétez avec le 2 (0	es pronoms sujets. Complete with subject pronouns)
a) cł	nantons bien.
b) jou	uent ensemble.
c)a	imez la glace ?
d)	oarles deux langues?
Q.11 Complétez les phra (CO6) (L1) 5	<u>Section-D</u> <u>Culture and Civilisation</u> ses.
(Complete the sent	ences)
a)	_ est la monnaie unique Européenne.
b)	est la capitale de la France.



et _



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//	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 cm² b) 300 cm² c) 40 cm² d) 480 cm²
- 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 25m long, 12m wide and 6m deep. The cost of plastering its walls and bottom at 75 paise per sq.m is?*
 - a) `456 b) `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) 16cm
 b) 18cm
 - c) 24cm d) 20cm
- *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) ½ 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_____*
- 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_____
- 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?



- *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!×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?



- *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
 - d) None of these c) Should

- 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

B. Tech. – First/Second Semester BASIC ELECTRICAL ENGINEERING (ESC-EE-101/BEE-101/BEE-101A)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-1] [L-3] [CO-2] [L-2]

[CO-1] [L-1]

[CO-3] [L-2]

[CO-1] [L-2]

[CO-2] [L-1]

[CO-4] [L-2] [CO-3] [L-3]

[CO-4] [L-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.

- b) Define mesh of a network.
- c) State Kirchoff's current law.
- d) The slip of three phase induction motor at starting is _____.
- e) In a pure inductive circuit_____ lags __
- f) State the condition of resonance in a series RLC network.
- g) Name two power semiconductor devices.
- h) Field system is rotating in _____ machines.
- i) Write down the emf equation of the transformer.
- j) What is an auto transformer?

PART-A

- Q.2 a) Explain Superposition Theorem
 - b) Find the current in 8Ω resistor using Superposition theorem.
- [CO-1] [L-2] **10** [CO-2] [L-4] **10**

[CO-1] [L-2] 2×10



Q.3 a) An alternating voltage of 220V is applied to an RLC network of resistance 10 Ω ,

inductance 25mH and capacitance 15 $\mu\text{F}.$ Find:

- i) impedance.
- ii) current
- iii) power factor
- iv) voltage drop across capacitance.

[CO-2] [L-2] **5**

[CO-3] [L-4] **5**

[CO-4] [L-3] 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] 6+4

- 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**

<u>PART-B</u>

Q.5 a) Draw and explain the parts of a dc machine.

[CO-5] [L-2] **10** 174/4

	b) Explain the speed control of a dc shunt motor	[CO-4] [L-2] 10
Q.6	a) Explain the working of a three phase induction motor.b) Explain any two single phase induction motor.	[CO-5] [L-2] 10 [CO-6] [L-4] 10
Q.7	a) What is the necessity of earthing? Explain plate earthing with the diagram.	help of a
	b) Explain the charging and discharging procedure of a Lead acid ba	[CO-1] [L1] 10 Ittery with

relevant equations.

[CO-1] [L-2] **10**

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.
 2×10

<u>PART-A</u>

Q.2	a) What you mean by operating system? State various types of operating systems	10
	b) Design an algorithm and a flowchart for largest of three numbers.	10
Q.3	a) List and explain loop control (or) iteration statements in C.	10
	branching.	10
Q.4	a) Define 'sorting'. Explain different types of sorting algorithms along with their complexity.	10
	b) Write a program to calculate the roots of quadratic equation.	10
	<u>PART-B</u>	
Q.5	a) Compare call by value and call by reference by citing examples.	10

b) Write a Pseudocode for selection sort. Explain its further working and complexity.
 10

Q.6	a) Write a recursive function to print Fibonacci series of n natural numbers.b) Write a C program to implement strcmp(), strcat(), strcpy() and strlen().	10 10
Q.7	a) What are the different file opening mode and functions available in 'C' language. Explain in detail.b) Define 'pointer'. Explain declaration and initialization with the help of a program.	10 10

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: 100

No. of pages: 1

[CO1] [L2]

[CO1] [L2]

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.

- Answer the following in brief: Q.1
 - a) Define 'impedance'.
 - b) State Kirchoff's voltage Law.
 - c) State any two advantages of three phase system over single phase system.

 d) Define mesh and node of a network. 	[CO1] [L2]
e) Write an expression for slip of an induction motor.	[CO1] [L2]
f) Moving Iron voltmeter has scale.	[CO3] [L2]
g) What is a shell type transformer?	[CO4] [L2]
h) What is an auto transformer?	[CO4] [L2]
i) State the condition for resonance of a series RLC network.	[CO1] [L2]
j) What are different types of excitation of a dc machine?	[CO5] [L2] 2×10

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 = 220V is applied to a network having R=100ohm and L=10mH and c=100µF. 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**
- [CO3] [L2] 10 Q.4 a) Explain construction of permanent magnet moving coil voltmeter. [CO3] [L2] **10**
 - b) Explain the construction of induction type energy meter.

PART-B

- a) State and explain the working principle of a transformer. Q.5 [CO4] [L2] **5**
 - b) Explain the various losses of a transformer.
 - c) Define efficiency of a transformer. Derive the condition for maximum efficiency of a transformer. [CO4] [L2] **10**

[CO4] [L2] **5**

Q.6a) Explain the parts of a dc machine with a neat diagram.[CO5] [L2] 10b) Differentiate between dc shunt generator and dc series generator.[CO5] [L2] 5c) State the applications of a dc series motor.[CO5] [L2] 5

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 40mH is connected across a 200V, 50Hz supply. What will be its inductive reactance?
 - j) Name the two types of three phase induction motors.

2×10

10

10

10

<u>PART-A</u>

Q.2 a) Find the current in the 4Ω for the network given in the figure.



b) State and Explain Superposition theorem.

- Q.3 a) A coil of resistance 10 Ω and an inductance of 100 mH is connected in series with a capacitance of 40 μ F across 200 V, 50 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.
 10

b) Explain the working and construction of induction type wattmeter.	10
a) Explain the working and construction of PMMC voltmeter.	10
	a) Explain the working and construction of PMMC voltmeter.b) Explain the working and construction of induction type wattmeter.

<u>PART-B</u>

- Q.5a) Explain the working principle of a single phase transformer.10b) Differentiate shell type and core type transformer.10
- Q.6 a) Draw the parts of a dc machine and explain in detail.

180/4

10
	b) Derive the emf equation of a dc machine.	10
Q.7	a) Explain the working principle of $3-\Phi$ induction motor. b) Explain the working principle of Synchronous generator.	10 10

End Semester Examination, Dec. 2022 B. Tech. – Fourth Semester HARDWARE DIGITAL DESIGN (EC-422)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

2×10

- 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 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?
 - q) 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) b) c)	Design a flow logic for implementing digital circuits in digital VLSI design. Differentiate behavioral and dataflow modeling using suitable examples. What are different hardware description languages? Compare them to be used for different applications.	10 5 5
Q.3	a) b) c)	What is a signal driver? Also, discuss the impact of inertial delay model on a signal driver. How can a memory space of 32 x 8 bit be declared in VHDL? Explain various modes declared for a port in an entity.	10 8 2
Q.4	a) b)	Design a BCD to excess 3 code converter using behavioral modeling. Design a 4-bit full adder with the help of generate statement.	10 10
Q.5	a) b)	<u>PART-B</u> Design an asynchronous decode counter in VHDL using structural modeling. Write VHDL code of SR flip-flop using behavioural modeling.	10 5
0.6	c)	What are type conversion functions? Write a type conversion function to convert	5
Q.0	b)	a binary number to a decimal number. Design a state machine for 4-bit synchronous up counter and write its VHDL code.	10 10
Q.7	a) b) c)	Design a simple microcomputer system using VHDL. Write VHDL code for 2-byte ROM in behavioural modeling. Differentiate FPGA and CPLD.	10 5 5
	-	182/4	

End Semester Examination, Dec. 2022 B. Tech. – Fourth Semester

ELECTROMAGNETIC THEORY (EC-421)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

10

10

10

10

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 $\[\prod \vec{B} \cdot \vec{ds} = 0 \]$.
 - 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 $3 \times 10^6 Hz$ and resistivity of $3 \times 10^{-3} ohm$ -cm.
 - i) What are the conditions for short circuited line?
 - j) Define characteristic impedance of a transmission line. **2×10**

<u>PART-A</u>

- Q.2 a) Transform the vector:
 - i) $r(\hat{a}_{\phi} + \hat{a}_{z})$ and
 - ii) $r(\hat{a}_{\theta} + \hat{a}_{\phi})$ in Cartesian coordinate system.
 - b) Check validity of divergence theorem for vector $\vec{A} = 4x\hat{a}_x 2y^2\hat{a}_y + z^2\hat{a}_z$ taken over a cube bounded by x = 0; x = 1, y = 0; y = 1, z = 0; z = 1. **10**
- 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 ' ρ_L ' c/m. **10**
 - b) Derive the Laplace's equation and Poisson's equation in all coordinate systems.
 10
- 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.

<u>PART-B</u>

- Q.5 a) Show Maxwell's equation for static fields. Explain how they are modified for time varying electric and magnetic fields. 10
 - 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. **10**
 - b) Write a short note on smith chart and write the condition for lossless, lossy, open circuit and short circuit line.
 10

- 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 $E=94.25 \cos(\omega t+6z) \text{ âx V/m}$. Calculate the:
 - i) Velocity of propagation.
 - ii) Wave frequency.
 - iii) Wavelength.
 - iv) Magnetic field intensity.
 - v) average power density in the medium.

2×5

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.

- Answer the following questions: Q.1
 - 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?
 - q) Differentiate between memory mapped I/O and peripheral mapped I/O.
 - h) Find out the number of address lines required to interface a 4KB 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.

2×10

8

8

4

10

10

10

10

PART-A

Q.2	a)	Explain	the	architecture	e, data	flow	and	instru	ction	execution	of	8085	
microprocessor.							10						
	b)	With t	iming	diagram,	explain	the	mem	ory r	read	operation	in	8085	

- 5 microprocessor. c) Describe the instruction format and addressing modes of 8085 microprocessor. 5
- a) Draw Architecture of microprocessor 8086 and label it. Q.3
 - 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. 10

PART-B

- Q.5 a) Interface 4K ROM and 8K 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 3200H. Use control register and port address of 8255 as 80 H, 81H, 82H and 83H respectively.

185/4

	b)	Explain the following terms:i) Programmed I/O ii) Interrupt driven I/O iii) Burst mode iv) Cycle stealing mode.	10
Q.7	a) b)	Draw the block diagram of 8259 PIC and explain its working. 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	10
		using timing diagram.	10

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 3dB.
 - f) Can two diodes be connected back to back to work as a transistor? Justify.
 - g) Calculate I_c and I_E given $\alpha_{dc} = 0.98$, $I_{CB0} = 4\mu A$ and $I_B = 50\mu A$.
 - h) Deduce the relation between a.c. drain resistance (r_d) , transconductance

 (g_m) and amplification factor (μ) .

- i) Elaborate the need of cascading.
- j) Justify the advantage of push pull amplifier.

<u>PART-A</u>

- Q.2 a) Describe Input and Output characteristics of Common Emitter configuration of BJT.
- 10

2×10

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 π 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.

10

10

10

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.	10
	 Derive Expression for Drain Current of n- Channel JFET. 	10

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. 10

b) For CE amplifier, $hie = 2000\Omega$, $hre = 1.6 \times 10^{-4}$, hfe = 49, $hoe = 50\mu A/V$. Determine the current gain, voltage gain, input resistance and output resistance if $30k\Omega$, R_L = $R_S = 600\Omega$. 10

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.	12 8
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.	12 8

b) What is harmonic distortion in amplifier? Derive expression for it.

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. $F(X, Y, Z) = \sum m(0,6) [CO-1] [L-6]$
 - 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 + BC in canonical POS.
 - 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=XY+X(Y+Z) +Y(Y+Z).

[CO-2] [L-3]

[CO-1] [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.

[CO3][L2]

[CO-1] [L-1]

[CO-1] [L-6] **10**

[CO-1] [L-3] **10**

[CO-2] [L-3] **8**

[CO-2] [L-6] **8**

- h) What is the requirement of A/D and D/A converters? Explain with examples. [CO4][L1]
- i) What are the characteristics of digital ICs?
- j) List two differences between open drain output and open emitter output of a Digital IC.

<u>PART-A</u>

- Q.2 a) With the help of De' Morgan's law statement, realize the function y = x'(y + z)' 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.
 - b) Find the following:
 - i) (23.625)10= (?)₈
 - ii) $(235.2)10 = (?)_4$
 - iii) (AFC4)16 X (B9C)₁₆ = (?)₁₆
- Q.3 a) Simplify the given expression using K-map: $\sum m(0,1,2,3,5,7,8,9,10,12,13)$.
 - b) Design a 32:1 mux using two 16:1 mux.
 - c) Implement using PLA: F1 (A, B, C)= Σm (0, 1, 2, 4) F2 (A, B, C)= Σm (0, 5, 6, 7) [CO-2] [L-6] **4**
- Q.4 a) Design and explain the working of a master-slave J-Kflip-flop. Show that Qn + 1 = JQ + K Qn 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

<u>PART-B</u>

- Q.5a) Explain in detail a four bit bidirectional shift register.[CO-2] [L-2] **10**b) Design asynchronous mod-6 counter and explain its working.[CO-3] [L-6] **10**
- Q.6a) 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.[CO-4] [L-2] **10**
- 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. [CO-5] [L-2] **10**

B. Tech. – Second Semester

DIGITAL ELECTRONICS AND CIRCUITS (EC-202)

Time:	Time: 3 hrs.		
Note:	Attempt FIVE questions in all; Q.1 is compulsory . Attempt any from PART-A and TWO questions from PART-B . Marks are each question.	<i>TWO questions (TWO against)</i>	
Q.1	 a) Convert the following into min terms: i) A'B+CD ii) ABC+C'D+AB'C b) List various advantages of digital signals. c) Write the gray code and excess-3 code for (32)₁₀ d) Convert the following hexadecimal number (3FB5.F)₁₆ into it i) Binary ii) Decimal iii) Octal number e) Discuss with an example showing positive & negative logic system of the period of th	[CO-2] [L-4] [CO-2] [L-1] [CO-2] [L-1] ts equivalent: [CO-2] [L-1] ems. [CO2][L2] [CO-2] [L-6] [CO-2] [L-6] [CO-2] [L-6] [CO-3] [L-2] er. O-4] [L-1] 2×10	
	PART-A][]	
Q.2	 a) Subtract the following decimal numbers using 2's complementiation i) 14 from 29 ii) 42 from 19. b) The seven bit hamming code is received as 1101001. Assume has been used, check whether it is correct or not. If not, code. 	t? [CO-2][L-3] 10 that even parity find the correct [CO-2][L-2] 10	
Q.3	 a) Minimize the following function using K-map and QM method: F(A,B,C,D)= πM(1,3,7,8,9,11) b) Design full subtractor using: i) ROM ii) PAL iii) PLA. 	[CO-2][L-4] 10 [CO-2] [L-6] 10	
Q.4	 a) Design the following using 16:1 Multiplexer: F(A,B,C,D)= ∑m(1,5,8,12,13,14) b) Design BCD-7 segment decoder using gates. Mention its application 	[CO-2][L-6] 10 ications. [CO-2] [L-6] 10	
	<u>PART-B</u>		
Q.5	 a) Convert the following flip flop conversion: i) JK to D ii) T to SR b) Draw and explain the working of ring counter with its timing of 	[CO-3][L-4] 10 diagram. [CO-3][L-2] 10	
Q.6	a) What is the major advantage of the R/2R ladder digital-to-a compared to a binary-weighted digital-to-analog DAC converter	analog (DAC), as ? [CO4][L-5] 10	

b) Design and explain the working of Flash type A/D converter. [CO-4][L-2] 10

- a) How TTL can be configured in totem-pole output? Mention the advantages Q.7 and limitations of this configuration.b) Design all logic gates by using CMOS technology. [CO-5][L-2] **10** [CO-5][L-6] **10**

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.
 - q) 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?
 - i) Differentiate between 'latch' and 'flip-flop'.

2×10

5×2

2×5

2 2

6

PART-A

- a) Explain the working principle of: Q.2
 - 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.	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. 10 10

- b) Draw and explain working of n-channel MoSFET.
- Q.4 a) Prove that:
 - i) A+AB = A
 - ii) A+AB = A+B
 - iii) (A+B)(A+C)(B+C) = AB+AC+BC
 - iv) AB+ABC+ABCD+ABCDE = AB
 - v) ABCD+ABCD+BCD = BC
 - b) Draw and explain with truth table:
 - i) NoR Gate.
 - ii) XoR Gate.
 - iii) S-R Flip-Flop.

PART-B

193/4

Q.5	a)	Describe the	basic element	s of operation	nal amplifier	with block diagram.
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- b) Draw and explain working of op-amp as:
 - i) Differentiator. ii) Integrator. iii) Subtractor.

5×3

- a) Draw and explain working of weighted register type digital to analog Q.6 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. 10 10
 - b) Differentiate between microprocessor and microcontroller.

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

2×10

- 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.

<u>PART-A</u>

a) Write down the benefits and barriers of big data analytics. Also justify whey Q.2 big data analytics is better than simple business process. 5 b) Define the form structured, unstructured and semi-structured data in big 5 data. c) Give three examples of big data case studies indicate which V's are satisfied by these case studies. 10 Q.3 a) Draw the Hadoop ecosystem and explain all of its components. 10 b) Explain the working procedure of MapReduce with an example. 6 c) Write down the goals of Hadoop distributed file system. 4 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. 5 c) Explain all the features of Hive through an example. 10 <u>PART-B</u> a) Explain the role of Hadoop in the Business Intelligence environment. Q.5 5 b) Differentiate between reporting and analysis. Discuss various Big Data Access Technologies used during reporting and analysis. 10 c) Draw and discuss Big R architecture and the CRAN repository. 5 a) Cite five domains where Streams is suitable for building solutions. 5 Q.6 b) Stream Operators cannot be deployed to an instance; in this view discuss Processing Elements (PEs). 5 c) Brief out the working of Stream Processing Language and its Primitive Operators. 10

Q.7	a)	Define the need of collections in SPL. Discuss List, Map, Set collections and	
C		their operations.	6
	b)	Write short notes on types and polices used in Window.	6
	c)	Discuss DeDuplicate, Throttle, Pair and Sort operators in Window.	8

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] [CO-5][L-2] f) Name any one consistency model and give a small example. q) Differentiate between task and thread. [CO-6][L-4] h) Discuss a common problem associated with distributed systems that employ cache. [CO-4][L-2] i) Difference between user level and kernel level threads. [CO-3] [L-2]
 - j) Discuss atomicity meaning in group communication. [CO-2] [L-2] **2×10**

<u>PART-A</u>

- 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.

- 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

<u>PART-B</u>

- Q.5a) 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

[[]CO-1][L-4] **10**

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.

[CO-5] [L-4] **10**

Q.7a) How process management can be applied in mach systems?[CO-6] [L-3] 10b) Discuss inter process communication in the context of mach.[CO-6] [L-3] 10

End Semester Examination, Dec. 2022 B. Tech. – Eighth Semester 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.

<u>PART-A</u>

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.	10 10
Q.3	a) Describe the working behavior of Support Vector Machine with Diagram.b) Discuss .linear Regression with help of example.	10 10
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 	10 10
Q.5	a) Illustrate with example marker decision process in reinforcement learning.b) Explain the terms: Value iteration, policy iteration.	12 8
Q.6	a) Explain the steps of back propagation algorithm in detail.b) Discuss artificial neural network with suitable example.	12 8
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.

6×2

2×10

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.
 2×10

<u>PART-A</u>

Q.2 a) Explain the different technologies available for Network Based Systems. Describe

each in brief.

[CO-1] [L-1] **10**

- b) Demonstrate the NIST cloud computing reference architecture. [CO-1] [L-2] **10**
- 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 [CO-3] [L-5] **10**

<u>PART-B</u>

- 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.

[CO-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**

200/4

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

[CO-1][L- 4]

[CO-1][L-2]

[CO-3][L-1]

[CO-2][L-4]

[CO-1][L-1]

[CO-1][L-2]

[CO-2][L-2] **2x10**

- 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?
 - b) Enlist any four components of a system.
 - c) Write the formula for linear congruential method.
 - 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-3][L-2]
 - g) How simulation can help in starting a business?
 - h) Define the following terms: system, queue.
 - i) Enumerate any two properties of random numbers.
 - j) Define 'multivariate analysis'. Explain two methods in detail.

<u>PART-A</u>

- 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.4a) 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**

<u>PART-B</u>

- 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? [CO-3][L-4] 10
- 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] **10**
 - b) Compare and Contrast the various coordinate systems. Also define the various modes for simulating autopilot systems. [CO-4] [L-4]**10**

B. Tech. - Sixth / Seventh Semester

SYSTEM PROGRAMMING AND SYSTEM ADMINISTRATION (CS-

703)

Time: 3 hrs. **100**

Q.2

Q.3

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

b) Write short notes on text-editors and programming environment.

a) What do you mean by macro? Explain conditional macro expansion with example.

a) Define an assembler. Explain in detail the designing of an assembler as pass

	b)	2. Write short notes on: i) Absolute loader. ii) Linkers.	10 5×2
Q.4	a) b) c)	Differentiate between absolute and relative path name. How CPU scheduling is carried out is UNIX? Explain the unix file system tree.	5 5 10
		<u>PART-B</u>	
Q.5	a) b) c)	Write a shell script to find the largest of three numbers. Write the difference between borne and C-shell. Explain the UNIX command for comparing and sorting files with example.	7 5 8
Q.6	a) b) c)	What are the roles and responsibilities of system administrator? Explain the system administrative commands for user management. Explain any five filter commands with example. Discuss the mechanism of process creation.	10 5 5

Max Marks:

No. of

2×10

10

10

- -

204/4

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. Q.7

4×3

End Semester Examination, Dec. 2022 B. Tech. – Seventh Semester SOFTWARE DEVELOPMENT PROCESS(CS-702)

Time: 3 hrs.

MaxMarks:100

No. of pages:1

4×5

- 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?

<u>PART-A</u>

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g classes and eliminating 5
15 5

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

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?

1×10

<u>PART-B</u>

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.

10

Max

of

No.

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester 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' 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.

2×10

<u>PART-A</u>

Q.2	a) What is the influence security and also explain in detail?b) Define 'hazard assessment'. What are the principles of hazard assessment?	10 10
Q.3	a) Explain the vulnerability assessment under physical security process.b) What are the terminology of vulnerability assessment process?	10 10
Q.4	a) Define 'physical security audit'. What are the four objectives of physical security audit?b) Explain the phases of five safety inspection.	10 10
	<u>PART-B</u>	
Q.5	a) Describe the different categories of layers of security.b) Design the three category of various alarm system.	10 10
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.	10 10
Q.7	 a) Explain the types of internal resources. b) Differentiate between fire detection and fire extinguishers. 	10 10

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester WEB TECHNOLOGY AND CYBER SECURITY (CS-504)

Time: 3 hrs.

Q.3

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 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.
 - q) What do you mean by identity theft?
 - h) How do we create a table in HTML?
 - i) Differentiate between LAN, WAN and MAN.
 - i) 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?	
-----	----	--	--

a) Design XML schema for Book information.

program in support.

b) Give different types of search engines and explain their working.

13

7

10

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

10

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

- a) Discuss the life cycle of servlets, also explain its advantages. Q.5 10 b) Write a program in JavaScript for displaying factorial of a number using do while loop. 10
- Q.6 a) Explain various forensics guidelines which are defined by FBI. 10 b) Discuss how to find evidence in browser. List various steps to protect it. 10

- Q.7 Write short notes on the following:

 - a) SQL injection.b) Cyber forensics.c) Cyber crime.d) Cyber security.

B. Tech. — Fifth Semester COMPUTER GRAPHICS (CS-502A)

Time: 3 hrs.

100

Max Marks:

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?

rated figure.

- 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?
 2×10

<u>PART-A</u>

Q.2	a)	Explain midpoint circle drawing algorithm in detail with the help of a suitable example.	10
	b)	Compare and contrast between Raster Scan and Random Scan in detail.	10
Q.3	a)	Write composite transformation in detail.	10
	b)	object with coordinates A(0,0), B(2,0), C(2,2), D(0,2).	10
Q.4	a) b)	Describe 4 Bit code algorithm in detail with the help of a suitable example. Analyze window, viewport and window to viewport mapping in detail.	10 10
		<u>PART-B</u>	
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^{0} about the line passing from C. Find the coordinates of	

10

5

- b) Differentiate between parallel and perspective projection. Which one of these is more realistic and why?10
- 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

B. Tech. – Fourth Semester

ANALYSIS AND DESIGN OF ALGORITHMS (CS-402)

Time: 3 hrs.

Marks: 100

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 an algorithm? List its characteristics.

b) State Master's theorem. Solve $T(n) = 9T(\frac{n}{3}) + 0(n^3)$.

- 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.

<u>PART-A</u>

Q.2 a) Solve the following recurrence relation using recursion tree and find the complexity.

T(n)=2T(n/2)+n

Q.4

- b) Write the algorithm for insertion sort and analyse its complexity. **10**
- 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.
 - a) State and analyse the strassen's matrix multiplication algorithm.
 - b) Write the algorithms for binary search using recursion and analyse its complexity. **10**

<u>PART-B</u>

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



213/4

2×10

10

10

10

No. of

Max

- 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.)? 10 10
Q.7	a) Explain the solution of n queen problem using backtracking.b) What are NP problems? Differentiate between NP hard and NP comple problems.	10 te 10

End Semester Examination, Dec. 2022 B. Tech.–Third Semester 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'.

2×10

<u>PART-A</u>

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

<u>PART-B</u>

Q.5	a) What are the various types of operating systems? Explain them briefly.b) Differentiate between viruses, worms and Trojans.	10 10
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. 	10 10
Q.7	Define the term 'GRC' and state the various tools used for GRC. 20	

B. Tech.—Third Semester

INTRODUCTION TO IT INFRASTRUCTURE LANDSCAPE (CS-308)

Time: 3 hrs.

Marks: 100

pages: 1

Max

No. of

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?

2x10

<u>PART-A</u>

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.

5x3

Q.4 a) Explain in detail the concept of virtualization along with its benefits. Also, explain the role of 'Hypervisors'.

10

b) What are server availability concepts and techniques? Explain in detail.

10

216/4
<u>PART-B</u>

Q.5	a) b) c)	What is LDAP protocol? Give its overview along with process of LDAP client server interaction. Explain briefly LDAP functional model. What is replication in LDAP? Discuss all major replication topologies in detail.	5 5 10
Q.6	a) b) c)	Explain briefly the various network security zones found in an organization. What are switching concepts in computer network? What are functions and limitations of layer 2 switching? 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.	5 5 10
Q.7	a) b) c)	Explain middleware, message oriented middleware with its applications in detail. What is IBM websphere MQ and what are its objects? What is data warehouse? Explain its dimensional model with help of an example, including basic concepts of dimensional modeling.	5 5

End Semester Examination, Dec. 2022 B. Tech. – Third Semester 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.

4x5

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 updation of 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.

<u>PART-B</u>

- 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 SQLa) Get the names of all the products that are sold.

10 10

> 4 8

4

8

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.10
- 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.
 20

Q.7	Explain concurrency control with locking method. Explain with examples.	
	schemes.	10

End Semester Examination, Dec. 2022 B. Tech. – Third Semester 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?

2x10

<u>PART-A</u>

- 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

<u>PART-B</u>

Q.5 a) Write and explain the Kruskal's algorithm for minimum spanning tree with an example.

5

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- b) Explain Krushkal algorithm to find shorted path.
- c) Differentiate between depth-first and breadth-first traversal with an example. 8

B. Tech. – Third Semester DISCRETE STRUCTURES (CS-301A)

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

2×10

- 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 $A' \cap B' \cap C'$.
 - 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: $2a_{n+1} - a_n = 12$
 - g) State lagrange's theorem.
 - h) State binomial theorem.
 - i) Find the chromatic number of graph.



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

chance that color are alternate?

<u>PART-A</u>

Q.2	a)	Consider the function f,g : R \rightarrow R defined by: f(x) = x ² + 3x + 1 , g(x) = 2x - 3	
		find the composition function 'gof' and 'fog'.	10
	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.	10
Q.3	a) i)	Prove by truth table: $(p \leftrightarrow Q) \cong [(p \rightarrow q) \cup (\sim p \cap \sim q)]$	10
	п) b)	$[(p \cap q) \rightarrow r] \cong [p \rightarrow (q \rightarrow r)]$ From the following formulae find tautology, contigency and contradiction: i)	10
		ii) $P \leftrightarrow \alpha \cong (P \land \alpha) \vee (\sim P \land \sim \alpha)$	10
Q.4	a)	Prove by mathematical induction 1+ 2+ 3+4n = $\frac{n(n+1)}{n}$	10
	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	

<u>PART-B</u>

- Q.5 a) Solve the differential equation: a_r + 4a_{r-1} + 4a_{r-2} = r² - 3r + 5.
 b) Solve the recurrence relation a_{r+2} - 3a_{r-1} + 2a_r = 0 by the method of generating functions with the initial conditions a₀ = 2 and a₁ = 3.
 Q.6 a) Explain various properties of binary operations.
 b) Consider an algebraic system (Q,*), where Q is the set of rational numbers and * is a binary operation defined by: a*b = a+b-ab, ∀.a, b ∈ Q. Determine whether (Q, +) is a group.
- Q.7 a) Draw the unique binary tree for the given in-order and post-order traversal: In-Order
 - b) Write Dijkstra's algorithm to find shortest path in a graph and find shortest path from a to f in following graph:



B. Tech. – Second Semester

WEB PROGRAMMING THROUGH PHP AND HTML (CS-205)

Time: 3 hrs.

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.
 - q) 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.
 - i) What are exceptions? Explain.

PART-A

Q.2 a) How a PHP script can be embedded in HTML code? Explain with an example. 8 b) Write a PHP code to check whether a given character is vowel or not. 8 c) Differentiate between echo and print statement. 4 Q.3 a) Write a program to check whether a number is palindrome or not. 8 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. 5 a) Write a program to modify elements of an associative array. 8 Q.4 b) Differentiate between 'foreach' and 'for-statement'. 4 c) What are different array sorting functions available in PHP? 8 PART-B a) What do you mean by exception propagation? Give an example to create Q.5 custom exception. 10 b) Explain the concept of break and continue statement by giving a suitable example. 10 a) What are cookies? Create an HTML form and apply validations on various Q.6 fields using JavaScript. 10 b) What is DOM passer? Give an example to read an XML file. 10 a) Write down the features of SQL. Create a table in SQL and apply all the Q.7 aggregation functions on it. 12 8

b) Explain the various views of PHP.

2×10

Max

B. Tech. – First Semester

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.

<u>PART-A</u>

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

5

- b) Explain hierarchy of memory.
- c) Convert:
 - i) $(.0101)_2 = ()_{10}$
 - ii) $(720)_8 = ()_{10}$
 - iii) $(4BF.BC)_{16} = ()_2$
 - iv) $(1101x101)_2 = ()_2$
 - v) Find 2's complements of 230.

2×5

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.

6

Q.4 a) Discuss for loop, while loop, do-while loop with syntax.

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

c) Discuss operators in C with example.

2×10

<u>PART-B</u>

Q.5 a) Give the difference between actual and formal parameters with example.

5

- b) What do you understand by function prototype?
- 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

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.

10

- b) Write short notes on:
 - i) Pre-processor directives.
 - ii) Error handling during file operations.

B. Tech. – Seventh Semester

ENTREPRENEURSHIP DEVELOPMENT (COM-0306)

Time: 3 hrs.

Marks: 100

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] [CO-3][L-2] b) List the methods of market research. 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] q) 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] **2×10** PART-A 0.2 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** a) What is meant by Team? Why team building is necessary and how it helps in Q.4 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. [CO1,2] [L-3] **12** b) Why to craft value among new products? [CO1] [L-2] **8** Draw and brief the business canvas model with suitable example. Q.6 [CO1,4,5] [L-6] **20** Q.7 Explain the functional principle of management in detail. [CO2,3] [L-3] **20**

No. of

Max

227/4

COMMAN FOR ALL BRANCHES – Fifth Semester ENTREPRENEURSHIP DEVELOPMENT (COM-0306A)

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 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) An entrepreneur

b) Trademarks relate to _____.

- 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 ____
- 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 as

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) IDE	BI iii) SFC
------------------	-------------

iv) IFCI [CO-1] [L-1-4]

2×10

<u>PART-A</u>

- 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**

<u>PART-B</u>

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] **10×2**

COMMON FOR ALL BRANCHES - Second Semester **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.

- Answer the following questions: Q.1
 - 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.
 - i) Compare In-Situ and Ex-situ Conservation of Biodiversity. [CO-1-5] [L-1,2] **2×10**

*[CO1][L1]***10** [CO-1][L-1]**10**

PART-A

- Q.2 a) Differentiate between primary and secondary succession with examples.
 - b) Describe Multidisciplinary nature of environmental studies.

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 [CO-2][L-2]**10** management.
- 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-37**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 [CO-5] [L-2] **10** their salient points.
 - 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? [CO- 6] [L- 2] 10

b) Explain the following: i) Chipko movement ii) Weapons of mass destruction.

[CO- 6] [L- 2] **10**

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

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-5] [L-3]

[CO-4] [L-3] [CO-3] [L-1]

[CO-1] [L-1]

[CO-1] [L-2]

[CO-6] [L-1]

[CO-1] [L-1]

[CO-5] [L-3]

[CO-2] [L-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) Enlist the role of "Wildlife (Protection) Act, 1972".
 - b) Differentiate between hazardous and non-hazardous waste.
 - c) Write down two effects of noise pollution.
 - d) Define the multidisciplinary nature of environmental studies.
 - e) Appraise the 10% rule of energy flow in an ecosystem.
 - f) What do you mean by disarmament?
 - g) What are the disadvantages of resettlement and rehabilitation?
 - h) Justify roles and responsibilities of CPCB in environmental protection.
 - i) Define 'species biodiversity'.
 - j) Write any four points which can be used for environmental protection.

[CO-6] [L-2] **2×10**

[CO-1] [L-3] **10**

<u>PART-A</u>

- 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.
- 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**

<u>PART-B</u>

- Q.5a) Demonstrate following with causes, effects and controls[CO-3] [L-3] 10i) 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.
 - b) Discuss the salient features of wildlife protection and forest conservation acts.

[CO-4] [L-3] **5×2** vation 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). [CO-5] [L-4] **10**

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.

<u>PART-A</u>

- 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?

2×10

<u>PART-B</u>

- 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.

5×4

<u>PART-C</u>

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

10×2

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

INDUSTRIAL CHEMISTRY (CH-101B)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

2×10

- 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) b)	Describe Electro-dialysis process. What are the advantages of this process? Analyze the method used for determination of hardness of water.	10 10
Q.3	a) b)	Explain Wet corrosion with suitable chemical reactions and mechanism. Discuss the following: i) Factors affecting corrosion.	10
		ii) Bimetallic corrosion.	5×2
Q.4	a) b)	 Justify Pb-Ag system with suitable phase diagram and the application of phase rule. Write short notes on: Phase. Component. Triple point. (v) Critical point in water system. 	10 2½×4
		<u>PART-B</u>	
Q.5	a) b)	Discuss the principle and applications of Atomic force microscopy. Explain i) Beer-Lambert's law ii) IR spectroscopy	10 10
Q.6	a)	Define electrically conducting polymers and outline their classification. Write their important properties and applications in engineering.	10

 b) Write the properties and applications of conducting and liquid crystal polymers.
 10

236/4

Q.7	a) Describe any five principles of green chemistry.	10
	b) Write short notes on:	
	i) Bio-based plastics.	
	ii) Green polymers.	5×2

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.

<u>PART-A</u>

- 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?

<u>PART-B</u>

- 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. **5**× **4**

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. **10**
 - b) What are the different methods to prorogate environmental consciousness in younger generation? **10**
- 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** 238/4

10x 2

2x 10

End Semester Examination, Dec. 2022 B. Tech. – First Semester

INDUSTRIAL CHEMISTRY (CH-101B)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

2×10

- 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) b)	Describe Electro-dialysis process. What are the advantages of this process? Analyze the method used for determination of hardness of water.	10 10
Q.3	a) b)	Explain Wet corrosion with suitable chemical reactions and mechanism. Discuss the following: i) Factors affecting corrosion.	10
		ii) Bimetallic corrosion.	5×2
Q.4	a) b)	 Justify Pb-Ag system with suitable phase diagram and the application of phase rule. Write short notes on: Phase. Component. Triple point. (i) Critical point in water system. 	10 2 ¹ ⁄2×4
		PART-B	_ / _ · · ·
Q.5	a) b)	Discuss the principle and applications of Atomic force microscopy. Explain i) Beer-Lambert's law ii) IR spectroscopy	10 10
Q.6	a) b)	Define electrically conducting polymers and outline their classification. Write their important properties and applications in engineering.	10

Write the properties and applications of conducting and liquid crystal polymers. **10**

239/4

Q.7	a) Describe any five principles of green chemistry.	10
	b) Write short notes on:	
	i) Bio-based plastics.	
	ii) Green polymers.	5×2

B. Tech. – Seventh Semester

EARTHQUAKE RESISTANT DESIGN OF STRUCTURE (C-829)

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

2×10

10

10

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'.

<u>PART-A</u>

- Q.2a) Explain the interior of the earth with diagram.10b) What are the causes of earthquake? Explain in details.10
- Q.3 a) A vibrating system consisting of mass of 50 kg and a spring of stiffness 4x10⁴
 N/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 is proposed to design the building with special moment resisting frame. The intensity of DL is 10kN/m and the floors are to cater to an IL of 3 kN/m². Determine the design seismic loads on the structure by static analysis.



<u>PART-B</u>

Q.5 a) What is shear wall and explain its behavior?

20

- b) A fixed-ended RC beam of rectangular section has to carry a distributed live load of 20 kN/m in addition to its own weight and a dead load of 25 kN/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 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.
- 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 kN/mHeight of wall h = 3.0 mWidth of wall b = 0.2 mUnit weight of wall w = 19.2 kN/m3 Soil is medium.

20

15

10

B. Tech. – Sixth Semester 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.

2×10

<u>PART-A</u>

- 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 m/sec.
 - iii) Air temperature is 25°C.
 - iv) Biometric pressure is 1000 millibars.
 - v) Stack gas velocity is 12 m/sec.
 - vi) Stack gas temperature is 150°C.10b) Discuss the various methods which can be adopted for controlling air pollution at source.10
- Q.3 a) Discuss the effects of improper waste management on human health and environment. **10**
 - b) Explain various categories of biomedical waste according to the management and handling rules. **10**
- 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.

<u>PART-B</u>

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 80gms/capacita daily BOD.	
		ii) 200,000 litres daily of industrial waste water containing 1500 mg/l of suspended solids.	10
	b)	What is Bio-chemical oxygen demand and how are the test results of the same useful?	10
Q.6	a)	Design a bar screen for a peak average flow of 40 million litres per day. Make suitable assumptions as required.	10
	b) c)	What are the objectives of sewage treatment? Explain the function and purpose of providing grit chambers.	5 F
Q.7	a)	Discuss the role of following in control of water pollution:i) Public consciousness and awareness.ii) Industrial cooperation.	5
	b) c)	iii) Legislative control.Discuss various causes of water pollution.Give a few prevention measures for control of eutrophication.	10 5 5

B. Tech. — Sixth Semester

DESIGN OF STEEL STRUCTURE-II (C-602)

Time: 3 hrs.

Marks: 100

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.

<u>PART-A</u>

- 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.



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 28.3m and breadth of 18.3m measured externally. The height from ground to eaves is 12m. Pitch of truss is 1/5 and the roof overhangs by 300mm 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 7.5m×6.25m×2.5m deep supported at 9.0m 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:

Max

No. of

2×10

5

5

15

15



Evaluate bending moment and draw bending moment diagram.

<u>PART-B</u>

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	
	1.50 kN/m ² . Also give the diagrammatic representation.	20
Q.6	 a) List down the points to check for feasibility of construction of tower. b) Explain the following: i) Lattice type structure. ii) Pole type structure. 	10 5×2
Q.7	a) What are the advantages of cold formed steel sections?b) Draw atleast four types of individual structural framing members.	10 10

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? 2×10

PART-A

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



20

Q.3 Design a continuous beam of span 5 meters carrying imposed load of 10kN/m and a live load of 12kN/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
 - b) Explain the following terms:
 - i) Rise and Tread
 - ii) Nosing

5

5x3

<u>PART-B</u>

Q.5 Design a raft foundation for the layout as shown in the figure net bearing capacity of the soil is 60 kN/m². 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 mm x 400 mm.



- Q.6 Design a rectangular tank of size 2m x 5m x 3m 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 mm x 500 mm, subjected to an initial prestress of 1600 kN and a uniformly distributed superimposed load of 5 kN/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.

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20

249/4

End Semester Examination, Dec. 2022

B. Tech. — Fifth Semester

IRRIGATION ENGINEERING-I (C-503A / C-503B)

Time: 3 hrs.

100

No. of

2×10

4

4

12

5

14

Max Marks:

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.

<u>PART-A</u>

- 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? 5
 - b) Design a regime channel for a discharge of 50 cumecsand silt factor 1.1, using Lacey's theory.
 10
 - 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 = 103.0m, Side slopes of channel = 1:1, Bed downstream= 101.5m Full supply level upstream=104.5^{\prime} Bed width U/S and D/S = 1.0m,

Soil = Good loam, Assume Blight's coefficient=6.

<u>PART-B</u>

Q.5	a) b)	What do you understand by head regulator? State function of distributory head regulator and cross regulator. Explain with sketches for different type of off take alignments of head and cross regulator	5
	c) d)	Differentiate between i) siphon aqueduct and canal aqueduct ii) aqueduct and Super passage. Describe selection of suitable type of cross drainage work.	5 5
Q.6	a) b)	Justify with neat sketches classification of Dam according to Hydraulic Design and advantage and disadvantage. Evaluate the factors on which selection of site for a dam depends.	10 10
Q.7	a) b)	Explain with, plan view of chute or Trough spillway and Conduit or tunnel spillway. Design an ogee spillway for concrete gravity dam for the following data. Average River bed level = 278.00m and RL of the crest is 378 m , slope of D/S face of the gravity is 0.75:1, Design of discharge 6600 m3/sec, length of the spillway 5 spans with a clear length of 9 m, thickness of pier 2m. Draw enlarged crest and section of spillway.	10 10

B. Tech. — Fifth Semester

WATER SUPPLY AND TREATMENTPLANT (C-502)

Time: 3 hrs.

Marks: 100

Max

No. of pages: 2

2×10

10

21/2×4

5

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10

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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 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_____.
 - c) The permissible limit of TDS in water is ______.
 - d) Physical analysis of water comprises of ______.
 - e) Write the chemical formula of alum.
 - f) Detention time in sedimentation tank ranges from _____ to _____ hours.
 - g) What is double chlorination?
 - h) Water softening refers to_
 - i) Size of distribution pipes depends on_____.
 - Grid iron system is also known as_____.

<u>PART-A</u>

- 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? **10**

Q.3 a) Write short notes on the following:

- i) pH value of water.
- ii) Hardness.
- iii) Fluorides.
- iv) Colour.
- b) A treated wastewater having the fluoride concentration 250mg/l with a discharge of 1.5m³/sec enters into a stream which has also the fluoride concentration of 10 mg/l with the discharge of 20m³/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 l/hr/m² and assume 40 min is lost in backwashing and 5% of filtered water is required for backwashing?

PART-B

- a) Explain briefly the various removal processes of temporary hardness Q.5 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 12mg/l of alum dose is required. Also determine the amount of 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=200m. Suction head of pump=5m. Static head of tank=2.5m. Ground level difference= 0.5m.

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? 10

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B. Tech. – Fourth / Fifth Semester **SOIL MECHANICS (C-406)**

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**. 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 20kg and its volume is $0.011m^3$. After drying in an oven, the mass reduces to 16.5kg. Determine the water content, density of moist soil, the dry density, void ratio and porosity. Take G = 2.70. **10**
- Q.3 a) What is Darcy's law? What are its limitations?

5

- b) Discuss the effect of particle size, void ratio and properties of water on permeability of soil.
- c) Determine the average coefficient of permeability in the horizontal and vertical directions for a deposit consisting of three layers of thickness 5m, 1m and 2.5m and having $K_1 = 3 \times 10^{-2} mm/\sec$, $K_2 = 3 \times 10^{-5} mm/\sec$, $K_3 = 4 \times 10^{-2} mm/\sec$ respectively. Assume the layers are isotropic.

10

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?

2×10

253/4

b) State the assumption in use of Boussinesq's theory to determine he vertical stress in a soil due to point load.

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5

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

<u>PART-B</u>

- 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 cm³.
 Empty mass of mould = 2475 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. **10**

- Q.6 a) Explain graphical methods to find out pre-consolidation pressure.
 b) Define the terms: coefficient of compressibility, normally consolidated soil, compression index, primary settlement, pore water pressure.
 10
- Q.7 a) Explain direct shear test of determining the shear strength of soils.
 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?
 10

End Semester Examination, Dec. 2022 B. Tech. - Fifth Semester

SOIL MECHANICS (C-406)

Time: 3 hrs.

Marks: 100

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 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

- a) Discuss Indian standard classification system. Q.2
 - b) The bulk unit weight of a soil is 19.2 kN/m³, 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 kN/m³. 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? 10
 - 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. 10 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. 10 b) Explain Modified Proctor Test. 10
- a) Define the following: Q.6

No. of

Max

2×10

10

10

10

5

- i) Compression index.
- ii) Expansion index.
- iii) Coefficient of volume compressibility.
- iv) Coefficient of compressibility.
- v) Coefficient of consolidation.
- b) Explain any one method of determining pre-consolidation pressure. 10
- Q.7 a) What is Mohr's theory for soils? Sketch typical strength envelopes for clean sand. 10 10
 - b) Explain unconfined compressive strength test.

2×5

B. Tech. – Fourth / Sixth Semester 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.

2×10

<u>PART-A</u>

- 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 210x8 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 N/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.

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<u>PART-B</u>

Q.5 Design a laterally simply supported steel beam of effective span 6m subjected touniformly distributed load of 20 kN/m.

5 4

6

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- 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:



5

5

B. Tech. – Fourth Semester **SURVEYING-II (C-403)**

Time: 3 hrs.

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.

<u>PART-A</u>

- 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 100m apart the stations P and R being in line with Q at P and R were 280 42' and 180 6' 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 3m.
 - 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.

Q.4 a) List out the laws of accidental errors.

b) Show the most probable value of the following:

10

5x4

10

10

10

Max

- 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° N.
 - ii) Hour angle of star = 43° .
 - iii) Declination of star = $18^{\circ} 20' \text{ N}$.
- Q.6 a) Explain with reference to aerial photographs. What is meant by overlap why they are provided? **10**
 - 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. **10**
 - b) What are the various applications in the field by using GIS and remote sensing survey? **10**

5×2

B. Tech. – Fourth Semester 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.

2×10

<u>PART-A</u>

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.10

20

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.

10

<u>PART-B</u>

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:

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

14

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. **20**

End Semester Examination, Dec. 2022 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?

2×10

<u>PART-A</u>

- 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 12m from left support.
 - ii) Calculate absolute maximum bending moment.



b) A distributed live load of 80 kN/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.



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



20

<u>PART-B</u>

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



- Q.6 a) A semi circular arch of radius R is subjected to udl of `w' kN/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/mm/kN. $\alpha = 12 \times 10^{-6}$ /°C. E=200 kN/mm², I=5x10⁹mm⁴, T=20° C. Calculate horizontal thrust and consider yielding and temperature effect.

6

Q.7 The loaded chord ACDEFB has span 50 m. The dip of chord at D=7.5 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.





B. Tech. — Third Semester

CONCRETE TECHNOLOGY (C-305A)

Time: 3 hrs. **100**

Max Marks:

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 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.

<u>PART-A</u>

- Q.2a) What are the advantage and disadvantages of concrete over other construction material?10b) Mention any five types of cement with their application.10
- 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. **10**
- Q.4 a) What are the properties of concrete in plastic state? Write Duff-Abram's water cement ratio with its limitations. **10**
 - b) Define "Workability". What are the factors affecting workability? Can workability of concrete change without changing water cement ratio.
 10

<u>PART-B</u>

- 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

10

2×10

 $2^{1/2} \times 4$

Q.6 a) What are the different types fibres used in FRC and how do they affect the properties of concrete? **10**

- 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 MPa, maximum size of aggregate = 20mm 4 (angular), Degree of workability = 0.9 CF, Degree of quality control = good and type of exposure = severe. Water absorption by CA = 0.5% and moisture content in FA = 2.0%. Assume any suitable missing data.

10

B. Tech. — Third Semester

STRUCTURAL ANALYSIS-I (C-301A/C-301B)

Time: 3 hrs. **100** Max Marks:

of

No.

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.

2×10

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 15m. Uniformlydistributed load of 40kN/m and 5m long crosses the girder from left to right.
 - a) Draw the influence line diagram for shear force and bending moment at a section 6m 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 24m and a central rise of 4m. It carries a concentrated load of 50kN at 18m from left support and a udl of 30kN/m over the left half portion. Solve
 - a) The vertical and horizontal reactions at the supports.
 - b) The moment at a section 6m from the left support.

6

<u>PART-B</u>

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



- 20
- 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. 10
 - b) A hollow alloy tube 4m. long with external and internal diameters of 40mm. and 25 mm. respectively was found to extend 4.8mm. under a tensile load of 60kN. 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?14

End Semester Examination, Dec. 2022 B. Tech. – Second Semester 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.

<u>PART-A</u>

2×10

Q.2	a)	Enlist the various types of dressing of stones. Explain any four with diagrams.	10
	b)	Make a clear diagram of Bull's trench kiln and explain the working of it.	10
Q.3	a) b)	What are the various types of lime used in construction work? Write in detail about the functions of cement ingredients mentioning their percentage as well.	10 10
Q.4	a) b)	Explain various methods to preserve timber in detail. Write the effects of fly-ash on cement concrete briefly. <u>PART-B</u>	10 10
Q.5	a)	Name and explain the tests carried out for aggregates (at least two).	10
	b)	What are the ingredients of paint and respective functions of them?	10
Q.6	a)	Explain the functions of basic ingredients of cement concrete.	10
	b)	Explain the working of vibrators with purpose and functions.	10
Q.7	a) b)	Explain various forms of Asphalt and differentiate between Bitumen and Coal Tar. Enlist and explain the various tests (at least two) for bituminous materials.	10 10

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 B =0 and curl 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.

2×10

PART-A

- Q.2 a) Given an electric potential $V = m(x^2 + y^2 + z^2)^{1/2}$ 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 θ 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**

<u>PART-B</u>

- 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. [CO-4] [L-4] **8**

- Q.6 a) Derive Maxwell's equations in differential form. [CO5] [L3] 8
 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.
 [CO6][L3] 8
 - 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 20mW apply on a surface where it is completely absorbed? The radius of the laser beam is 1mm. [CO-6] [L-4] **4**

End Semester Examination, Dec. 2022 B. Tech. — First Semester

MATHEMATICS-I (BMA-102 / BSC-MA-102)

Time: 3 hrs.

Marks: 100

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.
- Answer the Following questions: Q.1

a) Evaluate:
i)
$$\Gamma\left(\frac{1}{2}\right)$$
 ii)

- 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.

B(3, 2)

- d) Find the nth derivative of $f(x) = \cos(ax+b)$.
- e) Prove that the sequence $\left\{\frac{2n-7}{3n+2}\right\}$ is monotonically increasing.
- f) What is the half range cosine series for f(x) = k in (0,2).
- g) Find Curl of the vector $\vec{F} = (2x^2y + yz)\hat{i} + (xy^2 xz^2)\hat{j} + (2xyz 2x^2y^2)\vec{k}$.
- 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 $\begin{vmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{vmatrix}$
- 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. 10 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. 10
- Q.3 a) Find the maximum and minimum values of the following polynomial function by using second order derivative test: $f(x) = 8x^5 - 15x^4 + 10x^2$. 10 10
 - b) Expand $f(x) = e^{ax} sinbx, \forall x \in \mathbb{R}$.
- a) Discuss the convergence of series: $\frac{x}{1} + \frac{1}{2} \cdot \frac{x^3}{3} + \frac{1 \cdot 3}{2 \cdot 4} \cdot \frac{x^5}{5} + \frac{1 \cdot 3 \cdot 5}{2 \cdot 4 \cdot 6} \cdot \frac{x^7}{7} + \dots$ Q.4 10
 - b) Find the Fourier cosine series for $f(x) = x^3, 0 < x < L$

PART-B

273/4

2×10

10

Max

No.

of

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
 $\left(\frac{\partial u}{\partial x}\right)^2 + \left(\frac{\partial u}{\partial x}\right)^2 + \left(\frac{\partial u}{\partial z}\right)^2 = 2\left(x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z}\right)$
10

b) Find the directional derivative of the function $f(x, y, z) = xy^2 + yz^3$ 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 λ and μ so that the equations: $x+y+z=6; x+2y+3z=10; x+2y+\lambda z = \mu$ have (i) No solution, (ii) unique solution and (iii) an infinite number of solutions. **10**
 - b) Find the Eigen values and Eigen vectors of the matrix: $A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$ **10**
- Q.7 a) Let $r^2 = x^2 + y^2 + z^2$ and $V = r^m$, Prove that $V_{xx} + V_{yy} + V_{zz} = m(m+1) r^{m-2}$

b) Find the characteristic equation of the matrix $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ and use it to find the matrix represented by $A^5 + 5A^4 - 6A^3 + 2A^2 - 4A + 7I$.

10

B. Tech. – First / Second 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) Calculate no of radial and angular nodes in 2p orbital. 						[CO-1][L-3]		
	b) Arrar	b) Arrange O, F and S in the order of increasing atomic radius. Exp							
	using	shielding effe	ct.				[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 fus	sion for water is	s 8.01 kJ/r	nol. Calcul	ate the er	ntropy change		
	for 1	0 mole of ice	melting to form	liquid at 2	273 K.		[CO-4][L-4]		
f) Differentiate between E1 and E2 mechanism.						[CO-6][L-1]			
	g) Write the E-Z configuration of following:					[CO-3][L-2]			
	CH ₃ H	C=C	F Br	н					
	h) D	ifferentiate	between	dry	and	wet	corrosion.		
[(O-5][L-2]								
i) Discuss shielding effect with example.					[CO-				
1	[L-1]								
	j) Diffe	rentiate betwe	en n-doping an	d p-doping	g.		[CO-2][L-3] 2×10)	
			PAR	<u>T-A</u>					
Q.2	a) Deriv	e energy expr	ession for parti	cle in 1-dii	mensional	box.	[CO-1][L-3] 10		
	b) Com	pare the bond	order of NO	and CO w	ith the he	elp of mo	lecular orbital		
	diagr	am 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*.



<u>PART-B</u>

- 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 L² atm mol⁻²; b = 0.0428 L mol⁻¹, R=0.0821 L atm K⁻¹mol⁻¹] [CO-5][L-4]**10**b) Compare Stress corrosion and Differential aeration corrosion with reactions, diagrams and examples and discuss four factors affect the corrosion rates
 - 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. [CO-6][L-1]**10**

B. Tech. – First/Second Semester CHEMISTRY – I (BSC-CH-101/BCH-101)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

[CO-3] [L-1]

[CO-5] [L-1]

[CO-4] [L-4]

[CO-6] [L-1]

[CO-3] [L-2]

[CO-5] [L-2]

[CO-1] [L-3]

[CO-2] [L-3] **2×10**

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.
 - d) Discuss the significance of Van der Waal's constants.
 - e) Explain optical isomerism with suitable examples.
 - f) Differentiate between E1 and E2 mechanism.
 - g) Comments on physical significance of Ψ & Ψ 2.
 - h) Differentiate between dry and wet corrosion.
 - i) Calculate no of radial and angular nodes in 2p orbital.
 - j) Discuss the significance of Ellingham diagram.

<u>PART-A</u>

- 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.

- 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 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.

CH₃

b) Label each stereogenic centers as R or S





соон н—он о—сн_з

<u>PART-B</u>

Q.5a) Draw Fischer projection formulas for all isomers of 2,4 dibromohexane giving
stereochemical details for each structure.[CO-5] [L-3] 10

277/4

[CO-1] [L3,4] 10

[CO-3] [L-2] **10**

[CO-3] [L-3] 10

b) Compare bimetallic corrosion and differential aeration corrosion with reactions, diagrams and examples. Also, discuss the four factors which affect the

diagrams and examples. Also, discuss the four factors which affect the [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. – Semester CHEMISTRY - I (BSC-CH-101/BCH-101)

PART-A a) Differentiate ideal and real gas. Explain Vander wall's equation for real gas in [CO-2] [L-2] **10** b) Calculate the effective nuclear charge (Zeff) experienced by valence in the Chlorine (Cl) Potassium (K), Nickel (Ni) and oxygen (O) atoms. [CO-2] [L-4] **10** a) Which Conformer is most stable in ethane, butane, and cyclohexane? Explain b) Label each stereogenic centers as R or S COOH COOH CH,

Time: 3 hrs.

Q.3

Q.4

in

Max Marks: **100**

No. of pages: 2

[CO-6] [L-1]

[CO-3] [L-2]

[CO-5] [L-2]

[CO-1] [L-3]

[CO-2] [L-3] **2x10**

- 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. a) Find out the lowest possible energy for a particle in box. Q.1 [CO-1] [L-1]
 - b) State the method to calculate the number of nodes in nth quantum state.
 - [CO-2] [L-2] [CO-3] [L-1] c) Discuss enantiomers and diastereomers with suitable examples. 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? g) Comments on physical significance of Ψ & Ψ 2?
 - h) Differentiate between dry and wet corrosion?
 - i) Calculate no of radial and angular nodes in 2p orbital?
 - j) Discuss the significance of Ellingham diagram

- a) Derive energy expression for Particle in 1-Dimensional box in terms of Q.2 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**

- [CO-3] [L-2] 10
- [CO-3] [L-3] **10**



ÇH₃

details.

shell electron

detail.

<u>PART-B</u>

Q.5a) 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

description of any four.

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**

[CO-5] [L-2] **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 reaction and examples?

[CO-6] [L-3] **10**

End Semester Examination, Dec. 2022 B. Tech. – First Semester **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.
- a) Where is the Fermi level located in n-type semiconductors? Q.1 [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. [CO-1] [L-2] f) What are guantum 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 m³. 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] **2×10** PART-A a) Differentiate between direct and indirect band gap semiconductors. [CO-2] [L-2] 4 Q.2 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. [CO-1] [L-4] **12** b) Differentiate between Bose-Einstein and Fermi-Dirac statistic. [CO-1][L-2] **6** c) De-Broglie wavelength of an electron is 70 Å. What is its velocity? [CO-1][L-4] **2** 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. [CO-1] [L-3] 8 c) Summarize the characteristics of a laser beam. [CO-1] [L-2] **4** PART-B
 - a) What are nanomaterials? Discuss the different approaches in building Q.5 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? [CO-3] [L-3] **12** [CO-3] [L-2] **8**
 - b) Write a short note on Rutherford back scattering spectroscopy.

281/4

- Q.7 a) Establish the expression for divergence of electric field.
- [CO-4] [L-3] **6** [CO-4] [L-2] **6**
- 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? [CO-4] [L-2] **8**

B. Tech. – First Semester 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.

<u>PART-A</u>

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.

[CO-2] [L-3] **10**

2×10

- Q.3 a) Derive the expressions for Schrodinger time independent and time dependent wave equations. [CO-1] [L-4] **12**
 - b) State and explain photoelectric effect. [CO-1] [L-3] 6
 - c) What is the energy of gamma ray photon having wavelength 1 Å? [CO-1] [L-4] 2
- 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**

<u>PART-B</u>

- Q.5a) 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. [CO-3] [L-2] 8

- 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: $V = m(x^2 + y^2 + z^2)^{1/2}$, check whether the potential satisfies Laplace equation and find the electric field corresponding to it. [CO4][L4] **10**

B. Tech. – First Semester 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 b	ouilding	
		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. [CO-4	[] [L-1] 2 :	×10

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.
 - b) Write short note on Planck's hypothesis. [CO-1] [L-4] **12** [CO-1] [L-2] **4**
 - c) X- Rays of wavelength 1.50 Å are scattered from a thin Al foil. Scattered X rays are observed at an angle 60° from incident beam. Calculate the wavelength of scattered X-rays and kinetic energy of recoil electron. [CO-1] [L-4] 4
- Q.4 a) Explain with neat diagram the principle, construction and working of a He-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

<u>PART-B</u>

- Q.5a) 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. [CO-3] [L-3] **10**
- 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. [CO-4] [L-3] 8
 - c) Write some applications of piezoelectric materials.

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 0K, 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?

<u>PART-A</u>

- 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
 - ii) Occupation probability
 - 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

<u>PART-B</u>

- 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 AlGaN with a band gap of 4.5 eV. Find out
 - wavelength of light emitted. [CO-4] [L-4] **4**

c) Differentiate SLED and ELED and give one applications of each of these.

287/4

2x10

[CO-1] [L-2] **3**

[CO-1] [L-3] **4**

[CO-1] [L-2] **3**

- 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 Hot-

probe measurement technique.

[CO-6] [L-4] **10**

b) Derive suitable expression and explain the Vander Pauw and Four-point probe measurement for carrier density, resistivity and Hall mobility. [CO-6] [L-3] **10**
B. Tech. – First / Second Semester

SEMICONDUCTOR PHYSICS (BPH-104/BSC-PH-104)

Time: 3 hrs.

MaxMarks:100

No. of pages:1

2×10

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?

<u>PART-A</u>

Q.2 a) Discuss the Kronig-Penny model. How it explains the formation of energy bands separated by forbidden energy gap in solids. 15 b) Write short note on density of states. 5 Q.3 a) Derive an expression for the intrinsic carrier concentration in an intrinsic 12 semiconductor. b) Draw the energy band diagram for unbiased and reverse biased pn-junction. 4 c) Write short note on drift current. 4 a) Obtain an expression for the rate of spontaneous emission and explain its Q.4 dependence on temperature. 10 b) If light is incident on a semiconductor, obtain the conditions for optical loss and gain. 10 PART-B Q.5 a) Differentiate between radiative and non-radiative recombination. 8 b) Give the working of a double hetrojunction LED and explain how the extraction efficiency is improved. 12 Q.6 a) Describe the working principle, construction and working of p-n junction photodetector. Also draw its characteristics. 10 b) Write a short note on 'Noise limits on performance of photodetectors'. 10 Q.7 a) What is DLTS? How we get the information of deep level impurities using this technique? 8 b) Explain in detail the capacitance voltage measurement method. 8 c) Hall co-efficient of silicon is found to be $3.66 \times 10^{-4} \text{ m}^3 \text{c}^{-1}$. The resistivity of the specimen is 8.93×10^{-3} m. Find the mobility and density of the charge carriers. 4

End Semester Examination, Dec. 2022 B. Tech. – First Semester APPLIED PHYSICS (BPH-103 / BSC-PH-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 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.

2x10

<u>PART-A</u>

- Q.2 a) With the help of a labeled diagram, describe the principle, construction and working of a CO₂ Laser. [CO-1, CO-2] [L-1, L-2, L-4] **10**
 - 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] 10
- 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] **10**
 - b) Describe various mechanism of attenuation in optical fibres. [CO-1,3] [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

<u>PART-B</u>

- 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 Å. 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 C₆₀ buckyballs. Discuss the electrical, mechanical and vibrational properties of carbon nanotubes. [CO-1, CO-.3] [L-1, L-4] **12**

B. Tech. – First Semester MECHANICS (BPH-102/BSC-PH-102)

Time: 3 hrs.

Max Marks: 100 No. of pages: 1

2x10

- 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.
 - q) 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.
 - i) Is the rotations by a finite angle are vector quantities?

PART-A

- a) Explain the invariance of Newton's second law. Q.2 [CO-1] [L-2] **6**
 - b) Derive the Newton's equations of motion in planar polar coordinates. [CO-1] [L-6] 8 [CO-1] [L-2] 6
 - c) Discuss the fundamental forces of nature.
- a) Show that in the case of a conservative force, the work done around a closed Q.3 [CO-2] [L-3] 8 path is zero.
 - b) Write a short note on the law of conservation of angular momentum and its importance in Physics. [CO-2] [L-4] **7** [CO-2] [L-2] 5
 - 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** [CO-3] [L-4] **5** b) Write short note on Foucault pendulum. [CO-3] [L-2] **5**
 - c) Discuss in detail about weather systems.

<u>PART-B</u>

- 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**
- a) Differentiate between rectilinear and rotational motion. Q.6 [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. [CO5][L3] **8**

292/4

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. [CO-6] [L-6] **10** [CO-6] [L-5] **10**

B. Tech. – First Semester

INTRODUCTION TO ELECTROMAGNETIC THEORY (BPH-101/BSC-PH- 101)

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

2×10

7

8

4

8

6

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.

- Q.1 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 $\epsilon 0$.
 - i) Write about motional emf.
 - j) State the continuity equation.

<u>PART-A</u>

- 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 $v=m(x^2+y^2+z^2)$ where m is a constant. Does this potential satisfies Laplace equation? **7**
- 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.
 - c) Calculate the expression for vector potential of a solenoid having n turns/unit length and carrying current I.

<u>PART-B</u>

- 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.
- 4

8

10

Q.6 a) Derive four Maxwell's equations.

	b) State and prove Poynting theorem. Explain the term pointing vector.	12
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. 	8 8 4

OPEN ELECTIVE – COMMAN FOR ALL BRANCHES OUALITY CONTROL (BME-OE-003)

Time: 3 hrs.

Max Marks: 100 No. of pages: 1

[CO-1] [L-1]

[CO-3] [L-2]

[CO-1] [L-2]

[CO-4] [L-2] [CO-2] [L-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 variation.
 - [CO-2] [L-3] b) Summarize the importance of control charts in decision making.
 - c) Interpret the Pareto-Chart with neat sketch.
 - 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] [CO-4] [L-3]
 - f) Interpret the quality control importance in the organizations.
 - q) Distinguish between variables and attributes.
 - h) Discuss benchmarking.
 - i) Appraise the term total participation in quality management.

j) Name the various types of sampling used in SQC. [CO-3] [L-2] **2×10**

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**
- ABS hospital is having 250 beds capacity in total for patient cares. Being the Q.6 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 01st to 07th November on beds availability count every-day and observed the following:

Dates	No. of Beds Inspected	No. of beds are not conforming the
-1		uesileu requisitions
01 st Nov	80	04
02 nd Nov	50	06
03 rd Nov	80	03

04 th Nov	40	04
05 th Nov	70	06
06 th Nov	70	00
07 th Nov	80	08
Draw the neat of	chars and interpret v	whether the process is in control or not based
on recorded info	ormation.	[CO-2, 3] [L-4] 20

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: 100

No. of pages: 1

[CO.3, L1]

[CO.5, L1] **2x10**

- 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.
 - c) State the effect of stand-off-distance (SOD) on the MRR of AJM. [CO1, L4]
 - d) What is self adjusting feature of an ECM process?
 - 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?

<u>PART-A</u>

- 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 m/s. Find the volumetric flow rate (cmm³/s) 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 (cm³/min) in an ECM process of iron if the current available has been 259A. Assume atomic weight of iron to be 56gm, its valency 2 and density 7.8gm/cm³.
 - b) Explain the main steps of chemical machining process. Explain in brief the chemical blanking. [CO.3, L2] **10**

<u>PART-B</u>

- 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**

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.

4x5

<u>PART-A</u>

- 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**

<u>PART-B</u>

- 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. (CO2)(L6)**10**

- b) Write short notes on:
 - i) Cooling Tower.
 - ii) Necessity of insulation requirement in ducting and piping. (CO3)(L6)**10**

B. Tech. – Seventh Semester

HEATING, VENTILATING AND AIR CONDITIONING (BME-DS-721)

Time:	Time: 3 hrs. Max Marks: 100				
Note:	Attempt FIVE questions in all; Q.1 is compulsory . Attempt an questions from PART-A and TWO questions from PART-B . Each carries equal marks.	ny TWO question			
Q.1	 a) Define 'CHW and CDW'. b) Explain the working of cooling Tower in HVAC system. c) Explain the methods of heating system used in HAVC systems. d) Write down the name of four different valve arrangements used systems. 	[CO-2] [L-1] [CO-2] [L-2] [CO-6] [L-3] d in HVAC			
	e) Explain different pipe sizing and friction losses with respect to size o	[CO-2] [L-2] of pipe.			
	f) What is sensible heat its parameters for a room?g) What do you understand by wet bulb temperature and c temperature?	[CO-5] [L-2] [CO-4] [L-1] dew point			
	h) What do you understand by AHU?i) What are the different methods used for duct sizing?j) What are different duct shapes used in HVAC system? [Output does not be added here to be adde	[CO-4] [L-2] [CO-3] [L-3] [CO-2] [L-2] CO-2] [L-2] 2x10			
	<u>PART-A</u>				
Q.2	Explain the Chiller and its types used in HVAC.	[CO-2] [L-2] 20			
Q.3	What are the basic concepts of AHU and FCU in HVAC system? Descri	be both in			
		[CO-4] [L-6] 20			
Q.4	Explain the HVAC system with different plant layouts.	[CO-4] [L-6] 20			
	<u>PART-B</u>				
Q.5	Explain E20 sheet and the parameters used in the E20 sheet for calc heat load for a room or a building.	culation of [CO-5] [L-4] 20			
Q.6	What are the various types of Air Conditioning Systems? Explain with di	iagram. [CO-6] [L-3] 20			
Q.7	Explain the duct components with diagram and explain different types duct system.	s of supply [CO-2] [L-3] 20			

B. Tech. - Seventh Semester

OPERATION RESEARCH (BME-DS-701)

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.
- Answer the following in briefly: Q.1
 - 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 (L-1)
- c) Differentiate between slack and surplus variables in Linear Programming Problems. (CO-2 (L-2) CO-5 (L-2)
- d) List the types of Floats in Network
- e) Interpret the jockeying behavior of the customer while developing the queue model. CO-3 (L-1)
- CO-1 (L-1) f) Point out the various advantages of operation research.
- 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. CO-4 (L-
- 2) i) Name the models used in Operation Research .
- CO-6 (L-1) j) Demonstrate the Gauss-Jordan reduction process in Simplex Method.CO-6 (L-2)

PART-A

Dr. Kumar has Rs 10000/- to invest in one of three option namely: A, B & C. The Q.2 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	Strategy State of Nature		
	Inflation	Recession	No Change
А	2000	1200	1500
В	3000	800	1000
С	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

2x10

Use the Big M method to solve the following problem: Q.3

Maximize $z = -2x_1 - 3x_2$ Subject to the constraints:

 $x_1 + x_2 \ge 2$ $2x_1 + x_2 < 10$ $x_1 + x_2 \ge 8$ $x_1 \ge 0; x_2 \ge 0$ CO-2,4 (L-4) 20 303/4

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

		Ι	II	III	IV	V
	Α	10	5	13	15	16
	В	3	9	18	13	6
1003	С	10	7	2	2	2
	D	7	11	9	7	12
	Е	7	9	10	4	12

How should the jobs be allocated, one per employee, so as to minimize the total-hours? CO-4,5 (L-3) ${\bf 20}$

<u>PART B</u>

- 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 15minutes. 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	Estimated Durat	tion (weeks)	
(i - j)	Optimistic t _o	Most Likely t_m	Pessimistic t_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

CO-1,5 (L-5) 20

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	e Probability
120	018
140	0.26
160	0.44
180	0.12

Simulate the yield per acre for 10 years considering random number 20, 72, 34, 54, 30, 22, 48, 74, 76 and 02. CO-2,3 (L-4) **20**

B. Tech. – Sixth Semester 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.

<u>PART-A</u>

- Q.2What 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**

<u>PART-B</u>

- Q.5 a) Define 'fuel cell'. Also explain its components and working in brief. [CO-4] [L-2] 10
 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] **10**
- Q.7 a) Explain the principles of tidal energy. [CO-6] [L-3] 10b) 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 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] **2×10**

<u>PART-A</u>

- Q.2Discuss 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] **20**

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] **20**

<u>PART-B</u>

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] **20**
- 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] [CO-2] [L-2] d) Differentiate between parallel projection and perspective projection. e) List out the industrial applications of solid model. [CO-3] [L-3] f) State the importance of wire-frame modeling in CAD. [CO-3] [L-4] q) Write down the five examples of semi-automated systems. [CO-4] [L-3] h) What is the concept of composite part? [CO-4] [L-3] i) What do you understand by part programming? [CO-5] [L-4] i) State benefits of group technology. [CO-6] [L-2] 2×10

<u>PART-A</u>

- 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**

[CO-4] [L-5] **10**

<u>PART-B</u>

- Q.5 a) Write short notes on the following:
 - 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 rpm and feed = 30 mm/min[CO-5] [L-6] **10**



- b) Explain the concept of:
 - i) Drive Surface.
- Q.7 Write short notes on:
 - a) Part classification and coding.
 - c) Bill of material.

ii) Part Surface.

- b) Master production scheduling.
- d) MRP-II. [ČO-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

2×10

- 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?

<u>PART-A</u>

- 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. [CO-1] [L-2] **20**
- Q.3Derive 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

$$\frac{Ti - T\omega}{T - T\omega} = e^{\frac{\hbar A}{\rho V C p}\tau}$$

<u>PART-B</u>

- Q.5Derive 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
 - a) Stefan Boltzman law.
 - b) Absorptivity, reflectivity and transmissivity.
 - c) Gray body and black body.
- Q.7 A 100mm diameter steam pipe looses heat through convection. It is placed horizontally in ambient at 35°C. If Nusselt number is 25 and thermal conductivity of air is 0.02 W/mK then find the convection heat transfer coefficient. [CO-4] [L-3] **20**

[CO-1] [L-2] **20**

B. Tech. – Sixth Semester DESIGN OF MECHANICAL SYSTEMS (BME-DS-601)

Time: 3 hrs.

Max Marks: **100** *No. of pages: 2*

2×10

- 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'.

<u>PART-A</u>

- 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 40C8 (Syt = 380 N/mm2) and the factor of safety $$\rm is$$

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 a double parallel fillet welds and a single transverse weld as shown in the

311/4

figure.

maximum tensile and shear stresses are 70 MPa and 56 MPa respectively. Find

length of each parallel fillet weld, if the joint is subjected to both static and fatigue

loading.



[CO-3] [L-3] **10**

[CO-4] [L-3] 10

The

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 $0.8 \ \mbox{times}$ of the outside diameter. It is made of

steel(S_{yt} = 380 N/mm2) and the FOS is 4.Calculate the inside and outside diameter

of the shaft assume ($S_{sv} = 0.5 S_{vt}$).

<u>PART-B</u>

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 is lining

0.1 N/mm2. Calculate:

i) The mass of each shoe

ii) The dimensions of friction lining.

[CO-4] [L-3] **14**

[CO-1] [L-1] **6**

b) Explain function of brake? State different types of brakes and give at least one

practical example of each.

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 kN/mm², 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 one

half cycles, and radial load of 2500 N at 1440 rpm for the remaining cycle. The

expected life of the bearing is 10000 hrs. Calculate the dynamic load carrying capacity of the bearing. [CO-5] [L-3] **10**

- 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 N/mm². 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.

[CO-6] [L-6] **20**

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester

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? [CO-2] [L-2] d) Sketch a lever type clamp and swinging strap clamp. [CO-2] [L-3] e) Enlist the material properties for guideway. [CO-3] [L-4] f) What are the selection parameters of machine tools? [CO-3] [L-5] g) What is the function of flutes in tapping tool? [CO-4] [L-1] h) Draw the sketch of thread nomenclature. [CO-4] [L-3] i) Differentiate between 'gear casting' and 'gear forming'. [CO-5] [L-2] i) Identify the principal elements of cost estimation. [CO-6] [L-4] **2x10**

<u>PART-A</u>

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 ϕ 85×70*mm*.

Generate the process sheet for the components as shown in figure below:





- 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** 314/4 b) Describe the factors on which the machining accuracy of machine tool depends.

[CO-3] [L-1] **10**

<u>PART-B</u>

- 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 m/min. and feed is 0.25 mm per tooth. Determine:
 - i) Table feed in mm/min
 - ii) Total cutter travel
 - iii) Time required to machine the slot.

[CO-6] [L-5] **10**

B. Tech. – Fifth Semester TOOL DESIGN (BME-DS-524)

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 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.	[CO2 [L2] 2x10

<u>PART-A</u>

- 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.
- 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] **4×5**

B. Tech. – Fifth Semester

MECHATRONIC SYSTEMS AND CONTROL (BME-DS-522)

Time: 3 hrs. **100** Max Marks:

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	An	swer the following:		
-	a)	Explain Mechatronics with diagram using.	١C	01][L1]
	b)	Define digital logic system examples.	Ĭ	
	c)	Differentiate between sensor and transducer.	IC	021[L4]
	d)	Explain the purpose of using sensors in manufacturing.	[]	031[12]
	e)	Describe Microprocessor with various applications.		04][1]
	f)	Explain the functions of ALU.	[C	04][1]
	a)	Explain the need of building blocks in mathematical modeling.	[C	051[12]
	h)	Differentiate between DA and AD converters.	[] []	05][14]
	i)	Explain data presentation system with example.		06][12]
	j)	Explain the importance of calibration in industries.	[CO6][L2	2] 2x10
		<u>PART-A</u>		-
Q.2	a)	Describe various logic gates with truth table.	[CO1][[L-2]
	L)	10 Fundain in datail about the encouring evens of Machatuanias	[001]	ר ו
	D)	10		_L-2]
	_			
Q.3	Ex	plain construction and working of the following:		
	a)	Tactile sensor.	[CO2]	[L-2]
	ь)	10 Hydraulic actuator		.01
	0)	10		2]
04	a)	Explain the working of three types of huses in microprocessor	with diac	ıram
ų. י				L-21
		10		

b) Discuss the application of 8085 microprocessor in washing machine.

[CO3][L-2]

10

<u>PART-B</u>

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] 10

318/4

- Q.6 a) Differentiate between analog and digital converters. Explain applications of ADC. [CO5][L-3]
 10
 - 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

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]

2x10

<u>PART-A</u>

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 kJ/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°C respectively.

Assume:-Cp = 1.004kJ/kg K and Cv = 0.717kJ/kg K of air. [CO-1 L-4] **20**

Q.3 With the help of neat sketch explain the Battery ignition system. [CO-2 L-3] **20** Q.4 Describe the stages of combustion in SI engine. On what factors does flame speed depend.

[CO-3 L-3] **20**

<u>PART-B</u>

- 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 kg/h. The torque developed is 150 N-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 kJ/kg.
- d) The relative efficiency on a brake power basis.

Assume the engine works on the constant volume cycle. $\Upsilon = 1.4$ 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: 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 '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**
- a) Derive Economic Order Quantity graphically and analytically. Q.3 [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**

a) A company produces 4800 parts per day and sells then at approximately half Q.4 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** CO-4,6] [L-5] 10

b) Discuss EOO and Various models of inventory.

PART-B

- Discuss various functions of PPC in detail with help of conceptual diagrams and Q.5 examples. [CO1,3,6] [L-2] **20**
- Q.6 a) Discuss factors affecting productivity with help of examples. [CO-1,4,6] L4 **10** b) Discuss limitations of Job Evaluation and merit rating with help of a case study.

[CO-1,6] L4 **10**

Q.7 Plot the X bar and R chart for data given below and discuss whether process is statistically out of control:

Sub group	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:00 AM	10:30 AM	11:00 AM	
10	10.1	7.0	F 0	0.0	2.0	2.0	ГО	
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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	
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2		1.880		0.	0.000		3.267	
3		1.023		0.000		2.574		
4		0.	0.729 0.000		000	2.282		
5		0.	577	0.	000	2.1	.14	

[[]CO-3,5,6][L-4] **20**

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester

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

<u>PART-A</u>

- Q.2 a) Explain with the help of figure of inversions of double slider crank chain.
 - [L-1, CO1] **10** [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° of cam rotation; 2. Dwell for the next 30° of cam rotation;

3. Return stroke during next 60° of cam rotation, and 4. Dwell for the remaining 180° 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.

[L-6 CO3] **20**

<u>PART-B</u>
- Q.5 A shaft carries four masses A, B, C and D of magnitude 200 kg, 300 kg, 400 kg and 200 kg respectively and revolving at radii 80 mm, 70 mm, 60 mm and 80 mm in planes measured from A at 300 mm, 400 mm and 700 mm. The angles between the cranks measured anticlockwise are A to B 45°, B to C 70° and C to D 120°. 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
- 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.

CO5,6] **10**

Q.7a) Determine the stability of 4wheeler while taking a turn.[L-5 4,5] 15b) Derive expression for gyroscopic couple.[L-2 CO6] 5

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.

- a) Distinguish between Edge and Screw dislocations. Q.1
 - 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.
 - q) 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?
 - i) What are cupronickels?

PART-A

- a) Draw a neat sketch of FCC crystal structure and calculate its packing factor, Q.2 coordination number. [CO-1] [L-6] 8
 - b) Molybdenum has BCC structure and a density of 10.2 x 103 kg/m3. Calculate its atomic radius. The atomic weight of molybdenum is 95.94 g/mol and Avogadro's number is 6.023×1023 atoms/mol. [CO-2] [L-5] **12**
- a) Shear modulus 'G' (GPa) obeys the proportionality with Elastic modulus 'E' Q.3 Τf (GPa).

E=117 for a metal and Poisson's ratio (μ)=0.31, find the value of G for the metal.

[CO-3] [L-3] **10**

2×10

b) What is creep? Explain the different stages of creep with the help of diagram.

[CO-1] [L-1] **10**

[CO-6] [L-2] **10×2**

- Q.4 Write the short notes on the following:
 - a) Hardness testing.
 - b) Magnetic particle testing.

PART-B

- a) Explain Gibb's phase rule. Enumerate the degree of freedom of a three Q.5 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 [CO-4] [L-1] **15**

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.

[CO-5] [L-2] **4×5**

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

[CO-1] [L-1]

[CO-1] [L-1] [CO-1] [L-1]

[CO-1] [L-1]

[CO-1] [L-1]

[CO-1] [L-1] [CO-1] [L-1]

[CO-1] [L-1]

[CO-1] [L-1]

[CO-1] [L-1]

2×10

- 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?
 - b) What are the advantages of NC machine tools?
 - c) Define tool signature.
 - d) List the main requirement of cutting tool material.
 - 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.

<u>PART-A</u>

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**

[CO-1] [L-2] **5**

[CO-2][L-2] **5**

- Q.3 A cylindrical stainless steel rod with length as 150 mm, diameter being 12 mm is reduced to a diameter of 11mm by turning on lathe. The spindle rotates at 400 rpm and the tool traveling at an axial speed of 200 mm/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 w-s/mm³. [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'.
 - c) Give a comparative evaluation of the various cutting tool materials [CO-2] [L-2] **10**

<u>PART-B</u>

- 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 -L 5 V- 23 [CO-5] [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] 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 machines, which distinguish them from conventional machine tools. [CO-3] [L-2, 3] **10**
 - b) Explain the advantages and limitations of numerical control of machine tools?

[CO-5] [L-2, 5] **10**

End Semester Examination, Dec. 2022 B. Tech. – Fourth Semester

STRENGTH OF MATERIALS (BME-DS-402)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

2×10

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?

<u>PART-A</u>

- 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.
 [CO-1] [L-3] 6
 - 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.
 [CO2] [L4] 20
- Q.4 a) A rectangular section, 250 mm x 450 mm, spans a distance of 2 m. Find what uniformly distributed load can the beam section carry on this span. Permissible stresses are 10 N/mm² in tension and 20 N/mm² in compression.[CO-3] [L-4] 10 b) Derive the simple bending equation of beam and list the assumption made

b) Derive the simple bending equation of beam and list the assumption made therein. [CO-3] [L-5] **10**

<u>PART-B</u>

- Q.5 a) A simply supported beam carries a uniformly distributed load (w kN/m) over the whole span (L meter). Find the slopes at the supports and the maximum deflection. Sketch the elastic curves. [CO-3] [L-3] 10
 b) State and prove maxwell's reciprocal theorems. [CO-1] [L-2] 10
- Q.6a) 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 N-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? E = 200 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

B. Tech. - Fourth Semester

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 P-V and T-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?
- q) 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

a) What is Orsat Apparatus? Where is it used? Explain its construction and 0.2 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: C= 88%; H_2 = 5%; O_2 = 3 %; N_2 =1%; S= 0.5% and rest is incombustible matter.

Calculate:

diagrams.

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 15%

when

excess air is supplied.

[CO-4,5] [L-5] **10**

Q.3 a) Derive an expression for the air standard efficiency of diesel cycle with p-V and T-s

[CO-3][L-3] **10**

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:

2×10

- i) peak pressure and temperature,
- ii) work output per kg of air and

iii) air standard efficiency.

Assuming Cp=1.005 kJ/Kg and Cv=0.717 kJ/Kg for air. [CO-5] [L-5] **10**

- 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.

<u>PART-B</u>

- Q.5a) What do you understand by stagnation state.[CO-2] [L-2] 5b) Define critical pressure ratio for the nozzle of a steam turbine. Obtain
analytically
value in terms of the index of expansion.its[CO-2] [L-2] 5
- Q.6 The following data refers to a particular stage of a Parson's reaction turbine: Speed of the turbine=1500 rpm Mean diameter of the rotor = 1 m Stage efficiency = 80% Blade Outlet angle = 20° 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°C and condenser temperature of 40°C, enthalpy of the refrigerant Freon-12 at the end of the compression is 220kJ/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 kg/min.

Temperature (°C)	Pressure (MPa)	hf(KJ/kg)	hg (KJ/kg)
-10	0.2191	26.85	183.1
40	0.9607	74.53	203.1

[CO-2,3] [L-2,3] **20**

[CO-4,5][L-4,5] **4×5**

End Semester Examination, Dec. 2022 B. Tech. – Third Semester 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 30Kmph if the air resistance at 10kmph 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?

2×10

<u>PART-A</u>

- 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**

<u>PART-B</u>

- Q.5Explain with sketches the following terms and their effects:[CO-2] [L-2] **5×4**a) Castorb) Camberc) Toe ine) 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 R 15 91 T. Determine the significance of different symbols used for specification. [CO-3] [L-3] 10

End Semester Examination, Dec. 2022 B. Tech. – Third Semester 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

<u>PART-A</u>

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.

[CO-2,4] [L-3] **10**

- 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**

<u>PART-B</u>

- Q.5 a) Discuss the term rapid prototyping and its applications in detail. [CO-4,1] [L-3] **10**
 - b) Discuss the relevance of rapid prototyping in today's manufacturing scenario. Also, classify the rapid manufacturing techniques. [CO-4] [L-3] **10**
- Q.6 a) Discuss the advantages limitations and applications of powder metallurgy processes.

[CO-3,4] [L-3] **10**

b) Explain the sequence of processes in powder metallurgy with neat diagrams

335/4

- 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 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. [CO1L1]
 - b) What do you understand by equipotential lines and stream lines? Also prove that both the lines are perpendicular to each other. [CO1L1]
 - c) Explain the concepts of steady flow and incompressible flow. [CO2L2]
 - d) Write the expression of bernoulli's theorem and state the different types of energy heads available to a fluid. [CO1L1]
 - e) Differentiate between impulse and reaction turbine. [CO2L1]
 - 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. [CO1L1]
 - i) What is the significance of dimensional analysis?
 - j) Briefly explain the concept of hydrodynamic boundary layer. [CO3L2] **2x10**

<u>PART-A</u>

- Q.2 a) A plate 0.035 mm distant from a fixed plate, moves at 50 cm/s and requires a force of 2N per unit area (2N/m²) 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**

[CO3L1]

Q.4 A 45° 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 N/cm² and the rate if flow of water is 600 liters/s. Refer the figure shown below. [CO-4] [L-5] **20**



<u>PART-B</u>

- 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° 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. [CO-4] [L-2] **20**

End Semester Examination, Dec. 2022 B. Tech. – Third Semester 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?

<u>PART-A</u>

- Q.2 a) Write short notes on the following:
 - i) Thermodynamic system.
 - ii) Thermodynamic Equilibrium.

[CO-1,2][L-1,2] **10**

[CO-4,5][L-4,5] **10**

2x10

- b) A fluid at a pressure of 1 bar, and with specific volume of $0.18m^3/kg$, contained in a cylinder behind a piston expands reversibly to a pressure of 0.6 bar according to the equation $pV^2=C$ 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 Pa and 25° C having volume of $1.8m^3$ /kg and is compressed to 5×10^5 Pa isothermally. Determine:
 - i) Work done:
 - ii) Change in internal energy.
 - iii) Heat transferred
- 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° C and a sink temperature of 40° 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.

<u>PART-B</u>

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(°

		C)
Α	130	60
В	100	15

Establish the direction of flow of the air in the duct.

- 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. [CO-3,4][L-1, 3,4] **10**
- Q.6 a) Write short notes on:
 - i) Vander Waal's equation.
 - ii) Compressibility chart.

[CO-1,4][L-1,4] **5×2**

[CO-5][L-5] **10**

- b) Describe with a neat sketch a throttling calorimeter for measuring the dryness fraction of steam. [CO-2][L-2] 10
- Q.7a) Draw the p-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°C and condenser temperature of 40°C, enthalpy of the refrigerant Freon-12 at the end of the compression is 220kJ/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 kg/min.

Temperature (°C)	Pressure (MPa)	h _f (KJ/kg)	h _g (KJ/kg)
-10	0.2191	26.85	183.1
40	0.9607	74.53	203.1

[CO-4,5][L-4,5] **10**

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.

2x10

<u>PART-A</u>

Q.2 a) Determine the resultant moment produced by the forces about point O.



[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**

b) The uniform 10-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 $\mu s = 0.3$. Determine the angle of inclination θ of the ladder and the normal reaction at B if the ladder is on the verge of slipping.



[CO-2] [L-4]**10**

[CO-

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 comp



[CO-3] [L-4,L-5] 20

[CO-3] [L-3] **10**

- 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 the coefficient of friction between car tyres and the road is 0.4. Take $g = 9.80 \text{m/s}^2$. [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 6kN, 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. [CO-4] [L-3] **10**

End Semester Examination, Dec. 2022 B. Tech. – Third Semester 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.

2x10

<u>PART-A</u>

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.



(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-kg rod AB from sliding. The contact surface at B is smooth, whereas the coefficient of static friction between the rod and the wall at A is $\mu_s = 0.2$.



(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 $\mu_s = 0.3$ 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)

(CO2,4 L-3,L-5) **10**

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.



(CO4, 6) (L-4) 10

b) Determine the location (x bar, y bar) of the centroid C of the area.



(CO4,6) (L-4) 10

Figure (f)



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)

- (CO5) (L-3) 10
- 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.

(L-2) (CO2) **10**

Q.7 At the instant shown both rods of negligible mass swing with a counter clockwise angular velocity of $\dot{\omega}$ = 5 rad / s, while the 50- 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.



(L-3, L-5) (CO5,3) 20

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	An a) b) c) d) e) f) g) h) i)	swer the following: Define 'Plant Disease'. Differentiate between Plant disease and injury. What is the difference between local and systemic resistance? Summarize vertical and horizontal resistance. Differentiate between susceptible and resistant plants. What are avr genes? Name the pathogen associated with Irish Potato Famine. What do you mean by collateral hosts? What are ratoon crops? What do you mean by Dual culture technique?	[CO- 1] [L- 1] [CO- 1] [L- 3] [CO- 1] [L- 1] [CO- 1] [L- 2] [CO- 4] [L- 3] [CO- 1] [L- 1] [CO- 2] [L- 1] [CO- 2] [L- 1] [CO- 2] [L- 1] 2x10
		<u>PART-A</u>	
Q.2	a) b)	Compare the concept of 'Disease Triangle' and 'Disease Pyramid'. Describe the important events in history of Plant Pathology.	[CO-3] [L-2] 7 [CO-1] [L-2] 13
Q.3	a) b)	Explain the phenomenon of infection – pre-penetration, penetrat penetration. Discuss the role of toxins in plant defense.	ion and post [CO-4] [L-1] 10 [CO-3] [L-2] 10
Q.4	a)	What are the different types of chemicals used for plant dise Explain their classification according to mode of action and pathogen.	ase control? the type of
	b)	Give a comprehensive account of host pathogen interaction. PART-B	[CO-1] [L-2] 10 [CO-4] [L-1] 10
Q.5	a)	Explain the term biological control. Write a detailed acco	ount of the
-	b)	mechanism of biocontrol. Write a short note on 'integrated pest management'.	[CO-3] [L-2] 10 [CO-1] [L-1] 10
Q.6	a) b)	What are the sources of survival of infectious plant pathogens? Crop rotation is one of the most effective methods of root dise Comment and Justify.	[CO-1] [L-1] 10 ease control. [CO-3] [L-5] 10
Q.7	a)	How is mulching different from trenching?	[CO-3] [L-3] 5
	(ט	citrus stubborn disease causing substantial losses to crops.	15 potato and

348/4

B. Sc. (Microbiology) – Third Semester ENVIRONMENTAL MICROBIOLOGY (BMB-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 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.

<u>PART-A</u>

Q.2 Analyze different types of soil and discuss microbial diversity present in soil.

[CO-1] [L-4] **20**

2x10

- 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] **10**

<u>PART-B</u>

- 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.7a) 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**

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?	[CO-2] [L-1]
	d) What are mycotoxins?	[CO-3] [L-1]
	e) Draw the labeled diagram of spirulina.	[CO-3] [L-3]
	f) List four silent features of Fungi.	[CO-1] [L-1]
	g) Names the various modes of nutrition in fungi.	[CO-3] [L-1]
	h) Draw the diagram of basidiocarp.	[CO-2] [L-1]
	i) Write any two symptoms of rust disease.	[CO-3] [L-1]
	j) Draw the labeled diagram of Chlamydomonas.	[CO-3] [L-3] 2x10

<u>PART-A</u>

Q.2	Describe gener Deuteromycetes.	al features,	structure,	nutrition	and	reproduction	in		
						[CO-1] [L-2] 20		
Q.3	Describe the lifed	cycle of rust fur	ngi.			[CO-3] [L-2] 20		
Q.4	Explain the diver	Explain the diversity of habitat in algae in detail.					[CO-4] [L-4] 20		
	<u>PART-B</u>								
Q.5	Explain the applic	cation of algae	in biofuel pro	oduction in o	detail.	[CO-1] [L-2] 20		
Q.6	Describe the vari	ous modes of a	asexual repro	duction in f	ungi.	[CO-4] [L-2] 20		
Q.7	Explain the smut	diseases of pla	ants 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: 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 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] **2x10**

<u>PART-A</u>

- 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] 10
- 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**

<u>PART-B</u>

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.7a) 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**

B.Sc. (Hons.) Microbiology – Second Semester BIOINFORMATICS (BMB-DS-221)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-1] [L-1]

[CO-1] [L-2]

[CO-3] [L-2]

[CO-2] [L-2]

[[-____] [] _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 approaches used to align multiple sequences?
 - b) Interpret the applications of databases.
 - c) Outline the applications of sequence analysis program.
 - d) Show how local alignment is different from global alignment?
 - 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.	[CO-4] [I-2]
i) Elaborate protein secondary structure component.	[CO-4] [L-1]
j) Explain protein folding.	[CO-4] [L-2] 2×10

<u>PART-A</u>

Q.2Explain 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	n 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

<u>PART-B</u>

- 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?
 - i) Differentiate between inhibition and inactivation.

[CO-1-6] [L-2] **2×10**

PART-A

Q.2	a)	Enlist	the	different	factors	of	food	spoilage.	Explain	the	principles	along	with	
		exam	oles	of preser	vation.							[CO-	1][L-1]:	10

b) What is the significance of microbiological food testing? How do we achieve that?

[CO-1] [L-2] **10**

- a) Give a detailed analysis of various fungi associated with vegetable spoilage. Q.3 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

- Explain different types of modeling utilized in predictive microbiology. Explain Q.5 with examples. [CO-4] [L-3] **20**
- What are the two major methods for rapid detection of food borne pathogens? Q.6 Explain their differences and utility areas. [CO-5] [L-5] **20**
- a) What are the factors that stress upon the need for nutraceuticals? How do Q.7 they find utilization? [CO-6] [L-3] 8 [CO-6] [L-2] **12**
 - b) Give an overview of HACCP Guidelines.

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] **2×10**

<u>PART-A</u>

- 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. [CO-2] [L-2] 10
- Q.3 a) Illustrate the ray diagram of a light microscope.[CO-2] [L-2] 10b) 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

<u>PART-B</u>

- 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
- Q.6a) Demonstrate the process of discontinuous gel electrophoresis.[CO-4] [L-2] 10b) 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] 10b) Determine the quantity of an unknown sample using a calibration curve.

[CO-4] [L-5] **10**

B. Tech. (Biotechnology) – First Semester 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?
 - b) What are gain of function mutations?
 - c) What are loss of function mutations?
 - d) Differentiate between heterozygosity and homozygosity.
 - e) Differentiate between haploid and triploid.
 - f) Differentiate between telocentric and metacentric chromosomes.
 - g) How is sex determination in Drosophila different from that in man?
 - h) What is dosage compensation?
 - i) What is non-disjunction?
 - j) What is the chromosomal abnormality associated with down syndrome?

[CO-1] [L-2] **2×10**

<u>PART-A</u>

- 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 C—that 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? [CO-3] [L-5] **10**
- 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?

[CO-1] [L-2] [CO-1] [L-2]

[CO-1] [L-2]

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?

[CO-4] [L-6] 5×4

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



[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) AA BB
- iii) Aa Bb
- iv) DD EeHh
- v) II JJ KK Ll

[CO-4] [L-5] **10**

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 (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+, what [CO-5] [L-5] **10**

would be the genotype of the man?

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 of

a heterozygous woman and a man who has hemophilia? [CO-5] [L-4] **10** 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? [CO-5] [L-5]
- b) Can a normal son have a color-blind father?
- c) Can a colorblind son have a normal mother?
- d) Can a color-blind son have a normal father?

[CO-5] [L-5] [CO-5] [L-5] [CO-5] [L-5] **2½×4**

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. b) What are microtubules and microfilaments? c) Define 'apoptosis'. d) Illustrate the Integrin receptor structure and function. e) Explain the functions of mitochondria. f) Write a short note on the 'lysosomes'. g) List the cytoskeleton components. 	[CO-1][L5] [CO-3][L1] [CO-4][L1] [CO-1][L2] [CO-1][L2] [CO-2][L1] [CO-1][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] 2×10

<u>PART-A</u>

Q.2	Explain the structure and functions of the cell organelles involve in synthesis, sorting and trafficking?	protein [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.b) Compare animal and plant cell.	[CO1][L4] 10 [CO1][L5] 10
	<u>PART-B</u>	
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] 10b) Discuss the structure and function of the muscle cells[CO1][L5] 10

B.Sc. (Microbiology) – First Semester BACTERIOLOGY AND SYSTEMATICS (BMB-DS-102)

Time: 3 hrs.

Max Marks: 100

2×10

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.

<u>PART-A</u>

- 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.

PART-B

- Q.5 Explain the conventional, molecular and recent approaches to polyphasic [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] **10×2**

[CO-1][L-3] **10×2**

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**

2×10

 b) Spheroplasts are wall less forms. Define their structure, characteristics and economic importance. [CO- 3] [L-3] 10

<u>PART-B</u>

- Q.5 Classify general characteristics of actinomycetes and how these are important for industry and medicinal point of view? [CO- 3] [L-4] **20**
- 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 B. Tech. – Third Semester **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
$$\{a^{[k]}\}$$
. (CO-1,2: L-2) **2**
b) Find the Laplace transform of $t^2 \sin at$. (CO-1,2: 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-1,2: 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: $\delta(k) = \begin{cases} 1, k = 0 \\ 0, k \neq 0 \end{cases}$. (CO-1,2: L-3) **1**
g) For normal curve, prove that the maximum value of the ordinate is $\frac{1}{\sigma\sqrt{2\pi}}$.
(CO-1; L-1) **2**
h) Evaluate: $\int_0^{\infty} t^3 e^{-t} \sin t \, dt$ (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? (CO-1: L-4) **10**
b) Using convolution theorem to evaluate: $L^{-1}\left\{\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right\}$ (CO-1: L-4) **10**
Q.3 Solve the difference equation:
 $y_{k+2} + 4y_{k+1} + 3y_k = 3^k$ with $y_0 = 0$ and $y_1 = 1$ (CO-1,2: L-5) **20**

Q.4 a) Solve the integral equation
$$\int_{0}^{\infty} f(x) \cos \alpha x \, dx = e^{-\alpha}$$
 (CO-1: L-4) **10**

b) If
$$F(z) = \frac{z^2}{z^2 + 4}$$
, find Z^{-1} (CO-1,2: L-4) **10**

361/4

<u>PART-B</u>

Q.5 a) A sample of 100 dry battery cells tested to find the length of life produced the following results:

 $\overline{x} = 12$ 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?

b) Fit a second degree parabola to the following data:

Х	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

(CO-3: L-2) 10

(CO-3: L-3) 10

Q.6 a) The table gives the number of aircraft accidents that occurs during various days of the week:

Days	Sunda	Monda	Tuesda	Wednesda	Thursda	Frida	Saturda
	у	у	у	у	у	у	у
No. of Accident	14	16	8	12	11	9	14
S							

Find whether the accidents are uniformly distributed over the week. (CO-4: L-5) 10

- 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:

х	-4	1	2	3
У	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	Sample
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:

					4				Z = 0 Z .08 .05 .0714 .075 .103 .114 .1480 .151 .163 .144 .1480 .151 .163 .144 .1480 .151 .163 .144 .1480 .151 .163 .144 .1480 .151 .164 .1872 .2517 .2544 .2823 .2862 .3106 .3133 .3365 .3389 .3599 .4015 .4162 .4177 .4306 .4319 .4429 .4441 .4535 .4545 .4625 .4633 .4699 .4706 .4701 .4812 .4812 .4817 .4854 .4857 .4894 .4890 .4916 .4916			
		cui	RVE =	$\frac{1}{\sqrt{2\pi}}\int_0^t$	$e^{-\frac{z^2}{2}}dz$		1		z = 0			
= [.00	.01	.02	.03	.04	.05	.06	.07	.08	.0		
0.0	0000	0040	0080	0190	0160	0199	0239	0279	0319	03		
0.1	0306	0424	0479	0517	0557	0595	0636	0475	0714	07		
0.2	0793	0832	0871	0910	0948	0987	1026	1064	1103	11		
0.3	1179	1917	1965	1903	1991	1368	1406	1443	1480	15		
0.4	1554	1591	1628	1664	1700	1736	1772	1808	1844	18		
0.5	1915	1950	1985	2019	2054	2088	.2123	.2157	.2190	.221		
0.0	-	-	-	-	0990	0.400	0.154	9.485	9517	253		
0.0	05.00	2.071	2029	2301	2389	0794	39764	2704	0823	285		
0.4	2080	2011	2542	2013	2704	2000	2704	2079	3106	313		
0.8	0120	2110	2939	0000	20004	0020	3001	9240	3965	338		
10	3413	3438	3461	3485	3504	3531	3554	3577	3599	362		
	Mar He	(hand	a version	(page)	5000	0001	GOURT			5.00		
1.1	3643	3665	3686	37.08	8729	.3749	.3770	3790	.3810	383		
1.2	3849	3869	.3888	3997	3925	3944	.3962	.3980	,3997	.401		
1.3	4032	4049	4066	.4082	4099	.4115	4131	.4147	.4162	417		
1.4	.4192	4207	4222	.4236	4251	.4255	4279	.4292	.4306	.4319		
1.5	4332	4345	4357	.4370	.4382	4394	.4406	.4418	.4429	.4443		
14	4452	4462	4474	4484	4495	4505	4515	.4525	4535	4545		
1.7	4554	4564	4573	4582	4591	4699	4608	4616	.4625	.4633		
1.8	4641	4649	4656	4664	4671	4678	4686	4693	4699	.4706		
1.9	4713	.4719	4726	4732	4738	4744	.4750	4756	4761	4767		
2.0	4772	4778	.4783	4788	.4793	4798	480.3	4808	.4812	.4817		
23	4821	4824	4830	4834	4838	.4842	4846	4850	:4854	4857		
2.2	4861	4864	.4868	4871	4875	4878	4881	.4884	.4887	4890		
2.3	4893	4894	4898	4901	4904	.4906	4909	4911	.4913	4916		
24	4918	4920	4922	4925	.4927	.4929	4931	4932	14051	4952		
2.5	-4938	4940	4941	49.43	.4945	4946	4948	anab.	Sec			
100	1 Gain	ana -	1000	100.9	4959	4930	1961	4962	,4963	.4964		
2.0	4993	4900	4087	4968	4969	4970	4971	4972	4973	4974		
2.0	4974	4975	4976	4977	4977	4978	4979	4979	4990	1981		
-9.11	4981	4982	.4982	1983	4984	4984	4985	4985	4980	1000		
30	4987	1987	4987	.4988	4988	4989	6999	1989	4990	4990		
1.0.4	4990	4001	4991	49011	4992	4992	.4992	4996				

d.f.			Probabilit	y (Level of Sig)	nificance)	
(v)	0.50	0.10	0.05	0.02	0.01	0.00
1	1.00	6.31	12.71	31.82	63.66	636.62
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	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	5.96
7	0.71	1.90	2.37	3.00	3.50	5.41
8	0.71	1.80	2.31	2.90	3.36	5.04
9	0.70	1.83	2.26	2.82	3.25	4.78
10	0.70	1.81	2.23	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	1.74	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	1.73	2.09	2,53	2.85	3.85
21	0.69	1.72	2.08	2.52	2.83	3.83
22	0.69	1.72	2.07	2.51	2.42	3.79
23	0.69	1.71	2.07	2.50	2.81	3.77
24	0.69	1.71	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	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	2.46	2.76	3.66
30	0.68	1.20	2,04	2.46	2.75	3.65
1.000	0.67	1.65	1.96	2.33	2.58	3.29

Table 2 : SIGNIFICANT VALUES $t_v(\alpha)$ OF t-DISTRIBUTION (TWO TAIL AREAS) [| t | > $t_v(\alpha)$] = α

		for Given Probability α , $P = P_{+} (\chi^{2} > \chi^{2} (\alpha)) = \alpha$ And is Degrees of Freedom (d.f.)Probability (Level of Significance)0.95 0.50 0.10 0.05 0.02 0.010.950.500.100.050.020.010.03934552.7063.8415.2146.6351031.3864.6055.9917.8249.2103522.3666.2517.8159.83711.3417113.3577.7799.48811.66813.2771.1454.3519.23611.07013.38815.0862.6355.34810.64512.59215.03316.8122.1676.34612.01714.06716.62218.4752.7337.34413.36215.50718.16820.0903.3258.34314.68416.91919.67921.6693.9409.34015.38718.30721.16123.209					
Degree of			Probability	(Level of Sig	gnificance)		-
(reedom (v)	0 = .99	0.95	0.50	0.10	0.05	0.02	0.0
4	000157	00393	.455	2.706	3.841	5.214	6.63
1	.0201	103	1.386	4.605	5.991	7.824	9.21
24	115	959	2.366	6.251	7.815	9.837	11.34
3	.115	713	3 357	7.779	9.488	11.668	13.27
4	.291	1345	4.951	9.236	11.070	13.388	15.08
5	P66.	0.005	5.949	10.645	12 592	15.033	16.81
6	.872	2.630	0.940	19 017	14.067	16.622	18.47
- 7	1.239	2.107	5.044	10 929	15 507	18 168	20.09
8	1.646	2.733	1.344	14.004	16.001	19.679	21.66
9	2.088	3.320	8.343	15.004	18 907	21 161	23.20
10	2,558	3.940	9.340	10.307	.10.001	arriver.	
11	3.053	4.575	10.341	17.275	19.675	22.618	24.72
12	3.571	5.226	11.340	18.549	21.026	24.054	26.21
13	4.107	5.892	12.340	19.812	22.362	25.472	27.68
14	4.660	6.571	13.339	21.064	23.685	26.873	29.14
15	4.229	7.261	14.339	22,307	24.996	28.259	30.57
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	30.995	33,405
18	7.015	9.390	17.338	25,989	28,869	32.346	34,805
19	7.633	10.117	18.338	27.204	30.144	33.687	36.191
20	8.260	10,851	19.337	28.412	31,410	35.020	37.566
03	9 907	11 501	90.337	29.615	32.671	36.343	38.932
00	0.549	10 998	21 337	30.813	33.924	37.659	40.289
28	10 196	13 091	22.337	32:007	35.172	38.968	41.638
94	10.850	13.848	23.387	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	35,363	38.885	41.856	45.642
27	12.879	16.151	26,336	36.741	40.113	41.140	46.963
28	13.665	16.928	27,336	37,916	41.337	45.419	48.278
29	14.256	17.708	28.336	39.087	42.557	46.693	49.588
30	14.933	18.493	29.336	40.256	48.773	47.2903	00,892

End Semester Examination, Dec. 2022 B. Tech. - Fourth Semester

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?
 - [CO-1] [L-2] c) Relation between moment about mean and moment about a number. [CO-4] [L-1]
 - 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. [CO-3] [L-2]

- 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?
- i) A table with all possible value of a random variable and its corresponding [CO-6] [L-2] probabilities is called
- i) A variable that can assume any value between two given points is [CO-6] [L-2] 2×10 called_____.

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.
- In normal distribution, 31% of the items are under 45 and *% are over 64. Find Q.3 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:

х	10	12	15	14	19
У	40	41	48	60	50

b) Find the line of regression of y on x for the following data:

2 3 4 5 1 Х

[CO-3] [L-2] **10**

[CO-1] [L-2]

[CO-4] [L-2]

[CO-3] [L-2]

- [CO-5] [L-2]
- [CO-5] [L-2]

[CO-1] [L-3] **20**

5 2 3 8 7 y

[CO-3] [L-3] **10**

<u>PART-B</u>

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

[CO-4] [L-3] **15**

- 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:

х	0	1	2	3	4
f	109	65	22	3	1

(Hint: the tabulated value of χ^2 at 5% for 4 d.f. is 9.90)

[CO-5] [L-3] 20

Z test table

	Lovel o	fsignificance	the statement party
a di tanàn	1% (0.01)	5% (0.05)	10% (0.1)
Two tailed test	$ z_{\alpha} = 2.58$	z = 1.966	z = 0.645
Right tailed	$z_{a} = 2.33$	$z_{\alpha} = 1.645$	z., = 1.28
Left tailed	$z_{\alpha} = -2.33$	$z_{\alpha} = -1.645$	z, = - 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*).



df/p	0.40	0.25	0.10	0.05	0.025	0.01	0.005	0.0005
1	0.324920	1.000000	3.077684	6.313752	12.70620	31.82052	63.65674	636.6192
2	0.288675	0.816497	1.885618	2.919986	4.30265	6.96456	9.92484	31.5991
3	0.276671	0.764892	1.637744	2.353363	3.18245	4.54070	5.84091	12.9240
4	0.270722	0.740697	1.533206	2.131847	2.77645	3.74695	4.60409	8.6103
5	0.267181	0.726687	1.475884	2.015048	2.57058	3.36493	4.03214	6.8688
6	0.264835	0.717558	1.439756	1.943180	2.44691	3.14267	3.70743	5.9588
7	0.263167	0.711142	1.414924	1.894579	2.36462	2.99795	3.49948	5.4079
8	0.261921	0.706387	1.396815	1.859548	2.30600	2.89646	3.35539	5.0413
9	0.260955	0.702722	1.383029	1.833113	2.26216	2.82144	3.24984	4.7809
10	0.260185	0.699812	1.372184	1.812461	2.22814	2.76377	3.16927	4.5869
11	0.259556	0.697445	1.363430	1.795885	2.20099	2.71808	3.10581	4.4370
12	0.259033	0.695483	1.356217	1.782288	2.17881	2.68100	3.05454	43178
13	0.258591	0.693829	1.350171	1.770933	2.16037	2.65031	3.01228	4.2208
14	0.258213	0.692417	1.345030	1.761310	2.14479	2.62449	2.97684	4.1405
15	0.257885	0.691197	1.340606	1.753050	2.13145	2.60248	2.94671	4.0728
16	0.257599	0.690132	1.336757	1.745884	2.11991	2.58349	2.92078	4.0150
17	0.257347	0.689195	1.333379	1.739607	2.10982	2.56693	2.89823	3.9651
18	0.257123	0.688364	1.330391	1.734064	2.10092	2.55238	2.87844	3.9216
19	0.256923	0.687621	1.327728	1.729133	2.09302	2.53948	2.86093	3.8834
20	0.256743	0.686954	1.325341	1.724718	2.08596	2.52798	2.84534	3.8495
21	0.256580	0.686352	1.323188	1.720743	2.07961	2.51765	2.83136	3.8193
22	0.256432	0.685805	1.321237	1.717144	2.07387	2.50832	2.81876	3.7921
23	0.256297	0.685306	1.319460	1.713872	2.06866	2.49987	2.80734	3.7676
24	0.256173	0.684850	1.317836	1.710882	2.06390	2.49216	2.79694	3.7454
25	0.256060	0.684430	1.316345	1.708141	2.05954	2.48511	2.78744	3.7251
26	0.255955	0.684043	1.314972	1.705618	2.05553	2.47863	2.77871	3.7066
27	0.255858	0.683685	1.313703	1.703288	2.05183	2.47266	2.77068	3.6896
28	0.255768	0.683353	1.312527	1.701131	2.04841	2.46714	2.76326	3.6739
29	0.255684	0.683044	1.311434	1.699127	2.04523	2.46202	2.75639	3.6594
30	0.255605	0.682756	1.310415	1.697261	2.04227	2.45726	2.75000	3.6460
z	0.253347	0.674490	1.281552	1.644854	1.95996	2.32635	2.57583	3.2905
CL			80%	90%	95%	98%	99%	99.9%

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ORDINATES (Y) OF THE STANDARD NORMAL CURVE AT Z

-	1 2	1	1.	1 2	TA	5	6	7	8	9
Z	0	1	2	0 2000	0.2086	0.1984	0.3982	0.3980	0.3977	0.397
0.0	0.3989	0.3989	0.3989	0_3988	0.3960	0 3945	0.3939	0.3932	0.3925	0.391
0.4	0.3970	0.3965	0.3961	0.3950	0.3934	0.3867	0.3857	0.3847	0.3836	0.382
0.2	0.3910	0.3902	0.3984	0.3885	0.3070	0.3752	0.3739	0.3725	0.3712	0.369
0.3	0.3814	0.3802	0.3790	0.3778	0.3703	0.3605	0.3589	0.3572	0.3555	0.353
0.4	0.3683	0.3668	0.3653	0.3037	0.3021	0.3429	0.3410	0.3391	0.3372	0.335
0.5	0.3521	0.3503	0.3485	0.3407	0.3351	0 3230	0.3209	0.3187	0.3166	0.314
0.0	0.3332	0.3312	0.3292	0.3411	0.3034	0.3011	0.2989	0.2966	0.2943	0.292
0.7	0.3123	0.3101	0.3019	0.3030	0.3034	0.2780	0.2756	0.2732	0.2709	0.268
0.0	0.2691	0.2674	0.2030	0.2627	0.2005	0.2541	0.2516	0.2492	0.2468	0.268
0.9	0.2001	0.2037	0.201.3	0.2347	0.2303	0 2200	0.2275	0.2251	0.2227	0.244
1.1	0.2420	0.2390	0.2571	0.2.07	0.2083	0 2059	0.2036	0.2012	0.1989	0.220
1.7	0.1047	0.2135	0.2131	0.1872	0.1849	0.1826	0.1804	0.1781	0.1758	0.196
13	0.1714	0.1691	0.1669	0.1647	0.1676	0.1604	0.1582	0.1561	0.1539	0.173
14	0.1497	0.1476	0.1450	0 1435	0.1415	0 1394	0.1374	0 1354	0.1334	0.151
1.5	0.1295	0.1276	0.1257	0.1238	0.1219	0.1200	0.1182	0.1163	01145	0.13
1.6	0.1109	0.1092	0.1074	0.1057	0.1040	0.1023	0.1006	0.0989	0.0973	0.117
1.7	0.0940	0.0925	0.0909	0.0893	0.0878	0.0863	0.0848	0.0833	0.0818	0.09
1.8	0.0790	0.0775	0.0761	0.0748	0.0734	0.0721	0.0707	0.0694	0.0681	0.08
1.9	0.0656	0.0644	0.0632	0.0620	0.0608	0.0596	0.0584	0.0573	0.0061	0.000
2.0	0.0540	0.0529	0.0519	0.0508	0.0498	0.0488	0.0178	0.0373	0.0302	0.000
2.1	0.0440	0.0431	0.0422	0.0413	0.0404	0.0396	0.0387	0.0408	0.0459	0.055
2.2	0.0355	0.0347	0.0339	0.0332	0.0325	0.0317	0.0307	0.0379	0.0371	0.04
2.3	0.0283	0.0277	0.0270	0.0264	0.0258	0.0252	0.0510	0.0303	0.0297	0.036
2.4	0.0224	0.0219	0.0213	0.0208	0.0203	0.0252	0.0246	0.0241	0.0235	0.02*
25	0.0175	0.0171	0.0167	0.0163	0.0150	0.0198	0.0194	0.0189	0.0184	0.023
2.6	0.0136	0.0132	0.0129	0.0126	0.0138	0.0154	0.0151	0.0147	0.0143	0.018
2.7	0.0104	0.0101	0.0000	0.0004	0.00122	0.0119	0.0116	0.0113	0.0110	0.013
2.8	0.0079	0.0077	0.0075	0.0073	0.0093	0.0091	0.0088	0.0086	0.0084	0.010
2.9	0.0060	0.0058	0.0056	0.0075	0.0071	0.0069	0.0067	0.0065	0.0063	0.00
3.0	0.0044	0.0043	0.0045	0.0055	0.0051	0.0051	0.0050	0.0048	0.0047	0.006
3.1	0.0033	0.0032	0.0042	0.0040	0.0039	0.0038	0.0037	0.0036	0.0035	0.00
1.2	0.0024	0.0002	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026	0.0025	0.003
13	0.0017	0.0023	0.0022	0.0022	0.0021	0.0020	0.0020	0.0019	0.0018	0.002
14	0.0017	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014	0.0013	0.001
1.5	0.0012	0.0012	0.0012	0.0011	0.0011	0.0010	0.0010	0.0010	0.0009	0.001
1.6	0.000	8000.0	0.0008	0.0008	0.0008	0.0007	0.0007	0.0007	0.0007	0.000
7	0.000	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.000
	0.0000	100004	0.0004	0.0004	0.0004	0.0000	0.0007	0.0003	0.0003	0.000
	0.0000	0.0003	0.0003	0.0003	0.0000	0.0004	0.0003	0.0000	0.0000	0.000
and the second second	Stander	CONSTR.	0.0000	A STATE OF THE OWNER	0.0003	0.0003	0.0002	0.0002	0.0002	0.000

328

TABLES

AREA UNDER STANDARD NORMAL CURVE



Z	.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	.0000	.0040	.0080	.0120	0160	0100	0230	0279	0319	0150
0.1	.0398	.0438	.0478	.0517	0557	0596	0636	0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	0948	0987	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
11	3643	.3665	3686	.3708	.3729	.3749	.3770	.3790	3810	.3830
12	3849	3869	3888	.3907	.3925	.3944	.3962	.3980	3997	.4015
12	4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
14	4192	.4207	4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.6	4332	4345	,4357	.4370	.4382	.4394	.4406	.4418	.4429	,4441
1.5	4457	.4463	.4474	.4484	.4495	.4505	,4515	.4525	.4535	.4545
1.0	4554	4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.	4641	4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.8	4713	4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
1.9	4713	4778	.4783	.4788	.4793	.4798	.4803	.4808	,4812	.4817
2.0	4071	4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	4857
2.1	4061	4864	,4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.2	4801	4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4910
2.3	4018	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	493
2.4	4018	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	495
2.5	4953	4955	,4956	.4957	4959	.4960	.4961	.4962	.4963	496
2.0	10.4065	4966	.4967	.4968	4969	.4970	.4971	.4972	.4973	497
2.7	4974	4975	4976	.4977	.4977	.4978	.4979	.4979	.4980	.498
2.8	No. of the other	4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.498
2.9	1.000	1097	4987	.4988	.4988	.4989	.4989	.4989	.4990	.499

329

End Semester Examination, Dec. 2022

B. Tech. – Third/Fourth Semester **MATHEMATICS -III (BMA-306)**

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

[CO-1, 2] [L-2]

[CO-1] [L-1]

[CO-3] [L-1]

[CO-4] [L-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 $\{2^{|k|}\}$.
 - b) Find the Laplace transform of $t^2 \sin at$.
 - 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

$$\sum_{i=1}^{25} x_i = 125; \sum_{i=1}^{25} y_i = 100; \sum_{i=1}^{25} x_i^2 = 650; \sum_{i=1}^{25} y_i^2 = 460; \sum_{i=1}^{25} x_i y_i = 508$$
 [CO-3] [L-3]

g) For normal curve, prove that the maximum value of the ordinate is $\frac{1}{\sigma\sqrt{2\pi}}$.

[CO-5] [L-2]

- [CO-1] [L-1]
- h) Evaluate: $\int_0^{\infty} t \ e^{-t} \sin t \ dt$ [CO-1 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
- 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] 2×10

<u>PART-A</u>

Q.2 a) Using convolution theorem to evaluate: $L^{-1}\left\{\frac{s^2}{(s^2+16)(s^2+9)}\right\}$. [CO-1] [L-4] **10**

b) Find the Laplace transform of the square-wave function of the period a define as:

$$f(t) = \begin{cases} a & 0 \le t \le a/2 \\ -a & a/2 < t < a \end{cases}.$$
 [CO-1] [L-2] **10**

Q.3 Solve the following equation by using Laplace transform:

$$x''(t) + 9 x(t) = \cos 3t$$
 with $x(0) = 1$, $x\left(\frac{\pi}{2}\right) = -1$ [CO-1] [L-4] **20**

<u>PART-B</u>

Q.5a) 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

Х	78	89	97	69	59	79	68
У	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**

х	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

- b) A sample of 5000 members has mean of 3.2cms. And Standard deviation of 2.5cms. 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	12	14	10	10	9	7	12
Accidents							

Find whether the accidents are uniformly distributed over the week. [CO-5, 6][L-3] 10

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? [CO-5, 6] [L-3] 10

Tables are attached:



Table 1 : NORMAL TABLE AREAS UNDER THE STANDARD NORMAL

$$\mathbf{CURVE} = \frac{1}{\sqrt{2\pi}} \int_0^z e^{-\frac{z^*}{2}} dz$$

	.00	.01	.02	.03	.04	.05	.06	.07	.08	.0
0.0	.0000	.0040	.0080	.0120	.0160	.0199	0239	.0279	.0319	.03
0.1	0398	.0438	.0478	.0517	.0557	.0595	.0636	.0675	.0714	.078
0.2	0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.114
0.3	.1179	1217	1255	1293	.1331	.1368	.1406	.1443	.1480	.151
0.4	1554	1591	1628	1664	1700	1736	1772	.1808	.1844	187
0.5	.1915	1950	1985	2019	2054	2088	.2123	.2157	.2190	.222
0.6	2257	2293	2324	2357	2389	2422	2454	2485	.2517	.254
07	2580	2611	2642	2673	2704	2734	2764	2794	.2823	285
0.8	2881	2910	2939	2967	2995	3023	3051	3078	.3106	.313
0.9	2159	3186	3212	3238	3264	3289	3315	.3340	.3365	338
1.0	3413	3438	3461	3485	3508	3531	.3554	3577	.3599	.362
11	3643	3665	3686	3708	8729	3749	.3770	3790	.3810	383
1.2	3845	3869	3888	3907	3925	3944	3962	.3980	,3997	.401
1.3	4032	4049	4066	4082	4099	4115	4131	.4147	.4162	.417
14	4192	4207	4222	.4236	4251	.4255	4279	.4292	.4306	.431
1.5	4332	4345	4357	.4370	4382	4394	4406	.4418	.4429	.444
1.6	.4452	4463	.4474	4484	.4495	.4505	4515	.4525	4535	4540
1.7	4554	4564	4573	4582	.4591	4699	4608	4616	4625	.463
1.8	4641	4649	4656	4564	4671	4678	4686	4693	4699	.4706
1.9	4713	.4719	4726	4732	.4738	4744	.4750	4756	4761	4767
2.0	4772	4778	.4783	4788	.4793	4798	480.3	4808	.4812	.481)
23	4821	1896	4830	4834	4838	.4842	4846	4850	.4854	.4857
2.0	4861	4864	4868	4871	4875	.4878	4881	.4884	4887	4890
2.3	4893	4890	4898	4901	4904	.4906	4909	4911	.4913	.4916
24	4918	4920	4922	4925	.4927	.4929	4931	4932	4934	4930
2.5	.4938	4940	4941	49.43	.4945	.4946	4948	4949	4901	4904
	1000	ADDA	4056	1057	4959	4930	4983	4962	,4963	.4964
0.0	4003	ASIA	1987	1968	4969	4970	4971	4972	4973	4974
2.6	4974	4975	4976	4977	.4977	4978	4979	4979	4990	1981
9.11	4981	4982	,4982	1983	4984	4084	4985	4985	4980	1000
20	ACLERY	1997	4087	(988	4988	4989	4999	1989	4990	4990
2.2	4990	1991	4991	4991	4992	4992	.4992	4992	- Contra	

Table 3: CHI-SQUARE (χ^2)Significant Values χ^2 (α) of χ^2 Distribution Right Tail Areasfor Given Probability α , $P = P_r (\chi^2 > \chi^2 (\alpha)) = \alpha$ And is Degrees of Freedom (d.f.)

Degree of			Probability	(Level of Sil	and scores)	1	-
freedom (V)	0 = .99	0.95	0.50	0.10	0.05	0.02	0.0
4	000157	00393	.455	2.706	3.841	5.214	6.63
1	0201	103	1.386	4.605	5.991	7.824	9.21
14	115	959	2.366	6.251	7.815	9.837	11.34
3	.110	713	3 357	7,779	9.488	11.668	13.27
1	.291	1 3 45	4.951	9.236	11.070	13.388	15.08
5	.009	1.140	5.040	10.645	12 592	15.033	16.81
6	.872	2,630	0.040	18 017	14.067	16 622	18.47
- 7	1.239	2.167	0.340	12.017	15 507	18 168	20.090
8	1.646	2.733	7,344	13.362	10.001	10.100	91.660
9	2.088	3.325	8.343	14.684	16.919	13,013	00 000
10	2,558	3.940	9.340	15.987	18.307	21.101	20.200
11	3.053	4 575	10.341	17.275	19.675	22.618	24.725
19	3.571	5.996	11.340	18,549	21.026	24.054	26.217
18	4107	5.899	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	4.999	7 261	14 339	22 307	24.996	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	30.995	33.409
18	7.015	9 290	17,338	25,989	28.869	32.346	34.805
19	7,623	10.117	18 338	27.204	30.144	33.687	36.191
20	8.260	10.851	19.337	28.412	31.410	35.020	37.566
21	8.897	11.591	20.337	29.615	32.671	36.343	38.932
22	9.542	12,338	21.337	30.813	33.924	37.659	40.289
23	10.196	13.091	22.337	32:007	35.172	38.968	41.638
24	10.856	13.848	23.337	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	35,363	38,885	41.856	45.642
27	12.879	16.151	26,336	36.741	40.113	41.140	46.963
28	13.565	16.928	27,336	37,916	-41.337	45.419	48.278
29	14.256	17.708	28.336	39.087	42 567	46.693	49.588
30	14.933	18,493	29.336	40.256	43.773	47.5852	00,892

variate with unit variance.

End Semester Examination, Dec. 2022 B. Tech. – Third Semester 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
$$\frac{dy}{dx} = e^{x-y} + x^2 e^{-y}$$
 [CO:3 L-2]

b) Solve $\sin px \cos y = \cos px \sin y + p$ [CO:3 L-2]

c) Solve if possible:
$$dr + (2r \cot \theta + \sin 2\theta) d\theta = 0$$
 [CO:4 L-2]

d) Solve :
$$\frac{d^6 y}{dx^6} - y = 0$$
. [CO:4 L-3]

e) Examine the convergence of the series: $\sum (-1)^n \frac{1+2+3+....+n}{n^3}$ [CO:1 L-1]

- f) Find the equation of the tangent plane and normal line to the surface: $x^2 + 2y^2 + 3z^2 = 12$ at (1,2,-2) [CO:2 L-1]
- g) For a solenoidal vector \vec{F} , show that *curlcurlcurlcurl* $\vec{F} = \nabla^4 \vec{F}$ [CO:2 L-2]
- h) Find vector normal to the surface $f(x, y, z) = 3xyz + e^z x$ at the point (1,1,0) [CO:1 L-2]
- i) Expand a^x in powers of x. [CO:2 L-1]

j) Test the convergence of the series
$$\sum_{1}^{\infty} xe^{-x^2}$$
 [CO:1 L-2]

<u>PART-A</u>

Q.2 a) Discuss the convergence of the series: $\sum \frac{n^{n^2}}{\left(n + \frac{1}{4}\right)^{n^2}}$ [CO-1] [L-2] **6** b) Discuss the convergence of the series: $\left(\frac{1}{2}\right)x + x^2 + \left(\frac{9}{8}\right)x^3 + x^4 + \left(\frac{25}{32}\right)x^5 + \dots$ [CO-1] [L-3] **14**

Q.3 a) If xyz = 8, find the value of x, y, z for which $u = \frac{5xyz}{x+2y+4z}$ is maximum. [CO-2] [L-2] **10**

b) If
$$u_1 = \frac{x_1}{x_n}, u_2 = \frac{x_2}{x_n}, u_3 = \frac{x_3}{x_n}, \dots, u_{n-1} = \frac{x_{n-1}}{x_n}$$
 and $x_1^2 + x_2^2 + x_3^2 + \dots + x_n^2 = 1$
Find Jacobian $\frac{\partial(u_1, u_2, u_3, u_4, \dots, u_{n-1})}{\partial(x_1, x_2, x_3, x_4, \dots, x_{n-1})}$ [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 $\cos 33^o$ to four decimal places [CO-1] [L-2] **10 375/4**

<u>PART-B</u>

Q.5 a) Solve
$$\left(\frac{y}{x}\sec y - \tan y\right)dx + (\sec y \log x - x)dy = 0.$$
 [CO-3] [L-3] **10**

b) Solve
$$(1+y^2)dx = (\tan^{-1} y - x)dy$$
 [CO-3] [L-2] **10**

Q.6 a) Solve Cauchy's Equation:
$$r^2 \frac{d^2 u}{dr^2} + r \frac{du}{dr} - u + kr^3 \log r = 0$$
 [CO-4] [L-3] **10**

b) Solve:
$$\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 8x^2e^{2x}\sin 2x$$
 [CO-4] [L-3] **10**

Q.7 a) Using method of variation of parameters, solve $y' - 2y' + y = e^x \log x$

[CO-4] [L-3] **10**

b) Solve:
$$(3x+2)^2 \frac{d^2y}{dx^2} + 3(3x+2)\frac{dy}{dx} - 36y = 3x^2 + 4x + 1$$

[CO-3] [L-3] **10**

End Semester Examination, Dec. 2022 B. Tech. - (Third Semester) MATHEMATICS –III (BMA-303)

Time:	3 hrs.	Max Marks: 100
Note:	Attempt FIVE questions in all; Q.1 is compulsory . Atten questions from PART-A and TWO questions from PART-B . Man against each question.	mpt any TWO ks are indicated
Q.1	a) Solve $\frac{dy}{dx} = \sin^2(x - y + 1)$	[CO:3 L-2]
	b) Solve for y' , $y = 2xp + p^n$.	[CO:3 L-2]
	c) Solve if possible: $dr + (2r \cot \theta + \sin 2\theta) d\theta = 0$	[CO:4 L-2]
	d) Solve the following:	
	$\frac{d^6 y}{dx^6} - y = 0.$	[CO:4 L-3]
	e) Examine the convergence of the series: $\sum_{n=1}^{\infty} (-1)^n \frac{1+2+3+\dots}{n^3}$	<u>.+n</u>
	f) Find the equation of the tangent plane and normal line $2x^2 + y^2 + 2z = 3$ at $(2,1,-3)$	[CO:1 L-1] to the surface: [CO:2 L-1]
	g) Find $\nabla \phi$, if $\phi = 3x^2y - y^3z^2$ at (1,-2,-1)	[CO:2 L-2]
	h) Find vector normal to the surface $f(x, y, z) = 3xyz + e^z x$ 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 $\sum_{1}^{\infty} xe^{-x^2}$ [[CO:1 L-2] 2×10
	<u>PART-A</u>	
Q.2	a) Discuss the convergence of the series: $\frac{x}{\sqrt{5}} + \frac{x^3}{\sqrt{7}} + \frac{x^5}{\sqrt{9}} + \frac{x^7}{\sqrt{11}} + \frac{x^7}{$	
	b) Discuss the convergence of the series: $\left(\frac{1}{2}\right)x + x^2 + \left(\frac{9}{8}\right)x^3 + x^4$	[CO-1] [L-2] 10 + $\left(\frac{25}{32}\right)x^5$ + [CO:1 L-3] 10
Q.3	a) If $u_1 = \frac{x_1}{x_n}$, $u_2 = \frac{x_2}{x_n}$, $u_3 = \frac{x_3}{x_n}$,, $u_{n-1} = \frac{x_{n-1}}{x_n}$ and $x_1^2 + x_2^2 + x_3^2 +$	$\dots + x_n^2 = 1$

Find Jacobian $\frac{\partial(u_1, u_2, u_3, u_4, \dots, u_{n-1})}{\partial(x_1, x_2, x_3, x_4, \dots, x_{n-1})}$ [CO:2 L-2] **10**

b) Examine the function $f(x, y) = y^2 + 4xy + 3x^2 + x^3$ for extreme values.

[CO:2 L-2] 10

- Q.4 a) Test the convergence of the series: $\sum (-1)^n \frac{(x+1)^n}{2^n n^2}$ [CO:1 L-3] **10**
 - b) Compute the value of $\cos 33^{\circ}$ to four decimal places. [CO:1 L-2] **10**

<u>PART-B</u>

- Q.5 a) Solve $(xy^2 \sin xy + y \cos xy)dx + (yx^2 \sin xy x \cos xy)dy = 0$ [CO:3.L-3] **10** b) Solve Bernoulli's differential equation $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$ [CO:3.L-2] **10**
- Q.6 a) Solve Cauchy's equation: $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = \log x \sin(\log x)$ [CO:4.L-3] **10**

b) Solve:
$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$$
 [CO:4.L-3] **10**

Q.7 a) Using method of variation of parameters, solve $\frac{d^2y}{dx^2} - y = \frac{2}{1+e^x}$ [CO:4.L-3]**10**

b) Solve:
$$(3x+2)^2 \frac{d^2y}{dx^2} + 3(3x+2)\frac{dy}{dx} - 36y = 3x^2 + 4x + 1$$
 [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: $\frac{dy}{dx} + 2xy = x^2$

b) Solve: $(x^2 + y^2 + 2x)dx + 2y dy = 0$

- c) Find C. F. for the differential equation $y'' + a^2 y = 0$.
- d) Find P.I. for the differential equation $(D^2 4D + 3)y = \cos 4x$.
- e) Form the partial differential Equation $z = f(x^2 y^2)$
- f) Solve xp + yq = z
- g) Evaluate $\int_0^\infty t^2 e^{-2t} \sin t dt$

h) Find the inverse laplace transform $\frac{e^{-\pi s}}{s^2+1}$

- i) In the fourier series expansion of $f(x) = x^2 \ln (-\pi, \pi)$, what is the value of b_n ?
- j) Three unbiased coins are tossed. What is the probability of getting at most two heads?
 2×10

PART-A

Q.2 a) Solve the following differential equations: [CO-1] [L-2] **10** $(xy^2 Sin xy + ycos xy)dx + (x^2y Sin xy - xcos xy)dy = 0$ b) $\frac{dy}{dx} + xy = \cos x^2$ [CO-1] [L-2] **10**

Q.3 a) Solve
$$\frac{d^2y}{dx^2} + 4y = e^x + \sin 2x$$
. [CO-2] [L-3] **10**

b) Solve
$$\frac{d^2y}{dx^2} - \frac{dy}{dt} = 2x + 2t$$
, $\frac{dx}{dt} + 4\frac{dy}{dt}x - 3y = 0$ [CO-2] [L-3] **10**

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**

<u>PART-B</u>

Q.5 a) State and prove convolution theorem for laplace transform. [CO-4] [L-2] 10b) Solve the following differential equation by laplace transform.

$$\frac{d^2 y}{dx^2} + 4y = \cos 2x; \text{ given that } y(0) = 0 = \frac{dy}{dx}(0).$$
 [CO-4] [L-2] **10**

Q.6 a) Find the fourier series to represent the function $f(x) = x \sin x, -\pi < x < \pi$.

b) Find the fourier series expansion for $f(x) = 2\pi x$, $0 \le x \le 1$. [CO-5] [L-3] **15** [CO-5] [L-3] **15**

- 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

MATHEMATICS-II (BMA-202/BSC-MA-202)

Time: 3 hrs.

Marks: 100

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 $\vec{V} = (x)i + (4x)j + (6x)k$ from x = 0 to x = 2
 - [CO-1] b) Find the zeros of $f(z) = \frac{z-5}{2}$ [CO-1]
 - c) Find the complimentary function of the equation $\frac{d^2y}{dy^2} y = 7$ [CO-1,3]
 - d) Find the particular integral of the equation $(D^2 + 4D + 3)y = 25e^x$ [CO-1,3]

[CO-1,3] e) What is the necessary condition for a differential equation to be exact? f) Express $x^2 + 2$ in terms of legendre polynomial.

- [CO-1,3] g) Find the poles of $f(z) = \frac{e^z}{z^2 + 4}$ [CO:1,5]
- h) State Cauchy-Riemann equation for an analytic function in polar form [CO-1,4] State residue theorem. [CO-1,4]
- ydx + xdy = 0[CO-1,3] **2×10** i) Find the solution of the differential equation:

PART-A

a) Using double integration, find the area between the parabolas $y^2 = 4ax$ and Q.2 $x^2 = 4ay$

[CO-1,2] **10** b) Evaluate $\iint_{S} \vec{F} \cdot \hat{n} \, dS$, where $\vec{F} = 4x\hat{i} - 2y^2\hat{j} + z^2\hat{k}$ 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) $(2xy^2 + y)dx + (x + 2x^2y - x^4y^3)dy = 0$ [CO-1,3] **10** b) $p^3 + 2xp^2 - v^2p^2 - 2xv^2p = 0$ [CO-1,3] **10**
- Solve the following differential equations: Q.4
 - a) $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = \sin^2 x.$ [CO-1,3] **10**

Max

No. of

b)
$$x^2 \frac{d^2 y}{dx^2} - 3x \frac{dy}{dx} + 5y = x^3 \cos(\log x)$$
 [CO-1,3] **10**

<u>PART B</u>

Q.5 a) Determine analytic function f(z) = u + iv whose real part is $e^{2x}(x \sin 2y - y \cos 2y)$

[CO-1,4] **10**

b) If f(z) is a regular function of z, prove that

$$\left\{\frac{\partial}{\partial x}\left|f(z)\right|\right\}^{2} + \left\{\frac{\partial}{\partial y}\left|f(z)\right|\right\}^{2} = \left|f'(z)\right|^{2}.$$
[CO-1,4] 10

Q.6 a) State and prove cauchy's integral formula and hence evaluate $\iint_{z} \frac{3z+1}{z^2-7z+2} dz$,

Where, c is the ellipse $4x^2 + 9y^2 = 1$ [CO-1,5] **10**

b) By using residue theorem, evaluate $\iint_{c} \frac{1 - \cos 2(z - 3)}{(z - 2)^3} dz$, where c : |z - 2| = 1 $\left[(x^3 - y^3) + i(x^3 + y^3) - z \right]$

Q.7 a) Show that the function
$$f(z) = \begin{cases} \frac{x^2 + y^2}{x^2 + y^2}, & z \neq 0 \\ 0, & z = 0 \end{cases}$$
 satisfies C-R equations at the origin but does not have a derivative at origin.

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.
- a) A die is thrown twice and the sum of the numbers appearing is observed to Q.1 be 6. What is the conditional probability that the number 4 has appeared at least once?

[CO-1, 3] [L-2] **2**

[CO-1, 4] [L-3] **3**

- 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, 3] [L-2] **3** e) Find Q_2 , D_7 and P_{10} for the data 40, 42, 44, 46, 48, 50, 52, 54.
- f) Find the area under the normal curve in each of the cases. [CO-1, 5] [L-2] **2** ii) To the left of z=-1.28
 - i) z=-0.39 and z=4.21
- q) 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 $f(x) = ce^x$, $0 < x < \infty$ represents probability density function. [CO-1, 2] [L-2] **2**

<u>PART-A</u>

- a) A bag contains 4 white, 5 red and 6 blue balls. 3 balls are drawn at random Q.2 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: [CO-1, 3] [L-3] **10**

Х	0	1	2	3	4	5	6	7	8
P(x)	а	3a	5a	7a	9a	11a	13a	15a	17a

i) Determine the value of a

- ii) Find $P(X < 3), P(X \ge 3), P(2 \le X < 5)$
- iii) What is the smallest value of x for which P(X < x) > 0.5
- a) A car-hire firm has two cars, which it hires out day by day. The number of Q.3 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

Х	-3	6	9
P(x)	1/6	1/2	1/3
		<u> </u>	

Find E(X) AND E(X^2).Hence evaluate E($(2X + 1)^2$. [CO-1, 2] [L-3] **10**

<u>PART-B</u>

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** *i*ng data: [CO-1, 4] [L-3] **10**

b) Calculate Rank correlation coefficient from the following data:

Х	78	89	97	69	78	79	68
У	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

Х	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 $t_{tab} = 4.032$ 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? [CO-1, 6] [L-4] 10

Tables are attached:

2.8

3.0

3.1

	AREAS	Table UNDE	1 : NO	RMAL	TABLE	RMAL			N	
		cu	RVE =	$\frac{1}{\sqrt{2\pi}}\int_0^{\pi}$	$e^{\frac{z^2}{2}}dz$		1		z = 0	
=	.00	.01	.02	.03	.04	.05	.06	.07	.08	.0:
0.0	.0000	0040	0080	.0120	0160	.0199	0239	0279	.0319	.03/
11	0398	0438	0478	0517	0557	0595	0636	0675	.0714	.075
0.2	0793	0832	0871	0910	0948	0987	1026	1064	1103	114
0.3	1179	1217	1255	1203	1331	1368	1406	.1443	1480	151
0.4	1554	1591	1628	1664	1700	1736	1772	1808	.1844	187
0.5	1015	1050	TOPE	9010	2054	2088	2199	2157	2190	292
0,D.	3910	1800.	7390	2010		0003		.ator	- ALANTA	
3.0	2257	2293	2324	2357	2389	2422	2454	2485	.2517	.254
0.7	2580	2611	2642	2673	2704	2734	2764	.2794	.2823	285;
0.8	2881	2910	2939	2967	2995	3023	3051	.3078	.3106	.3133
0.9	3159	3186	3212	3238	3264	3289	3315	.3340	.3365	.3385
1.0	3413	3438	3461	3485	3508	3531	.3554	.3577	.3599	.362)
	ABSSER.				0.0000					
11	3643	3665	3686	.37.08	8729	3749	.3770	3790	.3810.	38,50
1.2	.3845	3869	.3888	.3997	3925	3944	.3962	3980	3997	4020
13	4032	4049	4066	.4082	.4099	4115	4131	.4147	4102	4910
14	4192	4207	4322	.4236	4251	4255	4279	.4292	.4,3970	4010
1.5	-4332	4345	4357	.4370	4382	4394	4406	.4418	.4429	-4441
100	1100	1100	1944	14.664	4405	1505	4515	45.25	4535	4545
1.0	3004	4009 ACCA		4104	4501	4599	1008	4616	4625	.4633
1.8	2641	4640	ACEC	4004	4678	4678	4686	4693	4699	,4706
1.0	4713	4719	4726	4732	4738	4744	4750	4756	4761	4767
2.0	4772	4778	.4783	4788	.4793	4798	480.3	4808	.4812	.4817
See.	- Call	States	Master	- interio	U.S.S.	11000000		4850	18844	4857
2.1	4821	4826	4830	4834	4838	4842	4040	4800	4887	4890
2.2	4861	4864	4868	4871	4870	4818	4000	4911	4913	.4916
2.3	4893	4896	4898	4901	4004	4000	4911	4932	4934	.4936
24	4918	4920	4922	4920	4921	4946	4948	4949	.4951	4952
20	-4938	.4040	40.41	Canad		and the second second	and a state of the		22	Anne a
2.5	4953	1955	.4956	4957	4969	4930	4961	.4962	,4963	1074
2.7	4965	4960	4967	4968	.4969	4970	4971	4972	4973	4981
2.8	4974	4975	4976	.4977	.4977	4978	4979	10.65	4080	1986
and the second second		and the second s	Contraction of the second s	The second second		1000	A FRIDAY	CARDING N	A DECEMBER OF THE OWNER OWNE	

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Table 2 : SIGNIFICANT VALUES $t_v(\alpha)$ OF t-DISTRIBUTION (TWO TAIL AREAS) [| t | > $t_v(\alpha)$] = α

d.f.	Probability (Level of Significance)								
(v)	0.50	0.10	0.05	0.02	0.01	0.001			
4	1.00	6.91	19.71	31.82	63.66	636.62			
9	0.99	0.02	1.90	6.97	6.93	31.60			
9	0.02	0.92	9.00	4 54	5.84	12.94			
	0.17	2.32	3.10	9.75	4.60	8.61			
2	0.74	2.13	2.78	3.27	4.03	6.86			
0	0.73	2.02	-2.07	0.07		100000			
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	2.31	2.90	3.36	5.04			
9	0.70	1.83	2.26	2.82	3.25	4.78			
10	0.70	1.81	2.23	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	1.74	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	1.73	2.09	2.53	2.85	3.85			
21	0.69	1.72	2.08	2.52	2.83	3.83			
22	0.69	1.72	2.07	2.51	2.42	3.79			
23	0.69	1.71	2.07	2.50	2.81	3.77			
24	0.69	1.71	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	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	2.46	2.76	3.66			
30	0.68	1.70	2,04	2.46	2.75	3.65			
	0.67	1.65	1.96	2.33	2.58	3.29			

Table 3: CHI-SQUARE (χ^2)Significant Values χ^2 (α) of χ^2 Distribution Right Tail Areasfor Given Probability α , $P = P_r (\chi^2 > \chi^2 (\alpha)) = \alpha$

And is Degrees of Freedom (d.f.)

Degree of		Probabulity (Letter of Significance)									
pression (v)	0 = .99	0.95	0.50	0.10	0.05	0.02	0.0				
4	000157	.00393	.455	2.706	3.841	5.214	6.63				
0	0201	103	1.386	4.605	5.991	7.824	9.210				
	115	352	2.366	6.251	7.815	9.837	11.341				
2	007	713	3 357	7,779	9.488	11.668	13.277				
1. d	.201	1345	4 351	9.236	11.070	13.388	15.086				
5	.004	0.005	5 348	10.645	12.592	15.033	16.812				
6	.872	2.050	0.940	19 017	14.067	16.622	18.475				
- 7	1.239	2.107	5.944	13.969	15 507	18.168	20.090				
8	1.645	2.100	0.049	14 684	16 919	19.679	21.669				
9	2.088	3.320	9.340	15.987	18,307	21.161	23.209				
10	2,000	67.040	5.040	10.007		00.010	04 795				
11	3.053	4.575	10.341	17.275	19.675	22.618	24.720				
12	3.571	5.226	11.340	18.549	21.026	24.004	26.217				
13	4.107	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	24.996	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	30.995	33,409				
18	7.015	9.390	17.338	25,989	28,869	32.346	34.805				
19	7.633	10.117	18.338	27.204	30.144	33.687	36.191				
20	8.260	10.851	19.337	28.412	31.410	35.020	37.566				
21	8.897	11.591	20.337	29.615	32.671	36.343	38.932				
22	9.542	12,338	21.337	30.813	33.924	37.659	40.289				
23	10.196	13.091	22.337	32:007	35.172	38.968	41.638				
24	10.850	13.848	23.337	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	35,363	38.885	41.856	45.642				
27	12.879	16.151	26.336	36.741	40.113	41.140	46.963				
28	13.665	16.928	27.336	37.916	41.337	45.419	48,278				
29	14.256	17.708	28.336	40.087	42.367	40.000	50.899				
30	14.933	18,493	29.336	40.200	44.1.15	167-010a	100710004 (

variate with unit variances

End Semester Examination, Dec. 2022 B. Tech. – First Semester MATHEMATICS FOR BIO-TECHNOLOGY - I (BMA-103)

Time:	3 hrs.	Max Marks: 100
Note:	Attempt FIVE questions in all; Q.1 is compulsory . Attempt a questions from PART-A and TWO questions from PART-B . Each carries equal marks.	ny TWO question
Q.1	a) Find the determinant of the matrix A= = $\begin{bmatrix} 14 & 28 & 6 \\ 0 & 60 & 1 \\ 7 & 0 & 80 \end{bmatrix}$	[CO-1] [L-2]
	b) If A = $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 5 \\ 0 & 0 & 3 \end{bmatrix}$. What are the eigen values of A ² ?	[CO-1] [L-2]
	c) Express the complex number $\frac{(-5+\sqrt{3}i)}{1-\sqrt{3}i}$ in the form of $a + ib$.	[CO-2] [L-2]
	d) Check the convergence of the series: $\sum_{x=1}^{\infty} \frac{1}{x^{-3}}$	[CO-3] [L-3]
	e) Draw Graph of $y = 2\cos x$	[CO-2] [L-1]
	f) Find the derivative of $y = x \log x$	[CO-4] [L-1]
	g) If $x^{y} + y^{x} = a^{b}$, Show that $\frac{dy}{dx} = \frac{yx^{y-1} + y^{x}logy}{x^{y}logx + xy^{x-1}}$	[CO-5] [L-2]
	h) If $y = \frac{1}{2x+3}$, find y_{10}	[CO-4] [L-3]
	i) Evaluate ∫ sinx cosx dx	[CO-6] [L-4]
	j) Find area of unit circle using double integrals.	[CO-6] [L-3]
		2x10
	<u>PART-A</u>	
Q.2	a) Investigate the value of λ and μ so that the equations:	[CO-1] [L-2] 10
	$2x + 3y + 5z = 9$; $7x + 3y - 2z = 8$; $2x + 3y + \lambda z$ has i) No solution, ii) unique solution and iii) an infinite number of s	= µ solutions.
	b) Find the inverse of a matrix $A = \begin{bmatrix} 1 & -4 & 3 \\ 1 & 1 & 1 \\ 3 & 0 & 2 \end{bmatrix}$	[CO-1] [L-3] 10

Q.3 a) Prove that $\tan 3x \tan 2x \tan x = \tan 3x - \tan 2x - \tan x$ [CO-2] [L-3] **10** b) Prove that $: \tan\left(142\frac{1}{2}\right)^{\circ} = 2 + \sqrt{2} - \sqrt{3} - \sqrt{6}$ [CO-2] [L-2] **10**

Q.4 a) Test for the convergence of the series:
$$\sum_{n=1}^{\infty} \frac{1}{n^3 + 1} x^{2n}$$
 [CO-3] [L-2] **10**

388/4

b) Test for absolutely and conditional convergence: $\sum_{n=1}^{\infty} (-1)^n \Box_{n+1}^{n^2}$ [CO-5] [L-2] **10**

<u>PART-B</u>

a) Calculate the approximate value of $\sqrt{17}$ to four decimal places by the Q.5 application of Taylor's series. [CO-4] [L-2] **10** b) Expand: $\cos(m\sin^{-1} x)$ by Maclaurin's theorem as far as x^{5} . [CO-4] [L-3] 10 a) If $u = \log_e \left(\frac{x^4 + y^4}{x + y} \right)$, show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 3$ Q.6 [CO-5] [L-3] 10 b) Find the extreme value of the function: $f(x) = 2x^3 - 6x^2 + 6x + 5$ [CO-5] [L-3] 10 Q.7 a) Change the order of integration in the integral: $\int \int e^{-x^2} dy dx$ [CO-6] [L-3] **10** 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 MATHEMATICS FOR BIO-TECHNOLOGY - I (BMA-103)

Time: 3 hrs.

Max Marks: **100** *No. of pages: 2*

2x10

- 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 $A = \begin{vmatrix} 1 & 1 & -3 \\ 2 & 5 & 3 \\ -2 & -4 & -4 \end{vmatrix}$
 - b) Verify the Cayley Hamilton theorem of the Matrix $A = \begin{bmatrix} 3 & 3 \\ 2 & 4 \end{bmatrix}$
 - 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 $Cos^{-1}(x)$ in powers of x
 - g) Find the nth derivative of log(ax+b)
 - h) Find the differentiation of $f(x) = x^3 \tan^{-1} x$

i) Find Limit of the
$$\lim_{(x,y)\to(0,0)} \frac{(1+x^2)Cos y}{y}$$

j) Evaluate $\int \log 2x \, dx$.

- Q.2 a) Find the rank of the matrix $A = \begin{bmatrix} 1 & -1 & 2 & -3 \\ 3 & -1 & 0 & 2 \\ 0 & 3 & 0 & 4 \\ 0 & 4 & 0 & 2 \end{bmatrix}$ [CO-1] [L-2] **10**
 - b) Find the eigen values and the corresponding eigen vectors of the matrix:
 - $A = \begin{bmatrix} 3 & 2 & -1 \\ 4 & 2 & 6 \\ 7 & 4 & 5 \end{bmatrix}$ [CO-1] [L-3] **10**
- Q.3 a) Separate into real and imaginary parts: cos(x+iy) [CO-2] [L-3] 10
 b) Find the general value of log(i) [CO-2] [L-2] 10
- Q.4 a) Discuss the convergence of the following series: $x + \frac{2^2 x^2}{2!} + \frac{3^3 x^3}{3!} + \frac{4^4 x^4}{4!} + \frac{5^5 x^5}{5!} + \dots \infty \qquad [CO-3] [L-3] \mathbf{10}$

b) Prove that the series $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$ converges absolutely. [CO-3] [L-3] **10**

<u>PART-B</u>

Q.5 a) If $y = e^{m\cos^{-1}(x)}$, calculate $y_n(0)$ by using Leibnitz theorem. [CO-4] [L-3] **10** b) Use Taylor's theorem to express the polynomial $f(x) = 3x^3 + 2x^2 + x - 5$ in terms of (x+1) [CO-4] [L-3] **10**

Q.6 a) If
$$u = \sin^{-1}\left(\frac{x^2y^2}{x+y}\right)$$
, 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
$$\int_{1}^{2} \int_{3}^{4} (xy + e^{y}) dy dx = \int_{3}^{4} \int_{1}^{2} (xy + e^{y}) dy dx$$
 [CO-6] [L-3] **10**

b) Evaluate
$$\int_{0}^{1} \int_{0}^{\sqrt{1-x^2}} \int_{0}^{\sqrt{1-x^2-y^2}} dx dy dz$$
 [CO-6] [L-3] **10**

End Semester Examination, Dec. 2022

B. Tech. – First Semester

MATHEMATICS-I (For All other branches except CSE & BT) (BMA-

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) Evaluate: (a)
$$\Gamma\left(\frac{7}{2}\right)$$
 (b) $B(7,9)$ [CO:1]

b) Evaluate:
$$\int_0^{\frac{1}{2}} \sqrt{\tan \theta} \, d\theta$$
 [CO:1]

c) UsingCauchy's mean value theorem, $f(x) = e^x$ and $g(x) = e^{-x}$, find c. [CO:2]

- d) Find the n^{th} derivative of $f(x) = cos^2(4x + 3)$
- e) For what value of a, $\vec{V} = (x+7y)i + (5y-2z)j + (2x+az)k$ is irrotational

vector

- f) What is the half range cosine series for f(x) = 1 in (0, 2)? [CO:3]
- g) What are the conditions for the existence of Fourier series? [CO:4]

h) Find
$$\frac{\partial u}{\partial r}$$
 and $\frac{\partial u}{\partial \theta}$, if $u = r \sin(r \sin \theta)$ [CO:4]

i) If A =
$$\begin{bmatrix} 1 & 2 & 4 \\ 0 & 9 & 7 \\ 0 & 0 & 3 \end{bmatrix}$$
 what are the eigen values of A^{-1} . [CO:5]

j) For what value of k, the given matrix has rank 2, where $A = \begin{bmatrix} 1 & 1 & 4 \\ 0 & 0 & 7 \\ K & 3 & 8 \end{bmatrix}$ [CO:5]

2x10

[CO:2]

[CO:3]

PART-A

Q.2 a) Evaluate:
$$\int_{-\infty}^{1} \frac{1}{x^4} dx$$
 [CO:1] **5**
b) Using the applications of beta and gamma function, Evaluate:

$$\int_{0}^{1} x^{10} (1 - x^{3})^{12} dx \qquad [CO:1] \ \mathbf{5}$$

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 $f(x) = 8x^4 - 21x^3 + 10x^2$. [CO:2] **7**

b) Find the value of
$$a$$
 and b such that $\lim_{x \to \infty} \left\lfloor \frac{x(1 + a\cos x) - b\sin x}{x^3} \right\rfloor = 1$ [CO:2] 5

c) Expand $\cos(m\sin^{-1}x)$ by using Maclaurin's series [CO:2] 8

392/4

Q.4 a) Discuss the convergence of series: $1 + \frac{x}{2} + \frac{2!}{3^2}x^2 + \frac{3!}{4^3}x^3 + \frac{4!}{5^4}x^4 + \cdots$ [CO:3] 8 b) Expand $f(x) = x \sin x; 0 < x < 2\pi$ in terms of fourier series [CO:3] 12

<u>PART-B</u>

- Q.5 a) If $x^x y^y z^z = c$, prove that $\frac{\partial^2 z}{\partial x \partial y} = -\frac{1}{x(\log_e x)}$ [CO:4] **10**
 - b) Find the directional derivative of $f(x, y, z) = xzy^2 + xyz^3$ at the point (-2,0,1) in the direction of the vector $3\hat{j} - 4\hat{k}$ [CO:4] **10**

Q.6 a) Investigate the value of λ and μ so that the equations: x+y+z=6; 2x+2y+3z=10; $3x+2y+\lambda_z=\mu$ 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 A = $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ [CO:5] **12**

Q.7 a) If
$$u = \cos ec^{-1} \left(\frac{x^{\frac{1}{2}} + y^{\frac{1}{2}}}{x^{\frac{1}{3}} + y^{\frac{1}{3}}} \right)^{\frac{1}{2}}$$
, find $x^{2} \frac{\partial^{2} u}{\partial x^{2}} + 2xy \frac{\partial^{2} u}{\partial x \partial y} + y^{2} \frac{\partial^{2} u}{\partial y^{2}}$ [CO:4] **10**

b) Find the characteristic equation of the matrix $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ and use it to Find the matrix represented by $A^5 + 5A^4 - 6A^3 + 2A^2 - 4A + 7I$. [CO:4] **10**

End Semester Examination, Dec. 2022

B. Tech. – First Semester

MATHEMATICS-I (For All other branches except CSE & BT) (BMA-

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) Evaluate: (a)
$$\Gamma\left(\frac{3}{2}\right)$$
 (b) $B(4,6)$ [CO:1L-3]b) Evaluate: $\int_0^{\frac{\pi}{2}} \sqrt{\tan \theta} \, d\theta$ [CO:1 L-3]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.[CO:2 L-3]d) Find the π^{th} derivative of $f(x) = sin(-x+3)$ [CO:2 L-2]e) Write the necessary condition for a series to be Convergent.[CO:3 L-1]f) What is the half range sine series for $f(x) = T$ in $(0,2)$ [CO:3 L-3]g) For what value of a, the vector $\vec{F} = (ax^2y + yz)\hat{i} + (xy^2 - xz^2)\hat{j} + (2xyz - 2x^2y^2)\vec{k}$ is solenoidal.[CO:4 L-3]h) Find $\frac{\partial u}{\partial r}$ and $\frac{\partial u}{\partial \theta}$, if $u = r \cos(r \sin \theta)$ [CO:5 L-3]i) If $A = \begin{bmatrix} 2 & 2 & 3 \\ 0 & 2 & 5 \\ 0 & 0 & 4 \end{bmatrix}$ 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 $A = \begin{bmatrix} 1 & 5 & 4 \\ 0 & 0 & 2 \\ k & 3 & 5 \end{bmatrix}$ [CO:5 L-3]**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 $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ [CO:1 L-2] **10** about *x*-axis.
- a) Find the extreme values of $x \sin 2x + \frac{\sin 3x}{3}$ in $[-\pi, \pi]$ [CO:2 L-2] **10** Q.3 b) Prove that:

$$\cos(m\sin^{-1}x) = 1 - \frac{m^2}{2!}x^2 - \frac{m^2(2^2 - m^2)}{4!}x^4 - \frac{m^2(2^2 - m^2)(4^2 - m^2)}{6!}x^6 + \dots$$
[CO:2 L-4] **10**

a) Discuss the convergence of series: $\frac{x}{1} + \frac{1}{2} \cdot \frac{x^3}{3} + \frac{1.3}{2.4} \cdot \frac{x^5}{5} + \frac{1.3.5}{2.4.6} \cdot \frac{x^7}{7} + \cdots$ [CO:3 L-2,3] 10 Q.4 b) Find the Fourier sine series for $f(x) = x^2, 0 < x < l$ [CO:3 L-3] 10

<u>PART-B</u>

Q.5 a) If
$$x^{x}y^{y}z^{z} = C$$
, prove that for $x = y = z$, $\frac{\partial^{2}z}{\partial x \partial y} = (-x \ln(ex))^{-1}$ [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) $div\left(\frac{\vec{r}}{r^{3}}\right) = 0$
ii) $div(r^{n}\vec{r}) = (n+3)r^{n}$ [CO:4 L-4] **10**

Q.6 a) Investigate the value of λ and μ so that the equations: $x+y+z=6; x+2y+3z=10; x+2y+\lambda z = \mu$

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:
$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$
[CO:5 L-4] **10**

Q.7 a) If u is a homogeneous function of x and y of degree n, then prove that $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = n(n-1)u$ [CO:4 L-4] **10** b) Find the characteristic equation of the matrix $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ and use it to express $A^5 - 4A^4 - 7A^3 + 11A^2 - A - 10I$ as a linear polynomial in A. [CO:5 L-4] **10**

End Semester Examination, Dec. 2022 B. Tech. – First Semester MATHEMATICS-I / APPLIED MATHEMATICS-I (BSC-MA-101/BMA-101/ MA-101A)

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

2×10

10

10

10 10

10

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
$$\int_{0}^{1} (1-x^{3})^{-\frac{1}{2}} dx$$
.

- b) Prove n = (n-1)!.
- c) Evaluate $\lim(\cot x) / \log x$.

d) Find
$$A^{-1}$$
, if $A = \begin{pmatrix} 1 & 2 \\ 2 & -3 \end{pmatrix}$

- 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; $A = \begin{pmatrix} 1 & 5 & 4 \\ 0 & 3 & 2 \\ k & 13 & 10 \end{pmatrix}$
- h) State linear dependence of vectors.
- i) Prove that $L: \mathbb{R}^2 \to \mathbb{R}^1$ defined by $L(x_1, x_2) = x_1 + x_2$ is a L.T.
- j) State Cauchy's mean value theorem.

<u>PART-A</u>

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: $4x_1 - x_2 = 12$; $-x_1 + 5x_2 - 2x_3 = 0$; $-2x_2 + 4x_3 = -8$
 - $4x_1 x_2 = 12$; $-x_1 + 5x_2 2x_3 = 0$; $-2x_2 + 4x_3 = -8$ b) Solve by Gauss-elimination methods: 10X+Y+Z=12; X+10Y+Z=12; X+Y+10Z=12

396/4
- a) Show that the matrices $\begin{bmatrix} 1 & 5 \\ 5 & 2 \end{bmatrix}$, $\begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$, $\begin{bmatrix} 4 & -2 \\ -2 & 6 \end{bmatrix}$ form a basis of V(R). Q.5 10 b) Verify Rank Nullity Theorem for the linear transformation T(x, y) where $T: \mathbb{R}^2 \to \mathbb{R}^3$ is defined by T(x, y) = (x + y, x - y, y)10
- a) Prove that the sum of two symmetric (skew symmetric) matrices is also Q.6 symmetric (skew symmetric). 10
 - b) Find the Eigen values and Eigen vectors of the matrix: $A = \begin{bmatrix} 4 & 2-2 \\ -53 & 2 \\ -24 & 1 \end{bmatrix}$. 10
- a) Find an invertible matrix P such that $P^{-1}AP$ is a diagonal matrix, where Q.7 $\begin{bmatrix} 3 & 2 & 0 \end{bmatrix}$ $A = \begin{bmatrix} 3 & 2 & 0 \\ 2 & 0 & 0 \\ 1 & 0 & 2 \end{bmatrix}$. Also write down the diagonal matrix.

10

b)Find the distance from the point y = (0, 0, 0, 1) to the subspace $V \subset \mathbb{R}^4$ 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 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.
- a) Show that row vectors of matrix $\begin{pmatrix} 2 & -3 & 1 \\ 4 & 3 & 1 \\ -3 & 1 & 9 \end{pmatrix}$ are linearly independent. Q.1 [CO-3, 5] [L-2] b) Prove that the set of all solutions (a,b,c) of the equation a + b+2c = 0 is a subspace of the vector space [CO-2, 4, 5] [L-3] c) Prove that $\int_{0}^{\infty} e^{-ax} x^{n-1} dx = \frac{\Gamma(n)}{a^n}$ [CO-2] [L-2] d) Find the sum and product of eigen values of $A = \begin{bmatrix} 2 & 1 & 7 \\ 0 & -1 & 4 \\ 0 & 5 & 6 \end{bmatrix}$ [CO-2, 4, 5] [L-2] e) Show that the matrix $A = \begin{bmatrix} 1 & 5 \\ 0 & 1 \end{bmatrix}$ is not diagonalizable over C. [CO-2, 4] [L-2] f) Find the n^{th} derivative of $\frac{1}{ax+b}$ [CO-2, 5] [L-3] g) Evaluate $\lim_{x\to 0} \frac{e^{-x} - e^{\sin x}}{x - \sin x}$ [CO-1, 2, 5] [L-2] h) Test the existence of the integral: $\int_{1}^{\infty} \frac{1}{r \ln(r)} dr$ [CO-1, 2, 4] [L-2] i) Evaluate $\int_{0}^{\pi/2} \sin^{3/2} \theta \cos^{2} \theta d\theta$ j) Find the rank of matrix $A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 4 & 7 \\ 3 & 6 & 10 \end{pmatrix}$ [CO-2, 4, 5] [L-2] [CO-2, 3, 5] [L-2] **2×10** PART-A Q.2 a) Express $\int_{0}^{1} x^{m} (1-x^{n})^{k} dx$ in terms of Gamma function and hence evaluate

 $\int_0^1 x^7 (1-x^3)^{10} dx$ [CO-2, 3, 4, 5] [L-3] **10** b) Find the surface area of the solid generated by the revolution of the ellipse $x^2 + 4y^2 = 16$ about its major axis. [CO-2, 3, 4, 5, 6] [L-3] **10**

Q.3 a) Find the extreme values of $f(x) = x^4 - 62x^2 + 120x + 9$. [CO-1, 2, 3, 4, 5] [L-2] **10** 398/4 b) Express $f(x) = e^{-a \sin^{-1} x}$ about x = 0

- Q.4 a) Investigate the value of λ and μ so that the equations: [CO-2, 3, 4, 5] [L-3] **10** $x+y+z=6, x+2y+3z=10, x+2y+\lambda z = \mu$ has i) No solution, ii) unique solution and iii) more than one solution b) Solve: 10x+y+z=12; x+10y+z=12; x+y+10z=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 $T: \mathbb{R}^4 \to \mathbb{R}^3$ is defined by T(x, y, z, t) = (x y + z + t, x + 2z t, x + y + 3z 3t). [CO-2, 4, 5] [L-3] **1**
 - b) Determine whether or not the following vectors form a Basis of R³: {(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: $\begin{pmatrix} 2 & -3 & +1 \\ 4 & 3 & 1 \\ -3 & 1 & 9 \end{pmatrix}$

- [CO-2, 4, 5] [L-3] **10** b) Apply the Gram Schmidt process to the columns of matrix $\begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 0 \\ 2 & 3 & 1 \end{pmatrix}$ [CO-2, 4, 5] [L-4] **10**
- Q.7 a) Find a matrix P which diagonalizes the matrix $A = \begin{pmatrix} 1 & 1 & 1 \\ 0 & 2 & 1 \\ -4 & 4 & 3 \end{pmatrix}$ Verify $P^{-1}AP = D$ where D is the diagonal matrix. [CO-2, 3] [L-3] **10**
 - b) Find the linear transformation T(x, y) where $T: \mathbb{R}^2 \to \mathbb{R}^3$ 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

COLOR IN DÉCOR (BID-DS-106)

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. Write short notes on the following: Q.1 a) Contrast of complement. b) Tint, Tone and Shade. c) Color Trends. d) Paint. e) Color Symbolism. 2×5 PART-A Q.2 Color is an important element in an interior space, Comment. (In 250 words) 10 Discuss the seven types of contrast in detail. Q.3 10 Q.4 Using colors draw and describe 'Color Wheel'. 10 PART-B Q.5 Describe the factors which influence the way color schemes are used in planning interior design. 10 an

- Write various components to determine sustainability of a paint product. 10 Q.6
- 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. 10

Time: 2 hrs.

Max Marks: 50

End Semester Examination, Dec. 2022

B.Sc. (Interior Design) – First Semester 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] **5×2**

5

5

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**

<u>PART-B</u>

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 B. Sc. (Interior Design) – First Semester HISTORY OF FURNITURE AND DECORATION-I (BID-DS-104)

Max Marks: **50** *No. of pages: 1*

10

- 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 the importance of history of furniture?

<u>PART-A</u>

- 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. [CO-2] [L-2] **10**
- Q.4 Draw Doric, Ionic and Corinthian Orders.

<u>PART-B</u>

Q.5 Take elements from gothic civilization and design a center table for your living room.

[CO-4] [L-4] **10**

[CO-3] [L-3] **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.

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.

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 throw numbers is 6 or 9?	vn at a time. What is	s the	e probability that the	sun	n of th	ne two [CO-1][L-1]
	a) 1/2	b) 1/3	с)	1/4	d)	1/5	
Q.2	In how many differ a) 120	ent ways can the let b) 1440	ters c)	of the word "TABLE 1800	" be d)	arran 3600	ged?
							[CO-1] [L-1]
Q.3	There are five station tickets that are required to the term of te	ons on a railway line. uired for railway autl	WI horit	hat is the number of ties?	diffe	erent	iourney [CO-1][L-1]
	a) 30	b) 25	<i>c)</i>	35	d)	20	
Q.4	<i>In how many ways such that all vowels a) 1,51,200 ways these</i>	<i>the letters of the wo</i> came at odd places b) 5,04,020 ways	ord ' and c)	CIRCUMSTANCES' ca d N always comes at 72,000 ways	an be end d)	e arra. !? None	nged [CO-1][L-1] of
Q.5	A problem is given 1/4 respectively. W a) 1/4	to three students wh hat is the probability b) 1/2	ose tha c)	chances of solving i t the problem will be 3/4	it are e sol d)	e 1/2, ved? 7/12	1/3 and [CO-1] [L-1]
Q.6	Two cards are draw is a spade and one	n together from a po is a heart, is:	ack	of 52 cards. The pro	babi	ility th	nat one [CO-1][L-1]
	a) 3/20	b) 29/34	<i>C)</i>	4//100	d)	13/10	12
Q.7	Two dice are throw number on the two	n together .What is a faces is divided by A	the f or	probability that the s 6.	sum i	of the	; [CO-1][L-1]
	a) 7/18	b) 14/35	<i>c)</i>	8/18	d)	7/35	
Q.8	In a race, the odd f Find the probability a) 319/420	avour of cars P,Q,R,. that one of them wi b) 27/111	S ar ins t c)	re 1:3, 1:4, 1:5 and 1 the race. 114/121	1:6 r d)	espec 231/4	tively. [CO-1][L-1] \$20
	$(x) = (x + 1) (x + 2)^3$	2)41/562 10 625	57.		u)	201/ 1	
<i>Q.9</i>	$\begin{array}{l} f(X) = [(X-1) (X-2)^{\circ} (X-2)$	x-3)"]/[(x-4)" (x-5) U (5,inf)	b) d)	(-inf,1) U (2,3) None of these			[CO-1][L-1]
Q.10	Find the minimum v a) 49/4	value of (x-2) (x-9)? b) 0	<i>c)</i>	11/4	d)	-49/4	[CO-1] [L-1]
Q.11	Triangle ABC is insc and AC = 9 cm, find a) 18 cm	rribed in a circle with d the length of AO. b) 10.6 cm	cer c)	ntre O. If AB = 17cm 16 cm	, ВС d)	С = 10 36 сп	ר כדה [CO-2] [L-1] ו
Q.12	A circle touches all and PS = 8 cm. The	four sides of quadrila en what is the length b) 15 cm	atera of	al PQRS. If PQ = 11 RS? 9 cm	ст.	QR =	12 cm [CO-2] [L-1]
012	In the figure RAC -	$- BCD AB = 32 cm^{-1}$	und	RD = 18 cm and the	un fir	nd the	lenath

Q.13 In the figure, BAC = BCD, AB = 32 cm and BD = 18 cm and then find the length of side BC. [CO-2] [L-1]



Q.14 In the given Figure $\angle PQA = 20^{\circ}$ and $\angle APQ = 120^{\circ}$ then the find out the $\angle PAO = ?$



Q.15	Two parallel ch	ords are drawn in a	circle of diameter 30 d	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	с) 12 ст	d) 16 cm		

Q.16 Capacity of a cylindrical vessel is 25,872 cm3. 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]

5: 3. The ratio of th	ieir volumes is:		
a) 27:20	b) 20:27	c) 4:9	d) 9:4

Q.18A cylindrical piece of metal of radius 2 cm and height 6cm is shaped into a cone
of the same radius. The height of the cone is:[CO-2] [L-1]a) 18 cmb) 14 cmc) 12 cmd) 8 cm

Q.19If 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) 1:5b) 5:4c) 5:16d) 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) 2h
b) 4h
c) 2h/3
d) 3h/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 m2 and its volume is 924m3. Find the ratio of its diameter to its height.[CO-2] [L-1]a) 3:7b) 7:3c) 6:7d) 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) Fourb) Twoc) Threed) 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? [CO-3] [L-1] 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 al	[CO-3] [L-1]			
	а) Тюо	b) None	c) Three	d) Five	
Q.29	If C is placed above	e G, which box is at b	pottom most position?		[CO-3] [L-1]
	a) B	b) C	с) Н	d) G	
Q.30	Which box is placed	l just above box H?			[CO-3] [L-1]
	a) A	b) D	c) G	d) B	
Q.31	Using Slangs during	a presentation is co	onsidered cool. True or	False.	[CO-4] [L-1]
	a) True		b) False		

407/4

Q.32 Showing your back to the audience is considered a bad etiquette during presentation _____. 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 0.34 Number of words on a PowerPoint slide should be not more than 50 words. True [CO-6] [L-1] or **False**. 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 _____ [CO-6] [L-1] b) False a) True Q.36 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.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 _____. [CO-5] [L-1] a) Sender b) Receiver c) Barrier d) None of them *Q.38* The most detailed of all the following documents is _____. [CO-5] [L-1] a) Resume b) Curriculum Vitae c) Bio-Data *Q.39 Most of us use* _____ *and* ____ *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 _____ refers to handshake, head nodding, blinking. [CO-1] [L-1] 0.40 a) Touches b) Prosody d) Haptics c) Gestures *Q.41* Group Discussions can be argumentative as well. **True** or **False**. [CO-5] [L-1] a) True b) False Q.42 Correct or Incorrect Body language can totally change the meaning of a

message. **True** or **False**. a) True

[CO-5]

408/4

Q.43	A cover letter or covering letter can also be a) A resume or CV b) A CV sales letter c) Letter of application	called.	[CO-5] [L-1]
Q.44	<i>Your cover letter should explain how much a) Benefit b) Charge</i>	you will the compan	γ.
	c) Disrupt		[CO-6] [L-1]
Q.45	<i>Cover letters often begin with the applicant a) Began their education b) Spend their free time c) Found out about the job</i>	explaining how they.	[CO-5] [L-1]
Q.46	Your cover letter can summarize a key sellin a) Work history b) Medical history c) Relevant experience	ng point such as yours.	[CO-5] [L-1]
Q.47	Use of and in addition of NON VERBAL Communication. a) Words and sentences b) Gestures and body language c) Body language and posture d) B & C	on to words when we speak is	s a part [CO-5] [L-1]
Q.48	Self-Introduction can be a deciding factor in False .	n a job interview process. Tru	e or
	a) True b)	False	[CO-6] [L-1]
Q.49	Self-Introduction should always be atleast f a) True b)	for 5mins. True or False . False	[CO-5] [L-1]
Q.50	<i>Cover letters often end with the applicant e</i> <i>a) Will enjoy their work</i> <i>b) Spend their salary</i>	xplaining how they.	[CO-6] [L-1]

c) Are best fit for the job

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester QUANTITATIVE APTITUDE AND PERSONALITY DEVELOPMENT-II (BHM-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 how many days cal	workman as B. toget n B alone finishes wo	her ork?	they finish the work	in i	14 day	s. In
	a) 39	b) 29	<i>c)</i>	21	d)	42	[CO-3] [L-1]
Q.2	An electric pump ca 3(1/2) hours to fill to empty it?	an fill a tank in 3 hou the tank. If the tank	irs. is fi	Because of a leak in full, how much time	the will t	tank i the lea	it took ok tale
	a) 21	b) 5	<i>c)</i>	17	d)	8	[CO-3] [L-1]
Q.3	If a green painted of cubes will have 3 st	cube of 16 cm is divi ided painted:	ided	l into 16 equal small	cub	es. Ho	w many
	a) 5	b) 7	<i>c)</i>	8	d)	12	[CO-3] [L-1]
Q.4	How many times de a) 23	o the hands of the cl b) 22	lock c)	<i>coincide in a day? 21</i>	d)	20	[CO-2] [L-1]
Q.5	If 13 th may 1999 is a) Monday	Monday what will be b) Wednesday	e 15 c)	s th may 2000 will? Sunday	d)	Frida	y [CO-2][L-1]
Q.6	In a certain code la code for "ANNUAL" a) ZFMOMM above	nguage, "YEARLY" is in the same languag b) ZNNFZA	s wr ge? c)	ritten as "BVZIOB". V ZMMFZO	Vhai d)	t will b None	e the [CO-2][L-1] of
Q.7	A dice is numbered then which of the f a) 2 is opposite to b) 1 is adjacent to c) 3 is adjacent to d) 3 is opposite to	<i>from 1 to 6 in differ following statements 6 3 5 5</i>	rent is n	ways. If 1 is adjace becessarily true?	nt ta	02,40	and 6, [CO-2] [L-1]
Q.8	A and B can do a p in 12 days. In how a) 1	iece of work in 4 day many days will A, B, b) 3	/s, v C a C)	while C and D can do and D do it together 5	o the ? d)	e same 7	e work [CO-2][L-1]
Q.9	<i>How many cubes</i> и а) 44	vill be formed of 2 cn b) 64	n ea c)	lge from 8 cm big cu 54	ıbe? d)	, <i>84</i>	[CO-3] [L-1]
Q.10	Shweta when incre hour less than the usually covered by	asing her speed fron usual time to cover a Shweta?	n 24 a cei	4 km/hr to 30 km/hr rtain distance. What	she is tl	takes he dist	one 'ance
	a) 60	<i>b) 120</i>	<i>c)</i>	110	d)	100	[CO-3] [L-1]
Q.11	Reema can comple	te a piece of work in	12	days while Seema c	an ti	he san	ne 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.12	6 men can pack 12 days can 14 men pa a) 2.8	<i>boxes in 7 days by v ack 18 boxes if they b) 3.5</i>	vorking for 7 hours a da work for 9 hours a day? c) 4.9	y. In how many [CO-3] [L-1] d) 3.2
Q.13	Walking at 4/5 of hi club. What is the us a) 1hr	is normal speed, Dev sual time taken by hi b) 2hr	vang is 15 minutes late m to cover the distance c) 3hr	in reaching his ? [CO-3] [L-1] d) 4hr
Q.14	A train starts from A train starts from B t time both trains will a) 12:51 AM	A to B at 9:00 am an to A at 10:00 am and I meet? b) 12:45 AM	d takes 6 hours to trave takes 8 hours to travel	el to B. Another to A. At what d) 12:154M
Q.15	In a certain code la language, how will a) 2514	nguage "EASY" is wr "BEAM" be written as b) 2344	<i>itten as "5117". In the s</i> s? c) 2233	d) 12.15AA same code [CO-3] [L-1] d) 2121
Q.16	A clock which is set be the correct time a) 10:18	right at 12 noon gai when the clock shov b) 10:08	ins 3 secs for every 2 m. vs 10:15 pm? c) 10:00	inutes, what will [CO-2][L-1] d) 10:05
Q.17	Which day of the waa a monoton a monoton waa waxaa w	eek will be 15 th augu b) Tuesday	ist 2021? c) Saturday	[CO-2] [L-1] d) Sunday
Q.18	Wages for 45 wome require to work 16 double of those of a a) 19	en amount to rupees days to receive rupee a woman? b) 25	15525 in 48 days. How es 5750, the daily wage. c) 34	r many men s of a man being d) 21
Q.19	<i>Walking 5/6 of its u cover the journey?</i> <i>a) 48</i>	sual speed, a train is b) 50	c) 22	<i>ts usual time to [CO-2] [L-1] d) 25</i>
Q.20	<i>A, B, and C underta work and rest is doi a) 101</i>	kes to do work for R ne by C alone. How I b) 202	<i>rs 707. A, and B togethe much should C get? c) 303</i>	or do 5/7 of the [CO-2] [L-1] d) 404
Q.21	A man covered a ce he would have take have taken 40 minu a) 19	ertain distance at son n 40 minutes less. If ites more. The distar b) 40	ne speed. Had he move f he had moved 2 kmph nce (in km) is c) 50	d 3 kmph faster, slower, he would [CO-2][L-1] d) 70

Direction for Q.22 – Q.25 read the Venn diagram carefully:



[CO-2] [L-1]

<i>Q.22</i>	How many doctors are neither artists nor players?					
	a) 17	b) 22	<i>c)</i> 10	d) 28		
<i>Q.23</i>	How many doctors	are both players and	artists?			
	a) 22	b) 3	c) 19	d) 10		
<i>Q.24</i>	How many artists a	re 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]



Q.26	The ratio of	f students who	passed in	Bengali,	to the students	who passed in	7
	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.28The percentage of students who passed in English isa) 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 living 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. [CO-5] [L-2]

Q.36 Amie agrees with the _____ that the grass is always greener on the other side of the fence.

a) perpetuityb) penchantc) maximd) conformation

Q.37 Victor Frankenstein's creature was a(n) _____, detested by everyone he met.

	a) itinerant c) cosmopolitan			b) anathema d) mercenary		
Q.38	Jack Nicholson was Best Actor.	at the of his	s career	when he receive	ed the Osc	ar for
	a) detriment c) oligarchy			<i>b) pinnacle d) d. rogue</i>		
Direc	tions Q.39-Q.40: (Choose Synonyms	;			[CO-4] [L-2]
Q.39	Distort a) Evil	b) Deform	c) Wr	ong	d) Harm	
<i>Q.40</i>	Stigma a) Stain	b) Trial	c) Dif	ficulty	d) Holine	255
Direc spaces senter	tions for Q.41 to Q s. Fill up the sentenc nces grammatically c	9.45: In each of the res with the correct w correct.	followii word fro	ng sentences, the om the given opt	ere are two ions to ma	o blank ke the [CO-4] [L-1]
Q.41	With borrowing cos for India's exporters policymakers will ne tenuous momentun a) elude; impruden c) eschew; pruden	ts set to rise and glo s who are yet to cap eed to pop n is to be sustained. nce ce	obal trac italize o pulism a b a	le tensions addir on the rupee wea ond stick to polic;) elope; reckles;) deteriorate; of	ng to uncen hkness, V sness bedient	rtainties _ if the
Q.42	Due to the classified as an auto because corruption, continue to be more a) ameliorate; dom c) deteriorate; obe	quality of elections, ocracy again. These social exclusion and e in autocrac ninant odient	, the foi develop d barriei cies. b a	rmerly fifth large oments are worry rs to fair econom) enhance; rebe) worsened; pre	est democra ving for citi nic competi ellious evalent	acy is izens ition
Q.43	In a country which caretaker governme a) interim; novelty c) permanent; con	has had three-decad ents are somewhat c nplex	te-long of a b a	military dictators) volatile; antiqu) eternal; innova	ships, uated ative	
Q.44	Mandatory pre-litiga involved, rather tha with and a) shuttle; release c) ball; engage	ation mediation puts In looking at externa d resolve disputes.	the l agenci b a	in the co ies like courts, al globe; involve) sphere; faster	urt of the _i nd urges ti d	parties hem to
Q.45	The youth climbed the driver sensitive a) smashing; mana c) break; involve	over the vehicle and ly to take aged	started the veh b a	' it w icle out of the cr) mashing; hand) defeat; directe	ith stones, rowd. dle ed	then
Direc highlig the co	tions for Q.46 to Q phted in bold. Alterna onstruction of the ser	9.50: In the question atives to the highligh intence. Select the co	n a part nted par prrect all	of the sentence t are given which ternative.	has been h may imp	rove [CO-6] [L-1]

415/4

- Q.46 To get one's name in the Rowland Ward's book of hunting records was the hot ambition of every serious hunter. b) burning
 - a) extreme
 - c) reluctant No improvement needed d)

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 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 $65776 \land 759 + 54697 \land 467?$ a) 4 b) 6 c) 9 d) 0
- Q.2 If $\log_a(ab) = x$, then $\log_b(ab) = ?$ a) 1/x b) x/(x+1) c) x/(1-x) d) x/(x-1)

[CO-3] [L-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.4If n is natural number, then (6n^2+6n) is always divisible by:[CO-3] [L-1]a) 6 onlyb) 6 and 12 bothc) 12 onlyd) 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.6A man on tour travels first 160 km at 64 km/hr and the next 160 km at 80
km/hr. The average speed for the first 320 km of the tour is[CO-2] [L-1]
A. 35.55 km/hrA. 35.55 km/hrb) 36 km/hrc) 71.11 km/hrd) 71 km/hr
- Q.7It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?[CO-1] [L-1]a) Sundayb) Saturdayc) Fridayd) Wednesday
- Q.8 What is the remainder when 15 ^ 23 + 23 ^ 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 [CO-3] [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] [L-1]
- 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.12What was the day of the week on 28th May, 2006?[CO-1] [L-1]a) Thursdayb) Fridayc) Saturdayd) 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) 1hr
 b) 1 hr 20 min
 c) 1 hr 10 min
 d) 50 min
 [CO-2]
 [L-1]
- 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:a) Wednesdayb) Saturdayc) Tuesdayd) 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. [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 in both the statements together are needed.

[CO-1] [L-1]

- 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% [CO-2] [L-1]
- 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? a) 600 b) 800 c) 1200 d) 2000
- Q.22A 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) 650b) 690c) 698d) 700
- Q.23 A 200 m long train passes a motorcycler, running in the same direction at 12 km/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.24A 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 kmsa) 4.58 kmsb) 6.35 kmsc) 5.76 kmsd) 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)



[CO-1] [L-1]

- Q.26 What is the difference between the number of vehicles manufactured by
Company Y in 2000 and 2001?
a) 50000[CO-2] [L-1]
(CO-2] [L-1]a) 50000b) 42000c) 33000d) 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.28What is the average numbers of vehicles manufactured by Company X over the
given period? (Rounded off to nearest integer)[CO-2] [L-1]
a) 119333a) 119333b) 113666c) 112778d) 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) 173b) 164c) 132d) 97

Directions for Q.31-Q.35: Read the following passage and answer the question:

[L-2]

[CO-6]

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 when the music on the radio was interrupted by a news destination 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 reason it 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
 - c) The Harrison's house

- b) The nearest 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) 3 a) 1 b) 2 d) 4 c) e) 5 Q.37 He came to (1)/ the final conclusion (2)/ that he would (3)/ not accept the offer. (4)/ No Error (5). 2 3 a) 1 b) c) d) 4 5 e) Q.38 He wanted (1) / to know whether (2)/ it was right and proper (3)/ way to do it. (4)/ No Error (5). 2 3 1 b) c) d) 4 a) 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 of the fence.		tha	at the grass is always greer	ne other side				
	a) d)	conformation	D)	penchant	C)	maxim			
O.40	Rickv	Smith's creature wa	as a(n)	a(n) detested by everyone he met.					
L	a) d)	itinerant mercenary	b)	anathema	c)	cosmopolitan			
Q.41 actor.	Ŵill S	mith was at the	of	his career when he receive	ed the (Oscar for best			
	a)	detriment d) rogue	b)	pinnacle	c)	oligarchy			
Directions for Q.42-Q.43: Choose Antonyms:									
Q.42	Heart	felt.	-						
-	a)	humorous d) unhealthy	b)	loving	c)	insincere			
0.43	Secre	t.							
L	a)	Friendly d) Amp	b) le	Overt	c)	Hidden			
Direc	tions	for Q.44-Q.45: Ch	oose S	Synonyms:					
		[CO-4] [I	2]						
Q.44	Prolor	ng.							
	a)	Inquire d) Extend	b)	Wax	c)	Wait			

0.45	Aloot
ųu	/

a)

b) Reserved Tidy Foolish

c) Slope

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]

d)

- 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	A and B invest in a charity and A's sha a) 1100	<i>business in the ratio</i> re is Rs. 640, the tot b) 1600	9 5 : 6. If 12% of the too al profit is: c) 1300	tal profit goes to [CO-1][L-1] d) 1400	
Q.2	A bag contains Rs. the ratio 4 : 6 : 4. a) 600	600 in the form of o The number of 50pa b) 300	ne-rupee, 50 paise and ise coins is: c) 450	25 paise coins in [CO-1] [L-1] d) 150	
Q.3	If Rs. 1380 be divid first part is:	led into three parts,	proportional to 1/2: 2/3	<i>: 3/4, then the</i> [CO-1] [L-1]	
	a) 364	D) 360	C) 392	d) 408	
Q.4	If 3 (A's capital) = receive	4 (B's capital) = 8 (C	C's capital), then out of o	of Rs. 255, C will [CO-1] [L-1]	
	a) 40	b) 50	c) 55	d) 45	
Q.5	Shweta is an exper Shweta asked the p increasing 27% of a 27% so the shopked or gain of shopkeep a) 5.54% loss loss	t in bargaining. Once price of Shampoo Sau the original cost. But peper sold it by decre per and by how much b) 5.54% gain	e she went to a nearby s chet the shopkeeper tol Shweta insisted to decl easing the price by 27% h percent? c) 7.29% loss	shop. When d her the price by rease the price by . What is the loss [CO-1] [L-1] d) No gain no	
Q.6	If the area of a rec what is the percent	tangle is increased b age increase in its le	y 44% and its breadth i ength?	ncreased by 20%, [CO-1][L-1] d) 12%	
Q.7	The weight of a A is of B more than that	s 20 % less than tha t of A?	of B. By what percent	age is the weight	[CO-1]
	a) 75%	D) 50%	C) 25%	a) 33.33%	
Q.8	Initially Ms. Mansi I Once again she inc wallet will be what a) 50%	has Rs. 8756.36 in he reased her amount b percent greater than b) 56%	er wallet then she increa by 30%. The final value n the initial amount. c) 70%	ased it by 20%. of money in her [CO-1][L-1] d) 80%	
Q.9	If x:y = 3:4 and y:z a) 78:82:65:45	z = 8:9, z:a is 5:6. Fi b) 30:40:45:89	ind x:y:z:a c) 30:40:45:54	[CO-1][L-1] d) 30:40:45:64	
Q.10	<i>Out of 420 compute computers.</i>	ers, 25% are non-de	efective. Find the no of c	lefective	
	a) 70 these	b) 80	c) 90	d) None of	
Q.11	If the cost price of	25 candies is equal t	to the selling price of 20	candies, then	
	what is the profit/lo a) 16.66% these	<i>bss percentage? b) 20%</i>	c) 25%	[CO-1] [L-1] d) None of	

- 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? [CO-1] [L-1] a) 10000 b) 20000 c) 13000 d) No Profit, No loss
- Q.13A, 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) 5.06a) 5.06b) 12.5c) 10.8d) 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): [CO-1] [L-1] 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 [CO-1] [L-1]

Q.16A 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 hrsb) 20 hrsc) 36 hrsd) 40 hrs

Q.17 8 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? [CO-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.
 [CO-1] [L-1]

 a) 1:3
 b) 2:3
 c) 1:1
 d) 4:5

Q.20A 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]
d) 25.14 La) 35.28 Lb) 29.16 Lc) 37.89 Ld) 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

[CO-2] [L-1]

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 c) IEWRRT d) IERWRT b) EIRTUW 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) DOOR b) GOOD c) FOUR d) DOOT 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? [CO-2] [L-1] c) muk d) mu a) ti b) fa Q.29 Mark:

boys are there in the row? a) 221 b) 23 d) 28 c) 27 *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] d) 32 a) 29 b) 41 c) 31

the left interchange their positions; Rahul becomes 20th from the left. How many

Q.23 In a row of boys, if Satish who is 4th from the right and Rahul who is 15th from

I. All word being flat is a possibility. II. All fruit being word is a possibility.

- 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:

e) If neither conclusion I nor II is true

Statements:

All the laptop are bike. Some bike are ants.

Conclusions:

O.22 Mark:

I. All the laptop are bikes. II. Some bikes are laptops.

[CO-2] [L-1]

[CO-2]

[CO-2] [L-1]

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 ≤ X, J < X
Conclusions:
I. A> J II. M< J

Q.30 Select a suitable figure from the Answer Figures that would replace the question mark(?) [CO-3] [L-1]



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. [CO-4] [L-1]

- *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 (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 dig a) 4	nit of the sum of first b) 6	111 whole numbers? c) 5	d) 0	[CO-2] [L-1]				
------	--	--	---	--	---------------------------------	--------			
Q.2	<i>If the unit digit of (</i> <i>a) 1</i>	(433×456×43N) is (N b) 8	l+2), then what is the v c) 3	alue of N. d) 6	?				
					[CO-1] [L-1]				
Q.3	In which position fr a) 81 st	om the right is the fi b) 82 nd	irst non-zero digit prese c) 83 rd	nt in 334! d) 84 th	?				
			-	-	[CO-3] [L-1]				
Q.4	Find the highest po a) 22	wer of 72 in 100! b) 24	c) 25	d) 27	[CO-1] [L-1]				
Q.5	<i>What is the remaine a) 0</i>	der when 4^ ⁹⁶ is divi b) 2	ided by 6? c) 3	d) 4	[CO-2][L-1]				
Q.6	Find the remainder	when 1! + 2! + 3! +	-4! + 5! + 10	00! is divi	ded by				
	14. a) 0	<i>b) 2</i>	c) 5	d) 8	[CO-1] [L-1]				
Q.7	Evaluate: 5 × (2 × a) 134 these	34) ÷ 6 + 7 – 8. b) 145	c) 150	d) None	e of				
Q.8	The arithmetic mea	n between two num	bers is 75 and their geo	metric me	ean is	ICO 1			
	a) 133 and 17	<i>b) 63 and 87</i>	c) 3 and 147	d) 73 ai	nd 77	[00-1]			
Q.9	Kanmani ranked six among those who p competition and five a) 35	Ateenth from the top Dassed an examination The failed in it. How ma b) 45	and twenty ninth from on. Six boys did not part any boys were there in c) 50	the bottoi ticipate in the class? d) 55	n the ? [CO-2][L-1]				
Q.10	The sum of three n	umbers in a GP is 26	and their product is 21	6. Find th	e				
	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 greates a) 193	at number which divid b) 183	des 639, 1065 and 1491 c) 223	exactly? d) 213	[CO-3] [L-1]				
Q.12	In a queue of childi right. When they in thirteenth from the a) 8 th	ren, Arun is fifth fron terchange their place left. Then, what will b) 14 th	n the left and Suresh is es among themselves, A be Suresh's position fro c) 15 th	sixth fron Arun beco om the rig d) 16 th	n the mes ht?[CO-2] [L-1]	7			
Q.13	Find the side of the room 5 meters 44ci a) 56 cm	largest square slab m long and 3 meters h) 42 cm	which can be paved on 74 cm broad. c) 38 cm	the floor	of a [CO-3][L-1] m				

Q.14	<i>If x and y are two c</i> <i>by 80, then x + y =</i>	digits of the number =?	653xy such that this nu	mber is di	ivisible	[CO-3]
	a) 2	b) 3	c) 4	d) 5		
Q.15	Without any stoppa 42 km/h, and with of 28 km/h. How m a) 14 minutes these	age, a person travels stoppages he covers nany minutes per hou b) 15 minutes	a certain distance at ar the same distance at a ur does he stop? c) 28 minutes	n average n average d) None	speed of speed [CO-3][L-1] e of	
Q.16	<i>The average of 17 and that of the last and 11.8</i>	numbers is 10.9. If t nine numbers is 11. b) 11.4	the average of first nine 4, the middle number is c) 10.9	numbers s: d) 11.7	is 10.5 [CO-1] [L-1]	
<i>Q.17</i>	Find the highest po a) 30	wer of 24 in 100! b) 32	c) 35	d) 38	[CO-1] [L-1]	
Q.18	<i>Given: log ₈ (5) = b</i> a) (1+2b)/2	b. Express log ₄ (10) b) (1+3b)/3	in terms of b. c) (1+3b)/2	d) (1+2	[CO-1][L-1] Pb)/3	
Q.19	Amit started walkin turned left, then tu going now? a) North or South West	g positioning his bac rned right and towar b) East or West	ck towards the sun. Afte rds the left again. In wh c) North or West	r some tin ich directi d) Souti	ne, he ion is he h or	
	West				[CO-1] [L-1]	
Q.20	Sum of first 25 terr common difference	ns in AP is 525, sum ?	of the next 25 terms is	725, what	t is the [CO-2] [L-1]	
	a) 8/25	b) 4/25	c) 6/25	d) 1/25		
Q.21	How many three di a) 260	igit numbers are divis b) 280	sible by 5 or 9? c) 200	d) 180	[CO-2] [L-1]	
Q.22	Sundar runs 20 m t to the right and run turns to left and run direction is Sundar	towards East and tur ns 9 m. Again he turi ns 12 m and finally f facing?	ns to right and runs 10 ns to right and runs 5 m ne turns to right and 6 m	m. Then l After thi n. Now to	he turns is he which	
	a) East	b) West	c) North	d) Sout	h	
Q.23	<i>Suraj has a certain 96 runs thereby inc 13th innings?</i>	average of runs for a creasing his average	12 innings. In the 13th by 5 runs. What is his a	innings he verage af	e scores ter the [CO-1][L-1]	
	a) 48 -	b) 64	c) 36	d) 72		
Q.24	If the 3rd and the 9 of this AP is zero. a) 7 nd	9th terms of an AP a b) 4 th	re 4 and -8, respectively c) 5 th	v, then wh d) 6 th	nich term [CO-2] [L-1]	
Q.25	Solve for x such that a) 2	at log ₂ 32 + log ₂ 16 b) 4	$f = (log_2 x)^2$ c) 6	d) 8	[CO-2] [L-1]	

- Q.26 pqr is a three digit natural number such that pqr=p!+q!+r!. What is the value of (q+r)*p? [CO-3] [L-1] 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) 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[CO-2] [L-1]b) Can keep your priorities in order[CO-2] [L-1]c) Can be a good thing[CO-2] [L-1]d) Wasn't discussed as a part of using time more efficiently[CO-1] [L-1]Q.33 Using a planner or making a "to-do" list every day.[CO-1] [L-1]a) Is a waste of paper.[CO-1] [L-1]
 - 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

- *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] b) False a) True *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 [CO-1][L-1] to a higher level of work responsibility? 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? b) Mid career c) Exit d) Late Career a) Exploration *[CO-1] [L-1]* Q.43 Development of a career of an individual undergoes through a number of [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: [CO-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? [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]

436/4

	a) Resume b) Career plan c) Transcript d) Learning plan	
Q.47	S in SMART goal stands for a) Simple b) Short c) Secure d) Specific	[CO-1] [L-1]
Q.48	Which is not a major factor in setting career goals? a) Value b) Interests c) Friends d) Aptitude	[CO-1] [L-1]
Q.49	Which goals allow adjustments in the be made as an individual moves the his/her career plan? a) Long term b) Medium term c) Short term d) Stepping stone	rough [CO-1][L-1]
Q.50	If an ultimate goal is to become a physical therapist, a career plan should include:	1

- a) Completing an internship
- b) Getting a masters degree/ phD
- *c*) Going to military
- d) Going to a community college

[CO-2] [L-1]

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 follow a) Prioritize all you c) Delay any unne	ving is the best strat Ir tasks cessary work	egy for effectively p b) Ignore all the l d) All of the abov	lanning out your time? unexpected work			
Q.2	Managers and lead considered a role n leader.	teristics. A leader is suited qualities of a					
	a) Vision, commitre b) Honesty, dedica	nent, devotion, clear ation, ambiguous, au v lack of empathy v	r purpose, ability to . Ithoritative Defiance	inspire			
	d) Authoritative. c	lear purpose, bossv					
Q.3	is inc	creasing leadership i	rapidly				
-	a) Strategy	5 ,	b) Command				
	c) Control		d) Getting others	to follow			
Q.4	Regarding leadersh	nip, which statement	t is false?				
	a) Leadership doe.	s not necessarily tak	e place within a hiel	rarchical structure of			
	an						
	Organization	narata na landara th	oir rolo is always do	arty actablished and			
	defined	Derale as reduers line	ell Tole is diways clea	ariy established and			
	c) Not every leade	or is a manader					
	d) All of the above						
0.5	are th	e approaches to the	studv of leadership	which emphasize the			
L -	personality of the l	eader:	···· /				
	a) Contingency the	eories	b) Group theories	5			
	c) Trait theories		d) Inspirational th	eories			
Q.6	The effectiveness of within the workgro	of a leader is depend up:	lent upon meeting _	areas of need			
	a) One	b) Three	c) Five	d) None of the			
07	above						
<i>Q.1</i>	opportunity cost of energy drink?	f component is the fo buying new basketi	ollowing: Lalla has d ball shoes is more va	etermined that the aluable than her daily			
	a) Smart	b) Manageable	c) Attainable	d) Realistic			
Q.8	All forms of stress	are bad and unhealt	hy. True or False.	,			
	a) TRUE		b) FALSE				
Q.9	Postponing a task i	for a later time witho	out valid reason is ca	alled			
	a) Waiting	b) Procrastination	c) Laziness	d) None of			
0.10	them			- time - t-t-t- t- th T			
<i>Q.10</i>	Time Management	is only based on ma	aking and following a	a time table to the T.			
	a) Truc		h) Falco				
011	α) πιμε Δ short term goal i	c	D) Taise				
Q.11	a) months to vear	S	h) days to weeks				
	c) next vear		d) vears to decad	les			
0.12	What part of SMAR	T is missing? I will l	ose 20 pounds by ex	xercising at the gym			
L	three times a week		, , .	5 57 -			
	a) Manageable	b) Attainable	c) Realistic	d) Time bound			
Q.13	What part of SMAR	T is missing? I plan	to save INR 2,000 b	y automatically			
	depositing INR 100	from my paycheck	into a savings accou	int each month for 2			
	vears						

a) Simple b) Manageable c) Attainable d Q.14 Failing to manage your time can lead to some consequences, like d) Realistic

	a) Less stress		b)	Missed deadlines		
	c) Greater productivit	y and efficiency	d)	A better professiona	al re	putation
<i>Q.15</i>	Álways start working d	, on the easiest task	ks, e	even if they are less i	imp	ortant. True
-	or False				-	
	a) True		b)	False		
<i>Q.16</i>	One of the following ti	hings is not a sche	edu	ling method		
-	a) Diary b)) To do list	<i>c)</i>	Time Table	d)	Social Media
<i>Q.17</i>	Who is a leader?		,		2	
-	a) a person whose be	haviour stimulate.	s ac	tion in a group.		
	b) person whose beha	aviour stimulates l	lead	lership in a group.		
	c) person whose beha	aviour stimulates a	ado	ption in a group.		
	d) None of the above.					
<i>Q.18</i>	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 follo	wing defines the l	role	of a leader?		
	a) Group advisor b)) As an analyzer	<i>c)</i>	As a listener	d)	All of the
	above	-	-		-	
Q.20	What is personality the	eory?				
	a) The theory which f	focuses on person	al q	ualities		
	b) The theory which f	focuses on person	al b	ehaviour.		
	c) The theory which f	focuses on person	al id	leas		
	d) All of the above.					
Q.21	In a class of 45 studer	nts Aditya's rank is	s tw	elve from top what i	s hi:	s rank from
	bottom.					
	a) 33		b)	34		
	c) 35		d)	cannot be determin	ed	
<i>Q.22</i>	In a class of 42 studer	nts Nutan's Rank I	s 22	from bottom what i	's he	er rank from
	<i>top.</i>		<i>L</i>)	22		
	$\frac{d}{21}$		<i>D)</i>	ZZ		
0 22	L) ZJ In a class Sonal's ran	k ic 10th from ton	u) Swh	Calliol De deleillin	ieu alou	/
<i>Q.23</i>	111 a Class, Solial's Talli>) 24		ווייי י ה)	25	EIUV	V.
	a) 27		נט ה	2J Cannot ha datarmir	nod	
0 74	If A is to the south of	R and C is to the	u) Daci	t of R in what direct	ion i	ic A with
$Q.2\tau$	respect to C?		casi		0111	SA WILI
	a) North-east h) North-west	c	South-east	d	South-west
0.25	A is 40 m South-west	of B. C is 40 m Sc	uth	east of B. Then. C.i.	s in	which
<i>Q.23</i>	direction of A?		Juch		,	Winch
	a) East b)) West	c)	North-east	d)	South
0.26	Rai travelled from a po	oint X straight tou	vard	ls east to Y at a dista	ince	of 80
L	metres. He turned rial	ht and walked 50	met	res, then again turne	ed n	iaht and
	walked 70 metres. Fin	ally, he turned rig	nht a	and walked 50 metre	s. H	low far is he
	from the starting point	t?				
	a) 10 metres b) 20 metres	C)	50 metres	d)	70 metres
<i>Q.27</i>	Pointing to a photogra	ph, a man said, "	'I ĥa	ve no brother or sist	er t	out that man's
•	father is my father's so	on." Whose photo	gra	oh was it?		
	a) His own b,) His son	c)	His father's	d)	His nephew's
<i>Q.28</i>	Pointing towards a boy	v, Veena said, "He	e ís	the son of only son a	of m	'Y
	grandfather." How is t	hat boy related to	o Ve	ena?		
	a) Aunt b,) Uncle	<i>c)</i>	Mother	d)	Data
	inadequate					

Q.29	Introducing Reena, daughter." How is l	Monika said, "She is Monika related to Red	the ena	e only daughter of m ?	y fa	ther's only
	a) Aunt inadequate	b) Niece	<i>c)</i>	Cousin	d)	Data
Q.30	Pointing to a man a mother." How is the	woman said, "His n woman related to t	oth the l	er is the only daught mother?	ter (of my
0.31	a) Mother Find the number of	<i>b) Daughter factors of 250?</i>	<i>c)</i>	Sister	d)	Grandmother
0.32	a) 8 Find the number of	<i>b) 16</i> <i>even factors of 340</i>	, C)	24	d)	32
Q.33	a) 8 Find the product of	<i>b) 6 factors of 280?</i>	<i>c)</i>	4	d)	2
Q.34	a) 280 ¹⁸ Find the sum of fac	b) 280 ²⁴ tors of 4004?	<i>c)</i>	280 ⁸	d)	280 ⁹
Q.35	<i>a) 4004³ Find the number of</i>	<i>b) 5444</i> prime factors of 218	с) 37?	9000	d)	9408
Q.36	a) 1 How many factors of	b) 2 of 2 ⁷ * 3 ⁶ * 5 ² * 9 ² *	с) 10	4 are multiples of 18?	<i>d)</i>	8
Q.37	a) 496 Find the sum of eve	<i>b) 480</i> en factors of 370?	<i>c)</i>	405	d)	505
Q.38	a) 656 Find the unit digit o	b) 456 f 21 ²⁵ * 784 ¹²⁵ * 582	С) 2 ⁶⁵⁸⁶	756 ??	d)	750
Q.39	a) 2 Find the last digit of	b) 0 f 554 ⁷⁸² * 983 ⁵⁸¹ ?	<i>c)</i>	6	d)	8
<i>Q.40</i>	a) 8 Find the unit digit o	b) 1 f (257 ⁴⁴⁵ + 881 ⁸⁵⁸) *	с) * (З.	6 23 ⁸²⁵ + 445 ⁹⁵⁴)?	d)	3
Q.41	a) 0 Find the last digit of	b) 1 f (276 ¹²² * 126 ⁸⁴²)?	<i>c)</i>	2	d)	4
<i>Q.42</i>	a) 0 Sonu is fifteenth fro	b) 6 om the front in a colu	c) Imn	2 of boys. There were	d) e thi	<i>3</i> rice as many
	behind him as there the seventh boy fro	e were in front. How m the end of the col	ma. lum	ny boys are there be n?	twe	en Sonu and
	a) 33 inadequate	b) 34	c)	35	d)	Data
Q.43	Forty boys are stan and Sanjay is thirty	ding in a row facing -first from the right e	the end	north. Amit is elever of the row. How far	nth will	from the left Shreya, who
	<i>is third to the right</i> <i>a) 2nd to the right</i>	of Amit in the row, L	be fi b)	<i>rom Sanjay? 3rd to the right</i>		
Q.44	c) 4th to the right Kashish goes 30 me	etres North, then turn	d) ns r apir	5th to the right ight and walks 40 m turns right and wal	etre	es, then again
	How many metres i	is he from his origina	nl pc	sition? 20	са)	۵ <i>ח</i> ۵
Q.45	A man walks 30 me metres. Then, turni and walks 30 metre	tres towards South. Ing to his left, he wai Ins. How far is he from	The Iks 2 n hi	<i>en, turning to his righ</i> 20 metres. Again, he is initial position?	t, h tur	ne walks 30 ns to his left
	<i>a) 20 metres these</i>	b) 30 metres	<i>c)</i>	60 metres	d)	None of
Q.46	Rohit walked 25 me metres. He then tur right and walked 15 which direction?	etres towards South. med to his left and v metres. At what dis	The valk stan	en he turned to his le ed 25 metres. He ag ce is he from the sta	eft a ain rtin	and walked 20 turned to his g point and in

441/4

a) _	35 m	etres	East
------	------	-------	------

c) 40 metres East

- b) 35 metres North
- *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 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) 74th Amendment Act.
 - e) Judicial Activism.

<u>PART-A</u>

Q.2 Discuss Fundamental Rights with special reference to the Right to equality.

[CO-3] [L-1,2] **10**

2x5

- 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**

<u>PART-B</u>

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.7What 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 and a flexible form of constitution. a) Rigid b) Malleable c) Brittle d) None of the above	[CO-1] [L-1, 4] 2
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	[CO-2] [L-2] 2
Q.3	Keshavananda Bharti case was a landmark judgement, because it spor a) Judicial review b) Basic structure c) Fundamental rights d) All the above	ke about: [CO-1] [L-1, 4] 2
Q.4	Addition of economically weaker section reservation was amendment of the following article: a) Article 16 b) Article 17 c) Article 18 d) Article 32	of which of [CO-3] [L-3] 2
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	[CO-3] [L-3] 2
Q.6	Article 19 comprises of: a) Right to assemble b) Right to freedom of expression c) Right to settle d) All the above	[CO-1] [L-3] 2
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	: [CO-1][L-3] 2
Q.8	S1: Double jeopardy means that no person will be punished for the sa	me offence

- *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) S1 and S2 are correct
 - b) Only S2 is correct
 - c) Only S1 is correct
 - d) S1 and S2 are incorrect

[CO-2] [L-3] **2**

- *Q.9 S1: Article 21 talks about right to life.*
 - S2: Article 21 talks about right to personal liberty.

front of the Magistrate within 24 hours.

S2: Preventive detention is mentioned under Article 22.

Q.10 S1: Under Preventive detention, the person loses the right to be produced in

- a) Only S2 is correct
- b) Only S1 is correct

a) Only S1 is correct b) Only S2 is correct

- c) Both S1 and S2 are incorrect
- d) Both S1 and S2 are correct

c) Both S1 and S2 are correct d) Both S1 and S2 are not correct [CO-2] [L-1, 4] **2** Q.11 Article 21A talks about: a) Prevention of dowry b) Prevention of untouchability c) Prevention of child labour d) None of the above [CO-1] [L-1] **2** 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 a) Article 32 b) Article 25 c) Article 26 d) Article 30 [CO-1] [L-1] **2** 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

- [CO-1] [L-1, 4] **2**
 - 446/4

[CO-2] [L-4] **2**

- 0.13 Madrassas are administered under:
- *Q.14* The term "minority" is defined under:

[CO-3] [L-4] **2**

- [CO-2] [L-2] **2**

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	[CO-2] [L-2] 2
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	[CO-1] [L-2] 2
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 S2 is correct c) Both S1 and S2 are correct d) Both S1 and S2 are incorrect 	[CO-3] [L-2] 2
Q.19	Advocate general is appointed by the: a) President b) Chief Minister c) Governor d) Chief justice of high court	[CO-3] [L-3] 2
Q.20	 S1: Amicus Curiae is giving legal representation. S2: Amicus Curiae is given to someone who cannot afford legal defens a) Only S1 is correct b) Only S2 is correct c) Both S1 and S2 are correct d) Both S1 and S2 are incorrect 	e. [CO-1] [L-3] 2
Q.21	 S1: Constitutional remedies are writs which can only be produced in jumagistrate court. S2: Constitutional remedies can be heard by the Supreme Court directional Only S1 is correct a) Only S2 is correct c) Both S1 and S2 are correct d) Both S1 and S2 are incorrect 	dicial ^I y. [CO-2] [L-2] 2
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 	[CO-2] [L-1] 2

Q.23 Freedom from taxation in the name of religion is mentioned.

- a) Article 23
- b) Article 25 c) Article 26

d) Article 27

- *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
- Q.25 Article 370 is related to:
 - a) Jammu and Kashmir
 - b) Manipur
 - c) Nagaland
 - d) All of the above

[CO-3] [L-4] **2**

[CO-1][L-1]**2**

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 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 OBC 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**

[CO-3] [L-4] **2**

[CO-1] [L-1] **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:
 - 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 ______ 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) S1 and S2 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 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. [CO-3] [L-1, 4] **2**
 - 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:
 - 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 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 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

[CO-3] [L-2] **2** 451/4

[CO-2] [L-4] **2**

[CO-2] [L-4] **2**

[CO-3] [L-1] **2**

[CO-1] [L-2] **2**

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 	[CO-1] [L-2] 2
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 the above	[CO-2] [L-1] 2
Q.18	 S1: Lok Adalats are not voluntary bodies. S2: Lok Adalats are regulated by the Governor of the State. a) Only S1 is correct b) Only S2 is correct c) Both S1 and S2 are correct d) Both S1 and S2 are incorrect 	[CO-1] [L-1] 2
Q.19	Advocate General is appointed by the: a) President b) Chief Minister c) Chief Justice d) None of the above	[CO-3] [L-1] 2
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 S2 is correct c) Both S1 and S2 are correct d) Both S1 and S2 are incorrect 	[CO-1] [L-4] 2 e.
Q.21	 S1: Constitutional remedies are writs which can only be produced in juct magistrate court. S2: Constitutional remedies cannot be heard by the Supreme Court direct a) Only S1 is correct b) Only S2 is correct c) Both S1 and S2 are correct d) Both S1 and S2 are incorrect 	licial [CO-3] [L-4] 2 ectly.
Q.22	 S1: The Supreme Court cannot 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 	[CO-3] [L-3] 2
Q.23	Freedom from taxation in the name of religion is mentioned in: a) Article 23 b) Article 25	[CO-2] [L-3] 2

c) Article 26

d) Article 27

Q.24 Sabarimala temble entry issue was related to which two Articles:

[CO-3] [L-4] **2**

- 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

[CO-1][L-1]**2**

End Semester Examination, Dec. 2022 B. Tech. – Third Semester 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.
 b) List the differences between respect and differentiation.
 c) List the differences between society and crowd.
 (CO-1) (L-1)
 (CO-3) (L-1)
 (CO-2) (L-1)
 - d) Recall the basis of holistic education. $(CO-1) (L-1) 5 \times 2$

<u>PART-A</u>

- 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**

<u>PART-B</u>

- 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 B. Tech. / B. Sc. (Microbiology) – First /Second Semester ENGLISH (BHM-201)

Time:	2 hrs.						Ma	ax Marks	: 50	
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) 11) 21) 31) 41)	2) 12) 22) 32) 42)	3) 13) 23) 33) 43)	4) 14) 24) 34) 44)	5) 15) 25) 35) 45)	6) 16) 26) 36) 46)	7) 17) 27) 37) 47)	8) 18) 28) 38) 48)	9) 19) 29) 39) 49)	10) 20) 30) 40) 50)	
Q.1	 With respect to the workplace, attitudes are defined as [L1][C01] 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 b She is afra a) Cognitive	een assig id that sh attituc e	gned to c ne will be de compo b) Affecti	omplete unable t nent. ve	an import to do so. t c) Group	ant proje Judy's fea D	ct using no ar is an exa d) Indiv	ew softw ample of [L3][(vidual	are. the CO1]	
Q.3	What does a) It means b) It means c) It means d) It means	it mean to devel to think to form to adver	to form a op a part critically an opinio tise a pro	n attitude icular beh about adv n or appro oduct you	e? lavior. vertising. oach. love.			[L3][(:01]	
Q.4	The teache a) have	r	b) has	ompleted	this chapt c). is	er.	d) are	[L3][(:01]	
Q.5	Ram and S a) have	hyam	b) has	business	partners. c) are		d) had	[L1][(:01]	
Q.6	She a) reach	b) read	er office b ches	oy 9 a.m. c) rea	daily. ached	d) r	eaching	[L1][(:01]	
Q.7	Rahul and	his frie 1]	nds		_ also in	lso invited to the party.				
	a) is	b) was		c) ha	d	d) v	vere			

455/4

Q.8	Neither you	or your sister shou	uld	to them.	
	a) talk b) talks	c) talked	d) talkir	ng
Q.9	Twenty years	5 the m	inimum age to	fill this form.	5
	[L3][CO1] a) are b) is c)	has	d) have	
0.10	A bouquet of	flowers	required fo	or the event.	
L	[L3][CO1]				
	a) are b) have	c) has	d) is	
Q.11	The wise leade	er and politician	assassina	ted.	[L1][CO1]
	a) are		b) has been		
	c) nave been		d) nad been		
Q.12	Belief, opinion,	knowledge, emotion	s feelings intentic	on are the comp	onents of
	a) Communica	ation b) Attitude	c) Personalit	.у с	d) Behavior
Q.13	Physical growt	h, Intellectual Devel	opment, Emotion	al Developmen	t are factors
	a) Behavior b) Personality	c) Communi	cation Style o	d) Attitude
Q.14	is	s the only compone	nt of attitude w	hich is visible	and can be
	observed direc a) Behavior	tly. b) Cogni	tive		[L1][CO1]
0 15	т	working all a	fternoon and	havo just fi	nichod tho
Q.1 3	assignme	working an a nt.		nave just n	insticu tric
	a) Have been	b) had b	een c) sha	all be d	d) am
Q.1 6	Rohan	the movie b	oefore he read t	the review.	
	[L1][CO1]				
	a) Watches	b) have watche	d c) had watch	ned d) was	watching
Q.17	Every boy and	girl in th	ne class today.		[L1][CO2]
	a) Are present	b) is present	c) have pres	ent d) had	present
Q.18	Which tense is	used to express gene	eral truths and fa	cts?	[L2][CO1]
	a) Present con	tinuous tense		b) Present per	fect tense
	c) Past perfect	tense		a) Present Ind	efinite tense
Q.19	According to the	ne prevailing rate, two	o dozen	_rupees one hur	ndred.
	a) costs		b) cos	st	[[][001]
	c) costing		d) cos	sted	
Q.20	Which one is n	ot a benefit to emplo	yee which results	s through positiv	ve attitude of
	an employee?	b) Loca Straca	Joh Cocyvity	d) Enjoying Lif	[L3][C01]
	a) FIOITIOUOII	D) Less Stress C)	JOD Security	u) Enjoying Li	C

Q.21	Each and ex [L3][CO1]	very member	to v	vote.		
	a) has	b) have		c) having	d) are	
Q.22	A large nun	nber of soldiers		died for the	country.	
	a) has	b) is	c) are	d) hav	/e	
Q.23	Half of the [L3][CO1 a) were	class] b) was	_ empty.	c) has	d) have	
Q.24	He (wi a) is writing	rite) to me every mo b) writing b)has	nth. been writing	d) has been	writing	[L1][CO1]
Q.25	This servant a) works	(work) with us b) whas been worki	for ten years. ng	c) is working] d) does	L3][CO1] work
Q.26	How yo a) is get	ou (get) on wit b) do get	h your studies c) is getting	5? d) h	nave got	[L1][CO1]
Q.27	She (le a) leaves	ave) for Jammu yest b) is leaving	erday. c) has been l	eaving d) le	eft	[L3][CO1]
Q.28	I (write a) wrote	e) to her last week. b) has been writing	c) had	been writing	d) writt	[L3][CO1] en
Q.29	He (be) a) being	weak in English in t b) been	he beginning. c) was	5	d) had b	[L1][CO1] Deen
Q.30	He (tea a) teaches	ch) in this college for b) is teaching	r five years. c) tau	ght d) has	been teac	[L1][CO1] hing
Q.31	He (buy) a) bought	a car one month ag b) has bought	o. c) has been l	ouying d) ha	ad been bu	[L1][CO1] Iying
Q.32	What time a) do, reach	you (reach b) does, reach) home in the c) did, reache	evening? ed d) ha	ave, reache	[L3][CO1] ed
Q.33	Where a) did, go	he (go) to play b) has, gone	in the evenir c) doe	ng? Is, go	d) does,	[L1][CO1] going
Q.34	What is the back of the back o	pest preferred dress formals als lothes if it is with kno on one's own comfor	to wear in a c own business t	orporate setti contacts	ng?	[L1][CO1]
Q.35	What is the setting or in	best way to dress u any other scenario?	p if the interv	view is for a	job in a m	ore casual [L3][CO1]

^{457/4}

τ	[L3][CO1] a) are] b) is	C) has	d) have			
0.47	Twenty vea	rs	the n	ninimum a	ae to fill t	his form		
Q.46	Neither you [L1][CO1]	l nor your si] b) talks	ster sho) talked	d) talking	o them.		
Q.45	Fear of reject a) Depression	tion is a type n b) Fai	of: lure c) Sadness	d) Speecl	n anxiety	[L1][CO1]	
Q.44	Mostly emotional Mostly emotional Mostly emotion (Magnetic Action of the Magnetic Action of	onal barriers b) Ext	are faced roverts	by: c) Listene	ers d) ⁻	Talkative pers	[L1][CO1] sons	
Q.43	What are the a) one	I	istening l b) two	evels?	c) four	d)	[L1][CO1] five	
Q.42	Which of the a) To stop ta c) Misinterpre	se is not a ste alking eting	ep in the b) Rece d) Resp	listening pro iving onding	ocess?		[L3][CO1]	
Q.41	Types of Mer a) Short Terr c) Both a and	nory n Memory I b	 b) Work d) none	ing Term M	emory		[L3][CO1]	
Q.40	How much ty a) one	pes of memo	ry? b) two		c) three	d)	[L3][CO1] four	
Q.39	Listening is t another perse a) Understan	he ability to _ on's spoken a d	nd nonve b) Analy	and appro erbal messa ze c) Res	priately res ges. spect	pond to the doubted by a bound to the doubted by a bound by a boun	meaning of [L3][CO1] hese	
Q.37 Q.38	 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 What is the rule to decide the color of the belt (for men)? 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.36	What should b a) getting too b) consulting c) ensuring t d) ensuring t	e avoided whi o trendy someone wit he right fit he colour and	le getting :h experie I look is f	a new suit or ence formal (ever	a dress for if it looks	the interview? extra formal)	[L3][CO1]	
	 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.48	A bouquet of fl [L3][CO1]	owers	req	uired for the event.
	a) are b) h	nave	c) has	d) is
Q.49	A pair of socks		_ been miss	sing from my wardrobe.
	a) have	b) has	c) were	d) is
Q.50 Much been said in the news				ews reports.
	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

<u>PART-A</u>

- 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?
 - [CO2][L1] **10** [CO2][L1] **10**

Q.4 Write your Self Introduction.

<u>PART-B</u>

- 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. [CO3][L1] **10**

End Semester Examination, Dec. 2022 B. Tech. – First / Second Semester ENGLISH (BHM-201/BHM-201A/HSMC-101)

Time: 2 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 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'.

<u>PART-A</u>

- 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.

<u>PART-B</u>

- 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.7Write 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

Max Marks: 50

No. of pages: 1

[CO-2] [L-1] **10**

2×5

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 a) Get you fired c) Helps you do m	f attitude ore	<i>b) Get you nowhere d) none of the above</i>	[CO-1] [L-1]
Q.2	What are the chara a) Personality, beli b) People, groups, c) Behavior and id	cteristics of attitude? efs, values, behavior ideas and objects co eas.	o s, and motivations. Inmunication.	[CO-1] [L-2]
Q.3	Personality is a trai a) TRUE	t that can be comple	tely changed? b) False	[CO-1] [L-2]
Q.4	is the only contract directly.	omponent of attitude	e which is visible and ca	n be observed
	a) Behavior	b) Cognitive	c) Happiness	[CO-1][L-1] d) Kinesthetic
Q.5	Radhika a) Seen	_ the pictures befor b) have seen	e she printed them. c) hadseen	[CO-1] [L-1] d) was seeing
Q.6	All the actors and p a) are present	erformers b) is present	in the theatre. c) have present	[CO-2] [L-1] d) had present
Q.7	Which tense is used a) Present continue c) Past perfect ten	d to express general ous tense se	truths and facts? b) Present perfect ten d) Present indefinite t	[CO-1] [L-2] ise rense
Q.8	According to the pr a) costs	evailing rate, two do b) cost	zenrupees of c) costing	ne hundred. [CO1][L1] d) costed
Q.9	Which one is a ben	efit to employee whi	ch results through good	communication?
	a) Clarity of thoug c) Self-confidence	ht	<i>b) Good interpersonal d) All of the above</i>	relation
Q.10	Which of the follow a) Acquired	ing is a part of the a b) Learned	lefinition of attitudes? c) Can be changed	[CO-1] [L-3] d) A & C
Q.11	The way you feel o a) Emotions	r think about someth b) Personality	ning or someone is knov c) Genetics	vn as your [CO-1] [L-1] d) Attitude
Q.12	How do you develo a) Avoid negative of b) Spend time with c) Be thankful. d) All of the above	<i>p a positive attitude: thinking. h the people who hav</i>	<i>e a positive attitude.</i>	[CO-1] [L-1]
Q.13	To show m a) Initiative	eans to take respons b) Action	sibility for a task or proj c) Organization	ect [CO-1][L-3] d) Purpose
Q.14	With respect to the	workplace, attitudes	s are defined as	[CO-1] [L-1]

	a) A coworker's re	eaction to your sugg	nestion of performing a s	specific task in a	
	<i>different mann</i> b) A way of think	er. ing that shapes how	we behave both at wor	rk and outside of	
	work.	ursts hatwaan amn	lovees resulting from d	iffering oninions on	
	completing a ta	ask.	loyees, resulting nom u		
	d) An employee's management.	reaction after being	n informed of an unpopu	ılar decision by	
Q.15	Jameson has beer	assigned to comple	ete an important project	using new	
	of the atti	traid that she will be tude component.	e unable to do so. Judy's	s fear is an example	[[]]
	a) Cognitive	b) Affective	c) Group	d) Individual	200 1
Q.16	What does it mean	n to form an attitude	<u>9</u> ?	[CO-1] [L-3]	
	<i>a) It means to de</i> <i>b) It means to th</i>	velop a particular be ink criticallv about a	enavior. dvertisina.		
	c) It means to for	rm an opinion or app	proach.		
	d) It means to ad	vertise a product yo	ou love.		
<i>Q.17</i>	The teacher	this chapt	er.	[CO-1] [L-3]	
	a) will have comp	leted	b) has completed		
	c) is completing		d) are completed		
Q.18	Ram and Shyam _	go for ti	he trip.	[CO-1] [L-1]	
	a) will not	b) has not	c) are not	d) had not	
0.19	She	reach on time.		[CO-1][L-1]	
C	a) did not	b) had not	c) having	d) have	
0.20	Rahul and his frier	nds in	vited to the party.	[CO-1] [L-1]	
<i>Q.=0</i>	a) is not	b) was not	c) had not	d) were not	
0.21	Neither vou nor vo	our sister should	to them.	[CO-1][I-1]	
L	a) have talk	b) talks	c) have talked	d) talking	
0.22	Twenty vears	the minimur	n age to fill this form.	[CO-1][I-3]	
<i>Q122</i>	a) are	b) is	c) has	d) have	
0 23	A bouquet of flow	erc fr	or the event	[[[]-1][]-3]	
<i>Q.23</i>	a) are bought	b) have bought	c) has bought	d) was bought	
0.24	The denims	heen stolen	n from my wardrobe.	[CO-1][I-1]	
L	a) have	b) has	c) were	d) is	
0.25	Nothina	been said don	e for the needv.	[CO-1] [L-3]	
t -	a) were	b) have	c) has	d) was	
0.26	The information p	rovided to vou	wrona.	<i>[CO-11 [L-3]</i>	
	a) were	b) was	c) are	d) have been	
<i>Q.27</i>	The company	of its sta	akeholders.	<i>[CO-11][L-11]</i>	
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464/4

	a) think	b) thought	<i>c)</i>	thinks	d)	thinking
Q.28	Either of the two di a) looking	resses shall b) look	<i>c)</i>	good. looks	d)	[CO-1] [L-1] looked
Q.29	Each and every me a) has	mber to b) have	о <i>vo</i> i с)	te. having	d)	[CO-1] [L-3] are
Q.30	A large number of a a) has	common people b) is	(died during the pand are	lem d)	ic. [CO-1][L-1] have
Q.31	The classroom a) were	b) was	<i>c)</i>	has	d)	[CO-1] [L-3] have
Q.32	He (w a) is writing writing	rite) to me every mo b) writing	nth. c)	has been writing	d)	[CO-1] [L1] has been
Q.33	This servant a) Works c) is working	(work) with us	for b) d)	ten years. has been working does work		[CO-1] [L-3]
Q.34	How you a) is, get	(get) on wit b) do get	th yo c)	our studies? is, getting	d)	[CO-1] [L-1] have got
Q.35	She (leave a) leaves	e) for Jammu yesterd b) is leaving	lay. C)	has been leaving	d)	[CO-1] [L-3] left
Q.36	I (writ a) wrote c) had been writing	re) to her last week. g	b) d)	has been writing written		[CO-1] [L-3]
Q.37	He (be) a) being	weak in English in th b) been	e be c)	eginning. was	d)	[CO-1] [L-1] had been
Q.38	He (teac a) teaches teaching	h) in this college for b) is teaching	five c)	years. taught	d)	[CO-1] [L-1] has been
Q.39	He (bu a) bought buying	<i>ıy) a car one month b) has bought</i>	ago c)	has been buying	d)	[CO-1] [L-1] had been
Q.40	What time a) do, reach reached	you (reach, b) does, reach) ho c)	me in the evening? did, reached	d)	[CO-1] [L-3] have,
Q.41	Where h a) did, go	e (go) to pla b) has, gone	y in c)	the evening? does, go	d)	[CO-1] [L-1] does, going
Q.42	What is the best pr a) business formal	eferred dress to wea s	r in	a corporate setting?	,	[CO-1] [L-1]

465/4

- 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

a) True

- 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 shoesb) sandals
 - c) high heels d) casual shoes
- Q.46 What is the rule to decide the color of the belt (for men)? [CO-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			and appropriately respond to the			d to the	
	meaning of another	r person's spoken and	d no	onverbal messages.			[CO-1] [L-3]	
	a) Understand	b) Analyze	<i>c)</i>	Respect	d)	all of	these	
<i>Q.48</i>	How many types of	memory are there?					[CO-1] [L-3]	
-	a) one	b) two	<i>c)</i>	three	d)	four		
Q.49	Which of these is a type of memory in human mind?						[CO-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? [CO-2] [L-1]

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 _______ % 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? ii) Receiving i) To stop talking 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 ______ skills, the ability to progress in the working world and in life, itself would be nearly impossible. i) Listening ii) Speaking iii) Writina iv) All of Them h) Which of these is not an element of the speaking technique? ii) Word Stress i) Voice Quality iii) Appearance iv) Correct Tones i) Which of these factors is not involved in the determination of correct tone? ii) Dressing Style i) Pitch iii) Ouality iv) Strength i) Which of these should be avoided for an effective speech? i) Determination of the purpose ii) Selection of message iv) Selection of theme iii) Lack of interest 1x10 SECTION-B What do you understand by Intercultural Communication? 5 0.2
- Q.3 What is the importance of facial expression while speaking to a group of people? Mention example. **5**
- Q.4 Explain the importance of etiquette and grooming in a professional setting. State an example of consequence of incorrect etiquette. **5**

<u>SECTION-C</u>

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 <u>feature</u> a variety of professional musicians and singers.

TASK	TIME	DATE
Make Posters	1 P.M.–4 P.M.	December 5th
Set Up Gym	11 A.M.–4 P.M.	December 11th
Help Performers	9 A.M.–4 P.M.	December 12th
Welcome Guests	10 A.M.–2 P.M.	December 12th
Clean up Gym	<mark>4 P.M.–7 P.M.</mark>	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 close	sest in meaning to	
	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. Shar	ma?	
-	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	2x5
	-	-	

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 ______.
 - 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 <u>depict</u> is the closest in meaning to ______.

- i) Show ii) Hunt iii) Count iv) Draw **1x5**
- 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.10

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. **10**

<u>PART-A</u>

- Q.2 What do you understand by non-verbal communication? Explain with examples. [CO-2] [L-1] **10**
- Q.3 Discuss the greatest challenges of effective communication in detail. [CO- 2] [L-1] **10**
- Q.4 What role do facial expressions, gestures and pauses play in communication?

[CO-3] [L-1] **10**

<u>PART-B</u>

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 comm	unication? [CO-3] [L-1] 10

Q.7 Define 'Barriers in Communication'. Give examples. [CO-2] [L-1] **10**

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 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.

2×10

PART-A

- Q.2 a) Explain Internet architecture in detail with the help of block diagram.[CO-1] [L-2] 10b) 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. [CO-3] [L-2] 10

<u>PART-B</u>

- 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. [CO-5] [L-2] **10**
- Q.7 a) Illustrate the historical background and objectives of Information and Technology Act. [CO-6] [L-3] **10**
 - b) Explain the intellectual property rights in detail. Also discuss how the penalty is imposed if intellectual property rights and violated. [CO-6] [L-3] **10**

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. b) Compare IP Address and MAC Address. c) Explain DNS poisoning attack. d) Define malware and how can you stop it? e) Explain phishing. f) Describe various modes of committing cybercrime. a) Explain digital signature 	[CO-1] [L-1] [CO-1] [L-5] [CO-3] [L-2] [CO-3] [L-1] [CO-2] [L-2] [CO-3] [L-2]
	 b) List out some tools used by ethical hackers. i) Define ransomware. j) Compare patent and trademark. 	[CO-4] [L-2] [CO-5] [L-4] [CO-3] [L-1] [CO-6] [L-5] 2×10
	<u>PART-A</u>	
Q.2	a) Compare classful addressing and classless addressing.b) Explain the functionality of ping and traceroute command.	[CO-1] [L-5] 10 [CO-1] [L-2] 10
Q.3	a) Explain Do Sattacks and how to prevent it?b) Explain the role of cryptography in information security.	[CO-3] [L-2] 10 [CO-2] [L-2] 10
Q.4	 a) Explain identity theft with suitable example. b) Analyze the importance of protection against cybercrime 	[CO-3] [L-2] 10 [CO-3] [L-4] 10
05	<u>PARI-D</u> Discuss different types of cyber laws and explain its need laws in deta	ail [CO-4] [L-2] 20
د.پ		
Q.6	a) Explain the importance of cyber ethics with suitable example.b) Explain different elements of cyber security.	[CO-5] [L-2] 10 [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 B. Tech. — Third Semester CYBER LAW AND ETHICS (BHM-001)

Time: 3 hrs.

Max Marks: 100

2x10

- 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?

<u>PART-A</u>

What do you understand by DNS phishing? Discuss how this threat can Q.2 a) affect cyber security. 10 What are different types of IP addresses? Mention the various protocols b) that are considered in them. 10 Q.3 a) Mention the various Basic security terminologies. Explain with examples. 10 Convert IP address 172.16.2.17 into binary and also write its class. b) Mention the various ranges of classful addressing. 10 0.4 Explain auction fraud and its types in detail. 10 a) Mention the various secure browser settings in context with Internet b) Explorer10. 10 PART-B Explain the cyber laws in India, their scope and coverage in detail. Q.5 a) 10 Explain the needs of Cyber Law in 21st century. b) 10 Explain the role of ethics in computer security. 10 Q.6 a) How an organization can take legal protection against cyber-crime? b) 10 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.

B. Sc. (Hons.) Geology – Fifth Semester 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.

<u>PART-A</u>

Q.2	a) Justify the importance of mining in present condition.b) Explain requirement of topographical survey in mining.	[CO-2][L5] 10 [CO-3][L5] 10
Q.3	a) Describe Percussion and Rotary drilling.b) Discuss underground Mining methods.	[CO-4][L6] 10 [CO-5][L5] 10
Q.4	a) Discuss function of Theodolite.a) Discuss the process of Mineral beneficiation for Coal.	[CO-4][L6] 10 [CO-5][L6] 10
	<u>PART-B</u>	
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.b) Discuss national mineral policies of India.	. [CO4] [L3] 10 [CO-4] [L-4] 10
Q.7	a) Explain comair underground and open caste mining.b) Write the short notes on iron ore deposit.	[CO-5] [L-5] 10 [CO-3] [L-4] 10

2x10

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester **RESEARCH INNOVATION AND CATALYST-III (BGE-DS-504)**

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. Answer in brief: Q.1 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.

Time: 3 hrs.

PART-A

Q.2	a) Describe choosing the appropriate research methodology.b) Formulate experimental procedures.	[L4][CO-1] 10 [CO4][L1] 10
Q.3	a) Discuss about analyzing the data set.b) Build arguments on primary and secondary data.	[CO-4][L2] 10 [L4][CO-2] 10
Q.4	a) Explain listing and analyzing the observations.b) Discuss analysis and interpretation of the data.	[L6][CO-3] 10 [L1][CO-3] 10
	<u>PART-B</u>	
Q.5	a) Explain graphical abstract.b) Compare Abstract and conclusion.	[L6][CO-4] 10 [L6][CO-4] 10
Q.6	a) Comment quality of research journals.b) Describe the format of a review paper.	[L4][CO-5] 10 [L5][CO-5] 10
Q.7	Write a model paper on Groundwater recharge in India.	[L6][CO-6] 20

2x10

Max Marks: 100 No. of pages: 1

475/4

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester BASIC ENGINEERING GEOLOGY (BGE-DS-503)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-2][L4] **2x10**

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.

<u>PART-A</u>

Q.2	a) Justify the durability of rock for road construction.b) Discuss elastic behavior of the rock.	[CO-4][L6] 10 [CO-3][L5] 10
Q.3	a) Discuss the safe geological condition for Dam construction.b) Discuss the common rock aggregate? Give example.	[CO-5][L5] 10 [CO-3][L4] 10
Q.4	a) Justify the geological investigation required for road and highways.b) Explain Grouting and its requirement.	[CO-4][L6] 10 [CO-4][L4] 10
	<u>PART-B</u>	
Q.5	a) Describe Gravity Dam and Arch Dam.b) Discuss uniaxial compressive strength.	[CO-4][L6] 10 [CO-3][L6] 10
Q.6	a) Explain the Seismic zones? How it's helpful in engineering design.b) Discusses Insitu stress test.	[CO-4][L4] 10 [CO-2][L6] 10
Q.7	a) Explain the causes of Mass movement and its type.b) Discuss the application of remote sensing and geographic inf systems (GIS) in field of planning.	[CO-5][L4] 10 formation [CO-4][L6] 10

B. Tech. – Fifth Semester 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**

<u>PART-A</u>

Q.2	a) Describe runoff, long term rainfall analysis and normal rainfall.b) Discuss DWLR generated hydrograph.	[L4][CO-1] 10 [L4][CO-1] 10
Q.3	a) With the help of a suitable diagram discuss transmissivity and storative	
	b) Build arguments how primary porosity is more homogeneous than se	[L4][CO-2] 10 condary. [L4][CO-2] 10
Q.4	a) Explain Darcy's Law considering groundwater flow.b) Discuss bore well construction and testing.	[L6][CO-3] 10 [L1][CO-3] 10
	<u>PART-B</u>	
Q.5	a) Describe with drawing the method of map preparation for EC.b) Describe type of Graphical presentation of water quality data used.	[L6][CO-4] 10 [L6][CO-4] 10
Q.6	a) Comment on geophysical methods of groundwater exploration.b) Explain litholog. Elaborate on construction of lithologs.	[L4][CO-5] 10 [L5][CO-5] 10
Q.7	a) Discuss groundwater quality issues in India.b) Discuss Roof top Rainwater harvesting.	[L6][CO-6] 10 [L6][CO-6] 10

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester ECONOMIC GEOLOGY (BGE-DS-501)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

[CO-2][L4] **2x10**

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.

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**

<u>PART-B</u>

- 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] **20**

478/4

End Semester Examination, Dec. 2022 OPEN ELECTIVE - COMMON FOR ALL BRANCHES GREEN ENERGY RESOURCES (BEE-OE-004)

Time: 3 hrs. 100 Max Marks:

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?
 2×10

<u>PART-A</u>

- 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

<u>PART-B</u>

- 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?

[CO-4] [L-2] 10

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?
 - b) Discuss Fuel cells use as alternative energy sources. [CO-1] [L-2] 10 [CO-1] [L-2] 10

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

2×10

[CO-3] [L-3] **20**

- 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.

<u>PART-A</u>

Q.2	a) Describe the role of industrial automation in ensuring overall an industrial production system.b) Compare the PLC and microcontrollers.	profitability of [CO-1] [L-1] 10 [CO-1] [L-2] 10
Q.3	Explain the architecture of PLC in detail.	[CO-2] [L-1] 20
04	Develop PLC Programming for the digital logic gates: OR AND	NAND XOR

Q.4 Develop PLC Programming for the digital logic gates: OR, AND, NAND, XOR, NOR.

<u>PART-B</u>

- Q.5 Illustrate with example the use of timers and counters in PLC. [CO-2] [L-1] **20**
- 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. *100*

Max Marks:

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	An	swer 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]
	T)	What is meant by degree of freedom in robot?	[CO-4][L-2]
	9) b)	Name the two types of joints commonly used in robots	[CO-3][1-2]
	i)	What is meant by robot work envelope?	[CO-5][L-2]
	i)	What is sensor noise?	CO-5][L-2] 2x10
	57	PART-A	
0.2	2)	Narrata the history of relate	
Q.Z	d) b)	Explain the different characteristics which make a robot efficient/	intelligent
	0)	Explain the different characteristics which make a robot efficiency	[CO-2] [L-2] <i>10</i>
			[][]
Q.3	a)	Explain different types of grippers.	[CO-1] [L-2] <i>10</i>
	b)	Explain the different mechanism of motion used in robot.	[CO-2] [L-2] <i>10</i>
Q.4	a)	Compare hydraulic and pneumatic types of actuators.	[CO-2] [L <i>-2] 10</i>
-	b)	Explain any two non-tactile sensors used in robots.	[CO-1] [L-2] <i>10</i>
		PART-B	
0.5	a)	Explain the architecture of map based localization.	[CO-2] [L-2 <i>] 10</i>
τ.	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] <i>10</i>
	b)	Analyze the different tasks involved in digital image processing.	Describe its
		auvantages and disauvantages.	[CO-3][L-2] 10
Q.7	a)	Explain the applications of robots in industrial sector.	[CO-4][L-2 <i>] 10</i>
-	b)	Explain the applications of robots in healthcare sector.	[CO-4][L-2] <i>10</i>

OPEN ELECTIVE – COMMAN FOR ALL BRANCHES HYBRID VEHICLES (BEE-OE-001)

Note: Attempt FIVE questions in all; Q.1 is compulsory. Attempt any TWO questions

	frc ea	om PART-A and TWO questions from PART-B . Marks are ch question.	e indicate	ed against
Q.1	An	swer the following in brief:		
	a)	Deliberate the brief history of electric cars. 1]	[[CO-1] [L-
	b)	Differentiate between IC engine-based vehicle and [CO1][L1]	electric	vehicles.
	c)	List the modes of the hybrid electric vehicles.	[[CO-2] [L-
	d)	What is meant by electric braking?	[[CO-2] [L-
	e)	Enumerate the types of DC motors.	[[CO-2] [L-
	f)	Write expression of Duty ratio in step up converters.	[[CO-3] [L-
	g)	List the types of power converters.	[[CO-3] [L-
	h)	What are the different types of batteries used in EV?	[[CO-4] [L-
	i)	What are the requirements of fast charging?	[[CO-4] [L-
	j)	Enumerate the components of charging stations. 2×10	[CO-4]	[L-1]

<u>PART-A</u>

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

Time: 3 hrs.

100

1

- 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] 10

Max. Marks:

No. of pages:

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

<u>PART-B</u>

- Q.5 a) Enumerate the operation of Single-phase Voltage source Inverters. Support the answer with appropriate waveform [CO4]
 [L-3] 10
 - b) List the types of DC-DC Converters and Analyse the working of Buck Converter [CO-4]
 [L-3] 10
- 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.
 [CO-5]
 [L-2] 10
 - b) List different types of charging techniques. Enumerate the principle of inductive charging employed in electric vehicle. [CO-5]
 [L-2] 10

B. Tech. – Seventh Semester

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.	[CO1][L2]			
	c) State two disadvantages of automation.	[CO1][L1]			
	d) Name the components of manufacturing system?	[CO2][L2]			
	e) Describe a revolute joint.	[CO3][L2]			
	f) What is resolution referred to robots.	[CO3][L2]			
	 g) Compare between rotational joint and revolving joint. 	[CO3][L2]			
	h) What do you mean by work space of a robot?	[CO3][L2]			
	i) Name any two non tactile sensors used in robot.	[CO4][L1]			
	j) What are the basic components of a feedback control system?	[CO5][L2]			
		2x10			

<u>PART-A</u>

Q.2	a) Explain the automation strategies in production in detail.b) Explain the different types of automation with examples.	[CO1][L3] 10 [CO1][L3] 10
Q.3	a) Explain the different layouts of flexible manufacturing system.b) Discuss how automation improves profit in a manufacturing industry?	[CO2][L2] 10 [CO1][L3] 10
Q.4	a) Narrate the history of robots in detail.b) Describe the different configuration of robots.	[CO3][L2] 10 [CO3][L2] 10
	<u>PART-B</u>	
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.	[CO5][L3] 10 [CO4][L2] 10
Q.6	a) Differentiate between pneumatic and hydraulic actuators.b) Explain the different robot mechanisms and transmission systems.	[CO5][L3] 10 [CO3][L2] 10
Q.7	a) Explain the robot vision systems in detail.b) Explain the different types of sensors used in robots.	[CO4][L2] 10 [CO4][L2] 10

B. Tech. – Seventh Semester

SMART GRID TECHNOLOGY (BEE-DS-725)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

[CO-3] [L-2]

[CO- 5] [L-2,4]

[CO- 4] [L-1,2]

[CO-4] [L-1,2] [CO2][L3] **2x10**

[CO- 5] [L-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 auestion.

- Answer the following in briefly: Q.1
 - 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] [CO-3] [L-4]
 - c) Compare the concept of resilient and self healing Grid.
 - d) Explain the concept of plugin hybrid electric vehicles.
 - e) Do microgrids increase the reliability of the grid?
 - f) What is power quality conditioner?
 - g) What is a Macro grid?
 - 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

- a) Describe the opportunities and challenges related to smart grid. [CO-1] [L-1,2] 10 Q.2 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] 10
- 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

- a) Describe & explain the power quality issues of grid connected renewable Q.5 energy resources. [CO- 4] [L-1,2] **10**
 - b) What is power quality management in smart grid? [CO- 4] [L-1,2] **10**
- Describe the concept of micro grid, and its need applications. Demonstrate Q.6 Microgrid using a case study. [CO-2] [L-2,3] **20**
- a) Explain following network architecture in smart grid communication entities: Q.7 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.

<u>PART-A</u>

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 °C has velocity of 15 m/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**

2x10

- Q.4 a) Derive an expression for estimation of average solar radiation. [CO-3] [L-3] **10**
 - b) Explain how solar radiation can be measured using pyranometer. [CO-3] [L-2] **10**

<u>PART-B</u>

- 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.7a) With block diagram explain solar thermal power plants.[CO-6] [L-2] **10**b) Compare parabolic and flat plate collectors.[CO-6] [L-3] **10**

487/4

End Semester Examination, Dec. 2022 B.Tech. – Sixth Semester 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:

	PART-A	
j)	How the modal matrix is determined?	[CO-2] [L-3] 2×10
	state feedback?	[CO-4] [L-2]
i)	What is the necessary condition to be satisfied for controller	design using
ĥ)	Specify the different matrics used for state space representation	. [CO-2] [L-2]
g)	Explain ABCD parameters in state space.	[CO-2][L-2]
• • •	31[1-4]	[00
f	When a system is observable?	[CO-
e)	Define 'state and state vector'.	[CO-1]{L-1]
d)	What are linear systems and nonlinear systems? Give examples?	? [CO-1] [L-1]
c)	Explain rank of a matrix.	[CO-1][L-1,2]
b)	List advantages of state space analysis.	[CO-1] [L-1]
a)	What are draw backs of transfer function model analysis?	[CO-3] [L-3]

Q.2 a) Find the state space model for a system described by the following differential equation.

$$\ddot{c} + 9\ddot{c} + 26\dot{c} + 24c = 24r$$
 [CO- 1] [L-5] **10**

b) Find the transfer function from the following transfer function:

$$\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & -2 & -3 \end{bmatrix} x + \begin{bmatrix} 10 \\ 0 \\ 0 \end{bmatrix} u \qquad y = \begin{bmatrix} 1 & 0 & 0 \end{bmatrix} x$$

[CO-2][[L-5] 10

b) How do you find the transfer function of a system from its state diagram?

[CO-4][[L-1,2] **10**

Q.4 a) The state space representation for a system is given by:

$$\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & -36 & -15 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$
$$y = \begin{bmatrix} 1000 & 100 & 0 \end{bmatrix} x$$

Determine the stability of the process.

b) List properties of Eigen values. Prove that if *A* and *A*^t have the same eigen values.

[CO-3][[L-4] **10**

<u>PART-B</u>

Q.5 a) Determine the state transition matrix for:

	0	1	0	
A =	0	0	1	[CO- 2] [L-5] 10
	1	-3	3	

b) Explain properties of the state transition matrix. [CO- 2] [L-2] **10**

Q.6 a) Find whether the system is obseervable or not.

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$
[CO- 3] [L-5] **10**

b) Examine the controllability of the system given below:

$$\begin{bmatrix} \dot{x}_{1} \\ \dot{x}_{2} \\ \dot{x}_{3} \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & -2 & -3 \end{bmatrix} \begin{bmatrix} x_{1} \\ x_{2} \\ x_{3} \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$
$$y = \begin{bmatrix} 3 & 4 & 1 \end{bmatrix} \begin{bmatrix} x_{1} \\ x_{2} \\ x_{3} \end{bmatrix}$$
$$y = \begin{bmatrix} 3 & 4 & 1 \end{bmatrix} \begin{bmatrix} x_{1} \\ x_{2} \\ x_{3} \end{bmatrix}$$
$$[\text{CO- 3]} \begin{bmatrix} \text{L-5} \end{bmatrix} \mathbf{10}$$

- Q.7 a) Discuss tracking problem in state feedback design.
 - b) Explain pole placement design technique.

[CO-4] [L-4] **10** [CO-5][L-2] **10**

[CO- 5] [L- 5] **10**

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester 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+a2=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-2] [L-2] [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?

- h) What is Computer Aided protection of power system? [CO-3] [L-3] [CO-4] [L-2]
- i) How does a PMU work?
- j) Why is a power system divided into a number of protective zones? Why do adjacent zones overlap? [CO-5] [L-2] 2x10

<u>PART-A</u>

- 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**

[CO-4] [L-2]

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	j 1·2	j 1·0

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.

<u>PART-B</u>

- 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**

[CO-3] [L-2] **20**

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester **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
 - Durability ii)

iv) All of these

- iii) Compliance with specifications 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? ii) Efficiency iii) Commutation i) Economy iv) Cooling
- i) What is the function of damper winding?

2x10

PART-A

- Q.2 a) What are the different types of ventilation used in electrical machines?
 - [CO-1] [L-2] **10** 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. [CO-2] [L-3] **10** 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

a) Write a note on i) mmf for teeth ii) Real and apparent flux density. [CO-4] [L-1] 10 Q.5 b) Determine the apparent flux density in the teeth of a dc machine when the real flux density is 2.15 Wb/m; slot pitch 28mm; slot width 10mm and the

492/4

gross core length 0.35 m. The number of ventilating ducts is 4, each 10mm wide. The magnetizing force for a flux density of 2.15 Wb/m² is 55000 A/m. The iron stacking factor is 0.9. [CO-4] [L-4] **10**

- 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.

b) Compare traditional methods with computer aided designing for machine design.

[CO-6] [L-3] 10

[[]CO-6] [L-1] **10**

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.
- Answer the following in briefly: Q.1 a) What are the conditions for a system to be linear? [CO-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? [CO-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

<u>PART-A</u>

Q.2 a) Determine the transfer function C(s)/R(s) from the block diagram:



5] **10**

b) Obtain the overall transfer function C/R of the signal flow graph shown below using Mason's gain formula.

[CO- 1][L-

5] **10**

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.

[CO- 3][L-

- 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:

 $s^{6}+5s^{5}+11s^{4}+25s^{3}+36s^{2}+30s+36=0.$ [CO- 2][L-4,5] **10**

b) The open loop transfer function of a closed loop system is: $G(s)H(s) = \frac{k}{s(s^2+2s+5)}$ Draw the root locus as *K* is varied from 0 to ∞ . [CO- 2][L-5,6] **10**

<u>PART-B</u>

Q.5 a) Explain the procedure of drawing Polar Plot and how can we analyze the stability through it.

[CO-2][L-3,4]. 10

- b) Applying Nyquist stability criterion, determine the closed loop stability for the following open loop transfer functions: $G(s) = \frac{1}{s(1+s)(1+2s)}$ [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.

[CO-3][L-4,6] 10

Q.7 a) Obtain the state space representation for a system characterized by the differential equation:

 $\frac{d_y^3}{dt^3} + 4\frac{d^2y}{dt^2} + 9\frac{dy}{dt} + 8y = 7u(t)$ where γ 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.

[CO- 3][L-1,2] **10**

B. Tech. – Fifth Semester

POWER ELECTRONICS (BEE-DS-501)

Time: 3 hrs.

s: **100**

MaxMark

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.	[CO1][L-2]
c)	Interpret the significance of duty ratio.	[CO2][L-2]
d)	Why dv/dt protection is required in SCR?	[CO2][L-3]
e)	What are line commutated converters?	[CO2][L-1]
f)	List the types of switched mode converters.	[CO3][L-2]
g)	Enumerate the effect of chopping frequency on	
	filter size.	[CO4][L-3]
h)	Discuss the need of feedback diodes connected in inverters.	[CO5][L-1]
i)	Classify types of commutation techniques.	[CO4][L-2]
j)	List the applications of three phase Inverters.	[CO4][L-2] 2x10

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.

[CO2][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 Vs =12 V. the required average output voltage is Va = 5V at R = 200 ohms. And the peak to peak output ripple voltage is20 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

B. Tech. – Fourth Semester

POWER SYSTEM – I (BEE-DS-402/BEE-DS-402A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

[CO-1] [L-1]

[CO-3] [L-2]

[CO-4] [L-2]

[CO-5] [L-1]

[CO-5] [L-2] **2×10**

- 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.
- a) Why thermal plants are not suitable for supplying fluctuating loads? Q.1 [CO-1] [L-2] [CO-1] [L-2]
 - b) Define "diversity factor".
 - c) What are the advantages of using bundled conductors?

d) Define voltage regulation in connection with transmission line.

- 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 Kv, 12 Kv, 36 Kv, 72 Kv, and 145 Kv respectively? [CO-3] [L-2]

- g) What will be the value of I_a , if I_{a1} = 110 \angle 35° and I_{b2} = 30 \angle 80°? [CO-4] [L-2]
- h) Enlist the various unsymmetrical fault occurring in power system. [CO-4] [L-1]
- i) Define insulation coordination?
- j) What are the different causes of Local Winds?
- k) Why DFIG is used in wind turbine?

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 am50 watt 5 am to 6 pmno-load

9pm to 12 midnight190 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 kV, 50 Hz and 0.85 p.f. lagging by means of a transmission line. The series impedance of a single conductor

is (20 + j52) ohms and the total phase-neutral admittance is 315 10 6 siemen.

Using nominal T method, deter- mine: i) the A, B, C and D constants of the line ii)

sending end voltage iii) regulation of the line.

[CO-3] [L-3] 10

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**

<u>PART-B</u>

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 kV X1= X2= 0:15 X0 = 0:05 G2 100 MVA 20 kV X1 = X2 = 0:15 X0 = 0:05

Transformers:

T1 100 MVA 20/220 kV X1 = X2 = X0 = 0.1 T2 100 MVA 20/220 kV X1 = X2 = X0 = 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 = X2 = 0.25 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 ¹/₄ 0:1 per unit on a 100-MVA base. Neglect D–Y phase shifts.

b) Using appropriate interconnection of sequence networks, derive the equation for

line to line fault in a power system with fault impedance of Z_f .

[CO-2] [L-3] **8**

- 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. [CO-3] [L-2] **10**
- Q.7 a) Describe the solar power plant. Draw and explain I-V and P-V characteristics of PV panels. [CO-5] [L-2] **8**
 - panels. b) Justify the suitability of induction generator in windmills.
 - c) Differentiate between fixed and variable speed wind turbines.

[CO-5] [L-3] **6**

[CO-5] [L-2] **6**

End Semester Examination, Dec. 2022 B. Tech. – Third Semester ELECTRICAL MACHINES - I (BEE-DS-302)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

2x10

- 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 DC motor.
 - h) What is back emf?
 - i) Transformer is rated in kVA. Why?
 - j) What is need of a starter in a DC motor?

<u>PART-A</u>

Q.2	a) b)	Compare electric circuit with magnetic circuit. Draw and explain B-H curve of magnetic materials.	[CO-1] [L-3] 10 [CO-1] [L-2] 10
Q.3	a) b)	Analyze the principle of operation of a DC generator. Explain the process of commutation.	[CO-2] [L-2] 10 [CO-2] [L-1] 10
Q.4	a) b)	Classify DC generators on the basis of excitation. A dc shunt motor connected to 125 V dc supply line and is found back emf of 90 V at 1200 rpm. Find the speed of this machine develops a torque of 30 N-m, with $Ra = .20$ ohm.	[CO-3] [L-3] 10 to have a e when it [CO-3] [L-4] 10
		<u>PART-B</u>	
Q.5	a) b)	Derive equivalent circuit of a single phase transformer. Analyze the procedure to determine iron and copper losses in a sin transformer.	[CO-4] [L-4] 10 gle phase [CO-4] [L-3] 10
Q.6	a) b)	Explain the construction of a three phase transformer. Draw and explain Scott connection. Prove that if secondary load is then primary side is also balanced.	[CO-4] [L-1] 10 balanced [CO-2] [L-4] 10
Q.7	Wr a) b)	ite short notes on <i>(any two)</i> of the following: Reluctance Motor. Permanent Magnet Brushless Motor.	

c) Stepper motor.

[CO-5][L-1] **10x2**

501/4

End Semester Examination, Dec. 2022 B. Tech. – Third Semester ELECTRICAL CIRCUIT ANALYSIS (BEE-DS-301)

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

[CO2][L2]

[CO1][L2]

[CO1][L1]

[CO1][L2]

[CO2][L2]

- 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.
 - b) State maximum power transfer theorem.
 - c) What are the assumptions made in mesh current analysis?
 - d) Differentiate independent and dependent voltage sources.
 - e) Define 'step signal'.
 - f) The characteristic impedance of a symmetrical T network is given as
 - g) What are zeros and poles of network function?[CO5][L2]h) Write the condition for symmetry of two port network.[CO3][L1]i) Differentiate twig and link of a graph.[CO1][L2]j) What is a fundamental tie set matrix?[CO1][L2] **2x10**

<u>PART-A</u>

Q.2 a) Evaluate the current in the 5Ω resistor of figure (all resistance values are in ohms) by Superposition theorem. [CO1][L4] 10



b) Prove that the current in 7 $\boldsymbol{\Omega}$ 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. [CO2][L2] **10**
 - b) Express the waveform in figure in terms of standard test signals.

502/4

[CO2][L3] **5**



Q.4 a) Obtain the driving point impedance of the network in Fig.4 at port 1 [CO3][L3] **10**



b) Obtain v(t) from pole zero plot of $V(s) = \frac{10s}{(s+3)(s^2+2s+4)}$ [CO4][L3] **10**

<u>PART-B</u>

Q.5a) Derive A B C D parameters in terms of h parameters.[CO3][L3] 10b) The transmission parameters of a circuit is given as $\begin{bmatrix} 4 & 1 \\ 3 & 3 \end{bmatrix}$. Obtain its y parameters.

[CO3][L4] 10

- 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 π sections when the cut off frequency is 10 KHz and nominal characteristic impedance of 600Ω. [CO4][L4] 10
- Q.7 a) For the network shown in fig 5, all the resistance are 1 Ω 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. [CO1] [L4] **10**


B. Tech. – First Semester

BASIC ELECTRICAL ENGINEERING (BEE-101/BEE-101A/ESC-EE-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:

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 ______ the current flowing through it. [CO-1] [L-3]
- c) An alternating voltage of $220\sin\omega t$ is connected across a coil. Find the rms value
- voltage.[CO-1] [L-2]d) State the condition of resonance.[CO-1] [L-1]e) Name two types of batteries.[CO-1] [L-1]f) Explain current division rule using a network as example.[CO-1] [L-2]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] **2×10**

[CO-4] [L-3]

[CO-4] [L-3]

<u>PART-A</u>

Q.2a) Explain Superposition theorem.[CO-2] [L-1] 10b) Obtain the current in the 6 Ωresistor using Superposition's theorem:



[CO-2] [L-4] **10**

Q.3 a) A coil of resistance 10 Ω and an inductance of 100 mH is connected in series with \$a \$

capacitance of $55\mu F$ across 200 sin 314 t ac supply. Calculate:

- i) Impedance.
- ii) Magnitude of current.
- iii) Power factor.
- iv) Voltage across the capacitance.
- v) Power dissipated in the network.

- [CO-2] [L-2] **2×5**
- b) State the advantages of three phase system over single phase system.

[CO-3] [L-2] **5**

[CO-1] [L-2] **5**

c) Explain the phenomena of resonance in a RLC series circuit.

Q.4a) Derive the emf equation of transformer.[CO-4] [L-2] 8b) Differentiate between core and shell type transformer.[CO-4] [L-2] 6c) Explain the hysteresis loop of a magnetic material.[CO-4] [L-2] 6

<u>PART-B</u>

Q.5	a) Draw and explain the parts of dc machine.b) Explain the different methods of speed control of dc shunt motor.	[CO-4] [L-3] 10 [CO-4] [L-2] 10
Q.6	a) Explain how a rotating magnetic field is produced in a 3 phase motor.	induction
	b) Explain the working of any two types of single phase induction moto	[CO-3] [L-2] 10 ors. [CO-4] [L-3] 10
Q.7	a) What is earthing? Why is it necessary?b) Explain the working of lead acid battery with charging and d equations.	[CO-1] [L-1] 5 ischarging
	c) Write a short note on 'power factor improvement'.	[CO-1] [L-2] 10 [CO-1] [L-2] 5

End Semester Examination, Dec. 2022 B. Tech. – First Semester

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.
 - b) Superposition theorem can be applied to ______ circuits.
 - c) Explain Kirchoff's voltage law.
 - d) The slip of three phase induction motor at starting is ______.
 - e) In a pure inductive circuit_____ lags _____
 - 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.
 - b) Find the current in 4Ω resistor.



Q.3 a) An alternating current is represented by $i = 220 \sin(314t + 80)$ 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
 [CO-4] [L-2] 10
- Q.5a) Draw the parts of dc machine and explain each part.[CO-5] [L-2] **10**b) Draw and explain the shunt motor characteristics.[CO-4] [L-2] **10**
- Q.6 a) Explain the working of three phase induction motor.

[CO-5] [L-2] **10 507/4**

- [CO-1] [L-2] **10** [CO-2] [L-4] **10**
- [CO4] [L1] [CO4] [L2]

[CO1] [L2]

[CO2] [L2]

[CO1] [L1] [CO4] [L2]

[CO1] [L2]

[CO3] [L1]

[CO1] [L2]

[CO5] [L3]

2x10

- b) Explain any two starting methods of three phase induction motor. [CO-6] [L-4] 10
- 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.
 [CO-1] [L-2] 10

OPEN ELECTIVE - COMMAN FOR ALL BRANCHES

INTERNET OF THINGS: BASICS AND APPLICATIONS (BEC-OE-005)

Time:	3 hrs.	Max Marks: 100
Note:	Attempt FIVE questions in all; Q.1 is compulsory . Attempt a questions from PART-A and TWO questions from PART-B . Each carries equal marks.	no. of pages: 1 any TWO a question
Q.1	 a) What are the main challenges of an Internet of Things (IoT)? b) Which class does 224.0.0.0 belong to? c) Does proxy server provide security to the network? d) How many analog pins are present on the arduino development be e) Write the commands used to read analog and digital data from arduino. 	[CO-1] [L-1] [CO-3] [L-3] [CO-3] [L-2] pard? [CO-4] [L-3] a sensor in
	 f) What is the task of message area and text console in arduino IDE? g) Elaborate various challenges in the implementation of IoT. h) Describe the role of Internet of Things in shopping i) Build the physical design of IoT. j) What is the role of setup method in arduino program? 	[CO-4] [L-3] [CO-4] [L-1] [CO-1] [L-2] [CO-5] [L-2] [CO-1] [L-3] [CO-4] [L-2] 2×10
	<u>PART-A</u>	
Q.2	a) Explain the different characteristics of IoT.b) Explain about Industrial Internet of things (or IIoT).	[CO-1] [L-2] 10 [CO-1] [L-2] 10
Q.3	a) How do IoT devices communicate? Explain with suitable diagrams.b) Explain modified OSI Stack for the IoT / M2M Systems.	[CO-2] [L-3] 10 [CO-2] [L-2] 10
Q.4	a) What is the need of network? Also, explain in detail the LAN and Wb) List out the properties used to characterize the devices.	/AN. [CO3][L2] 10 [CO-3] [L-2] 10
	<u>PART-B</u>	
Q.5	a) Writ a program to blink default LED on arduinoboard with the dela	y of 2 sec.
	b) Draw the block diagram of arduino development board.	[CO-4] [L-6] 10 [CO-4] [L-2] 10
Q.6	a) Why do security issues exist in IoT? What are the key security factors considered when deploying IoT devices?b) Illustrate IoT security threats in terms of Botnet, Denial of service, middle and Ransomware.	actors to be [CO-4] [L-3] 10 man in the [CO-4] [L-4] 10
Q.7	Write short notes on: a) Home automation. b) Smart irrigation.	[CO-5] [L-2] 10×2

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

[CO-1] [L-1]

[CO-2] [L-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'.
 - b) Differentiate between 'active and passive components' with examples. [CO-1] [L-2]
 - c) Define transistor and explain its types with symbols.
 - d) Calculate the value of resistor which has first 3-color bands green yellow and black.

e) f) g) i) i)	 Explain diffusion current and drift current. Define 'phased array antennas'. Describe sensors and its types. Define 'chrominance signal'. List five special function registers. Explain the term Mechatronics. 	[CO-3] [L-1] [CO-1] [L-2] [CO-4] [L-1] [CO-5] [L-2] [CO-4] [L-1] [CO-5] [L-3] [CO-4] [L-2] 2×10
])	Explain the term Mechatronics.	[CO-4] [L-2] 2×10

<u>PART-A</u>

Q.2	a) b)	With the help of a diagram explain PN junction diode with it conditions and V-I characteristics. Explain various advantages and disadvantages of electronics usin applications.	ts biasing [CO-2] [L-2] 10 Ig various [CO-2] [L-2] 10
Q.3	a)	Explain LED and Varactor diode in detail.	[CO-2] [L-2] 10
	b)	Explain the term transistor and operation of PNP transistor.	[CO-2] [L-2] 10
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.	[CO-3] [L-2] 10
		<u>PART-B</u>	
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	I washing
	IIIc		[CO-5] [L-2] 10
Q.7	a) b)	Draw pin diagram of 8051 Microcontroller and detail each pin in brie Define robotics and differentiate between actuators and sensors.	f. [CO5][L2] 10 [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**

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 200W in 30min. Evaluate energy required by fan. [CO1] [L-2]
 - b) A 25 MW rated power plant running at its full capacity would generate ______ 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.

- h) Draw block diagram of grid connected without battery back-up system. [CO4][L-2]
- 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] **2×10**

<u>PART A</u>

- 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.

[CO2] [L-2] **12**

No.

- 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, Vm = 16V, Isc = 4A and Im= 3A. [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

<u>PART B</u>

Q.5 a) Describe types of solar PV systems. Explain hybrid and standalone PV system in details.

[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 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.
- Answer the following questions in brief: 0.1
 - 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 6W and an antenna gain of 50.2db.
 - 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 30,000km 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 20db. Find the value of overall $(C/N)_0$ at the earth station. 2x10

PART A

- a) Describe the block diagram of satellite communication system and explain Q.2 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 20000km and 16000km 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. [CO2][L2] **12**
- a) Derive the expression for complete link design equation for satellite Q.4 communication. [CO3] [L5] **10**
 - b) What is System Noise temperature? How does it effect the C/N and G/T ratio?
 - [CO3] [L2] **10**

[CO2][

PART B

- a) Prove that for FM signal $(s/n)_0 = (C/N)_I 3(1+m)m^2$. Q.5 [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? [CO4] [L3] **12** [CO4] [L4]**8**
 - b) Analyze demand assignment multiple access techniques.

- Q.7 Write short notes on *(any four):*
 - a) GPS. b) VSAT.
 - d) Earth Sensing Satellite.

- c) Laser Satellite Communication.
- e) SARSAT. [CO5] [L2]**4x5**

B. Tech. - Seventh Semester 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 ____
 - 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 2µs at an average power of 100w. 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 80µs.
 - j) What is the significance of a duplexer in a Radar System? **2×10**

<u>PART-A</u>

- Q.2 a) Explain the block diagram of a conventional radar with a super heterodyne receiver. **10**
 - b) What are the major applications of radar? Discuss each application in detail. 10
- Q.3 a) Derive the simple form of radar range equation.
 - b) Calculate the maximum Range of a Radar for the following specifications: Operating Frequency= 10 GHz Peak Power transmitted by Radar $P_t = 400 \text{ KW}$ Effective aperture of receiving Antenna $A_e = 5 \text{ m}^2$ Radar cross section of Target $\sigma = 30 \text{ m}^2$ Power of minimum detectable signal= 10^{-10} W
- Q.4 a) Describe the principle of operation of CW Radar with the help of a block diagram. 15
 - b) If the Radar operates at a frequency of 5GHZ, then find the Doppler frequency of an aircraft moving with a speed of 100KMph. **5**

<u>PART-B</u>

- Q.5 a) What is an MTI radar? Draw its block diagram and explain its principle of operation.
 14
 - 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. **10**

12

8

- 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 **5×4**

B. Tech. – Sixth Semester MOBILE COMMUNICATION (BEC-DS-602)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-3] [L-2]

[CO-2] [L-2] [CO-1] [L-2]

[CO-2] [L-1]

[CO-4] [L-3]

[CO-4] [L-2]

[CO-5] [L-2]

[CO-4] [L-1]

[CO-4] [L-2]

[CO-1] [L-2]

2x10

- 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.
 - b) List the various goals, assumptions and requirements in mobile IP.
 - c) Compare fixed and wireless networks.
 - d) Define tunneling and encapsulation in mobile IP.
 - e) What do you understand by consistency in file system?
 - f) Explain the features of distributed file systems.
 - g) What do you understand by transaction and mobile transaction?
 - 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.

<u>PART-A</u>

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] **10**
- 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**

<u>PART-B</u>

- 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 Mcommerce, its advantages and disadvantages. [CO-5] [L-2] **10**

B. Tech. – Fifth Semester

DIGITAL SIGNAL PROCESSING AND ITS APPLICATIONS (BEC-DS-510)

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) $x(n) = \delta(n-1) + \delta(n+1)$
 - c) Check the system for causality: y(n) = x(2n).
 - d) Find the z transform and ROC of the signal: (12200 12)

 $x(n) = \{1, 2, 3, 0, 0, -1, -2\}$

- 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: H(s)=1(s+2)
- j) Explain sample and hold circuit.

<u>PART-A</u>

- 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) $X(t) = \cos(2n)$ [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:
 - b) Check the following system for linearity and time invariance: y(n) = Ax(n) + B [CO-2] [L-4] **12**
- Q.4 a) State and prove sampling theorem.
 - b) Given the continuous-time signal x (t) = 5 cos 200 Π t. Find:
 - i) Minimum sampling rate required to avoid aliasing.
 - ii) If $F_s = 150$ Hz, what is the discrete time signal obtained after sampling?

[CO-1] [L-4] **12**

[CO-1] [L-3] **8**

<u>PART-B</u>

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 / $(3z^2-4z+1)$ when ROC is:

- i) |z| > 1ii) |z| < 1/3 [CO-3] [L-3] **10**
- Q.6 a) Explain the process of sampling rate conversion using the decimation and interpolation. [CO-5] [L-2] **6**

519/4

2x10

- 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]
 - b) Explain the design technique for FIR filters using rectangular window. [CO4] [L4] **12**

B. Tech. – Fifth Semester

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) b)	What is Goodness of fit? Explain Polynomial Regression.	[CO1] [L-2] [CO4] [L-1]
(C) (d) (م	What is the use of NumPy as a toolkit? What do you understand by Decision Tree classifier?	[CO1] [L-3] [CO3] [L-3]
e) f) g) h) i)	What is the most important value in ANOVA Table? How can you create a Pandas Data Frame using python List? Define 'Correlation and Regression'. What are Convolutional Neural Networks?	[CO2] [L-3] [CO3] [L-3] [CO2] [L-1] [CO6] [L-1]
j)	Discuss Lasso Regularization.	[CO4] [L-2] 2x10

<u>PART-A</u>

- 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

<u>PART-B</u>

- Q.5a) Write a short note on support vector machine.[CO4] [L-2] 10b) Explain CART analysis in detail.[CO4] [L-2] 10
- Q.6 a) What do you understand by Principal Component Analysis? Why is it needed?

[CO5] [L-2] **10**

[CO2] [L-5] 10

- 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] 10b) What are the different types of Neural Networks? Explain any one in detail.

[CO6] [L-2] **10**

End Semester Examination, Dec. 2022 B. Tech - Fifth Semester

ANTENNAS (BEC-DS-503)

Time: Max M	3 h 1ark	s : 100
Note:	' Att froi	mpt FIVE questions in all; Q.1 is compulsory . Attempt any TWO questions
	PA que	T-A and TWO questions from PART-B . Marks are indicated against each stion.
Q.1	An a)	wer the following in briefly: Define Vector Potential and explain its need with suitable flow diagram. CO-11[L-2]
	b)	Describe Conduction and dielectric loss.
	c)	CO-1][L-2] Distinguish the terms "Isotropic", "Directional" and "Omni directional". [CO-1][L-2]
	d)	Describe Radiation pattern lobe.
	e)	[CO-2][L-2] Identify characteristics of array. [CO-3][L-3]
	f)	Define folded dipole antenna. Derive its input impedance.
	g)	State Babinet's principle.
	h)	CO-3][L-4] f the critical frequency of ionized layer is 1.5MHz, calculate electron density of the layer.
	i)	CO-4][L-5] Justify bending mechanism of ionosphere.
	j)	Identify challenges in antenna design. [CO- 5][L-3] 2x10
		<u>PART-A</u>
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**

<u>PART-B</u>

- Q.5 a) Design a log Periodic antenna to obtain a gain of 9dB and to operate over a frequency range of 125MHz to 400MHz.
 [CO-3][L-6] 8
 - b) A paraboloid reflector has radiation characteristics whose half power beamwidth is 50. 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 VLSI TECHNOLOGY AND CIRCUITS (BEC-DS-502)

Time: 3 hrs.

Max Marks: 100

[CO1][L2]

[CO4][L3]

[CO3][L2]

[CO3][L1]

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?
 - c) Why is Sio₂ 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 SiCl4 for epitaxial growth. [CO2][L2]
 - f) Differentiate between Wet and Dry Etching.
 - q) Why aluminium is preferred for metallization?
 - h) What is Channel length modulation?
 - i) Why NMOS technology is preferred over PMOS technology? [CO4][L2]
 - i) Design SR flip flop using CMOS.

PART-A

- a) Define the Moore's law. Draw and Explain the VLSI Design flow? Q.2
 - (CO.1)(L2) 10

[CO4][L6] **2x10**

- b) Describe the evolution of integrated circuit technology. (CO.1) (L2) **10**
- a) What are different oxidation techniques for growing oxide layer? Explain any Q.3 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

- a) How would you explain AC and DC plasma excitation in detail? (CO.5) (L2) 10 Q.5
 - 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.

b) Design a circuit for the equation given below using CMOS. Also draw its stick diagram.

⁽CO.4)(L6) 10

(*A* + *B*) * *C* (CO.5) (L6) **10**

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester DIGITAL SIGNAL PROCESSING (BEC-DS-501)

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.
- Answer the following in briefly: Q.1 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] q) 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 H(S)=1/S+2 into digital filter using approx. of derivative method with T=1sec. [CO5] [L-2]

i) What is frequency warping? Derive the relation between ω and Ω .

j) A signal x(n)= $\begin{cases} a^n & n \ge 0\\ 0 & otherwise \end{cases}$

Obtain decimated signal with a factor of 3.

[CO1] [L-2] 2x10

[CO5] [L-2]

<u>PART-A</u>

Q.2 a) Determine
$$x(n)$$
, if $x(z) = \frac{z+2}{2z^2 - 7z + 3}$ when ROC is given as:

i)
$$|z| > 3$$

ii) $|z| < \frac{1}{2}$ [CO2] [L-4] **10**

- 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: $x_1(n) = (1, 2, 3, 1)$ $x_2(n) = (4, 3, 2, 2)$ [CO3] [L-4] **12**

b) Calculate DIT FFT of x(n) = [1,1,1,0,0,1,1,1]. [CO3] [L-3] 8

Q.4 a) A low pass filter is to be designed with the following desired frequency response:

Time: 3 hrs.

$$H_{d}\left(e^{j\omega}\right) = \begin{cases} e^{-j2\omega}, & -\pi/4 \le \omega \le \pi/4 \\ 0, & \pi/4 < |\omega| \le \pi \end{cases}$$

Determine the filter coefficients $h_d(n)$ if the window functions is defined as:

$$\omega(n) = \begin{cases} 1, & 0 \le n \le 4\\ 0, & otherwise \end{cases}$$

Also determine the frequency response $H(e^{j\omega})$ of the designed filter.

[CO4] [L-4] **10**

b) Explain Fourier series method for designing of FIR filter. [CO4] [L-3] **10**

<u>PART-B</u>

Q.5 a) What is bilinear transformation? Derive the mapping formula. Compare bilinear transformation with other transformations based on their stability. [CO51 [I -3] **15**

b)	Convert the analog filter	$H(s)=1/(s+1)^3$ 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)= ay(n-1)+a x(n)- x(n-1)
 b) Determine the parallel realization of the IIR digital filter transfer function:
 - $H(z) = \frac{3(2z^2+5z+4)}{(2z+1)(z+2)}$ (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.
- a) State and prove time scaling property of z-transform. Q.1
 - b) Sketch the following signals:
 - i) x(n) = u(n + 3) + u(n 3)
 - ii) $x(n) = \delta(n-1)$
 - c) Check the system for time variance: $y(n) = 3n \cos x(n)$.
 - d) Find the z Transform and ROC of the signal:
 - e) Calculate DTFT of x (n) = $a^n u(n)^r$ | 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 T=1sec.
 - i) What is finite word length effect in digital filters?

j) A signal x(n)=
$$\begin{cases} a^n & n \ge 0\\ 0 & otherwise \end{cases}$$
Obtain interpolated signal with a factor of 2.

Q.2 a) Determine
$$x(n)$$
, if $X(z) = \frac{z}{(z-1/2)(z-1/4)}$

- [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][CO-2] [L-3] **10**
- Q.3 a) Compute circular convolution of the sequences $x[n] = \{1,2,1,2\}$ and $h[n] = \{1,2,1,2\}$ {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**

2x10

a) Explain design of linear phase FIR filters by the frequency sampling method. Q.4

[CO-4] [L-3] **8**

b) The desired frequency response of a LPF is:

 $H_{d}(e^{jw}) = \begin{cases} 1 & -\pi/2 \le w \le \pi/2 \\ 0 & \pi/2 \le |w| \le \pi \end{cases}$ Find h(n) using rectangular window of length 5.

[CO-4] [L-4] **12**

PART-B

- Q.5 a) Explain approximation of derivative technique for IIR filter designing in detail.
 - $\label{eq:constraint} \begin{array}{l} [CO-5] \ [L-3] \ \textbf{10} \\ \text{b) Convert the analog filter into digital filter whose system function is} \\ H(s) = 36/[(s+0.1)^2+36] \\ \text{The digital filter should have a resonant frequency $\omega_r=0.2\pi$. Use impulse} \\ \text{invariant mapping.} \\ \end{array}$
- Q.6 a) What is multirate DSP? Why is it required? [CO-1] [L-2] 6
 - 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] 8b) For the system function given by:

 $H(z) = (1+2z^{-1}+z^{-2})/(1+(3/4)z^{-1}+(1/8)z^{-2})$

Draw a signal flow graph that implements this system as a cascade form and parallel form realization. [CO-5] [L-4] **12**

[CO-1] [L-2] **7** [CO-1] [L-2] **7**

End Semester Examination, Dec. 2022 B. Tech. – Fourth Semester

BASIC OF ELECTRONICS ENGINEERING (BEC-DS-421)

Time: 3 hrs.

Note:	Attempt FIVE questions in all; Q.1 is compulsory . Attempt questions from PART-A and TWO questions from PART-B . Et carries equal marks.	t any TWO ach question
Q.1	 a) Distinguish between intrinsic and extrinsic semiconductor. b) Evaluate I_{dc} for full-wave rectifier. c) Derive relation between a & β. d) Draw circuit diagram for transistor as amplifier. e) Evaluate CMRR of operational amplifier if differential gain 4x 10 mode gain is 1x 10³. 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: F(A,B,C) = Σm(0, 1, 2, 4, 5, 7) j) Illustrate type of channel. 	[CO-1] [L-2] [CO-1] [L-2] [CO-2] [L-2] [CO-2] [L-2] ⁶ and common [CO-3] [L-3] [CO-4] [L-2] [CO-4] [L-2] [CO-5] [L-3] [CO-5] [L-3] [CO-5] [L-2] 2×10
	<u> PART-A</u>	
Q.2	 a) Explain V-I characteristics of PN junction diode in brief. Or 	[CO-1] [L-3] 10
	a) Derive diode current equation for PN junction diode.b) Explain working of full wave rectifier. Also derive expression for it.	or efficiency of
		[CO-1] [L-3] 10
Q.3	a) Describe input and output characteristics of common base co	onfiguration of
		[CO-2] [I -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.

[CO-3] [L-6] **10**

Max Marks: **100** *No. of pages: 1*

a) Draw circuit diagram for integrator and derive equation for output voltage. Also Draw input and output voltage waveform for the given function.

Or

X = +5 for $0 \le t \le 10$ ms

X = -5 for $1ms \le t \le 20ms$

[CO-3] [L-5, 6]

b) State ideal characteristics of operational amplifier. Also draw its block diagram.

[CO-3] [L-2] **10**

<u>PART-B</u>

Q.5 a) Draw Pin configuration of IC 555 Timer. Explain as table mode of 555 Timer.

[CO-3] [L-4] **10** [CO-3] [L-6] **10**

b) Design comparator circuit by operational amplifier.

Q.6	a) b)	Design full subtractor by half subtractor. Design the circuits given below.	[CO-4] [L-5] 10
		i) Design JK flip-flop using SR flip-flopii) Design 16:1 MUX using 4:1 MUX	[CO-4] [L-3] 10
Q.7	a)	Draw block diagram of communication system. Illustrate its each	block.
	b)	Explain spectrum allocation in automobile industry.	[CO-5] [L-5, 4] 10 [CO-5] [L-3] 10

End Semester Examination, Dec. 2022 B. Tech. – Fourth Semester ARTIFICIAL INTELLIGENCE (BEC-DS-406)

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

Time: 3 hrs.

	indicated against each question.	
Q.1	 a) Explain the different domains of artificial intelligence. b) How is machine learning related to artificial intelligence? c) What is deep learning? d) What is Alpha-beta pruning? e) How can AI be used in detecting fraud? f) What is overfitting? How can it be overcome in Machine Learning? 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? j) What are the different software platforms for AI development? [C 	[CO-1] [L-2] [CO-4] [L-3] [CO-1] [L-1] [CO-2] [L-1] [CO-5] [L-3] [CO-3] [L-3] [CO-3] [L-1] [CO-2] [L-2] [CO-4] [L-2] [CO-5] [L-1] 2×10
	<u>PART-A</u>	
Q.2	a) What is an Intelligent agent?b) Explain turing test approach.	[CO-1] [L-2] 10 [CO-1] [L-2] 10
Q.3	a) Explain A* algorithm with an example.b) Discuss local search and optimization algorithms that are used in AI.	[CO-2] [L-2] 10 [CO-2] [L-2] 10
Q.4	 a) What are expert systems? Explain MYCIN system in detail. b) What is HMM model? Explain with an example. 	[CO-3] [L-2] 10 [CO-3] [L-2] 10
0.5	a) Discuss different strategies that are used for data cleaning in	machine
L	learning.	[CO_3] [I_3] 10
	b) Explain Naïve Bayes classifier algorithm in detail.	[CO-3] [L-3] 10 [CO-3] [L-3] 10
Q.6	a) What is regression? Explain linear regression in detail with a example.	a suitable
	b) Discuss reinforcement learning in detail.	[CO-4] [L-3] 10 [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. [CO-5] [L-3] **10**

Max Marks: **100** *No. of pages: 1*

B. Tech. – Fourth Semester

MICROPROCESSOR AND MICROCONTROLLERS (BEC-DS-403)

Time:	3 hrs. Ma	x Marks: 100
Note:	Attempt FIVE questions in all; Q.1 is compulsory . Attempt any questions from PART-A and TWO questions from PART-B . Mark indicated against each question.	TWO s are
Q.1	a) Why the address /data bus is multiplexed in 8085 and what disadvantage?	is its
	b) Find out the number of address lines required to access 8KB of RAM.c) State the function of given 8085 instructions: JP, JPE, JPO, JNZ.d) What will be the status of carry flag, zero flag, parity flag, auxiliary can sign	[CO-1] [L-3] [CO-3] [L-3] [CO-4] [L-2] rry flag,
	flag and accumulator after execution of ADC B instructions? (Assume $B=20$	e A=3F,
	Cy= 1). e) How register bank selection is done in 8051 microcontroller as programming?	[CO-3] [L-1] ssembly
	f) Does the stack of 8051 microcontroller grows upwards or downwards	[CO-3] [L-4] ? What
	 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/programming 	[CO-2] [L-3] [CO-2] [L-2] [CO-2] [L-1] counter
	 a) j) If the crystal frequency is 22 MHz, what will be the baud rate if: i) TH1 = -3 	[CO-5] [L-3]
	ii) TH1 = -12 with SMOD =0 and SMOD=1? [CO-	5] [L-3] 2×10
0.0	PART-A	C 11
Q.2	 a) With respect to the block diagram of 8085, explain the working following: General purpose register. Interrupt control unit. Timing and Control unit. b) What is the significance of each of the following PINs of microprocessor? HOLD ALE READY S0, S1 	CO-1] [L-2] 10 6 8085 CO-1] [L-2] 10
Q.3	a) Explain various categories of interrupts available in 8086. [Ob) How does the 8086 processor access a word from an odd memory local	CO-2] [L-4] 10 Ition?

Q.4 a) Explain memory read operation in minimum mode of 8086 with the help of a timing

diagram.

[CO-2] [L-2] **10**

[CO-4] [L-3] **4**

- 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 DS=0223H, DI=0CCCH and SI =1234H
 - i) MOV [DI], AL
 - ii) MOV [SI][56H], BL

PART-B

- a) Describe internal data memory organization of 8051 microcontroller. [CO-2] [L-2] 10 Q.5 b) Develop a program to transfer block of 10 numbers from memory location 7000 to [CO-4] [L-6] **10** 8000H stored in internal memory.
- 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**

the [CO-3] [L-6] **10**

- Q.7 a) Design a code to transfer the letter "A" serially at 9600 baud rate continuously. Use [CO-5] [L-6] **10**
 - 8 bit data and 1 stop bit. Use Timer 1. b) Sketch interfacing diagram of 4Kbyte EPROM and 4Kbyte of RAM to 8051.
 - Draw

memory map.

End Semester Examination, Dec. 2022 B. Tech. – Fourth Semester 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 3dB 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 $V_{in} = 10 \text{ Sin} 2\pi x 10^{3} \text{ t}$ is applied to the in	verting
	-	configuration of op-Amp 741. Given $R_1 = 1K\Omega$ and $R_f = 10K\Omega$.	[CO-5] [L-4]

2×10

<u>PART-A</u>

- 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] 10
 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**

<u>PART-B</u>

- 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 C₁=C₂=0.001µF and R₁=4KΩ while R₂ is kept variable. The frequency is to be varied from 20 KHz to 50MHz, by ranging R₂. Calculate minimum and maximum value of R₂.[CO-4] [L-4, 5, 6] **10**
- Q.6a) 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] 10b) 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?

2x10

<u>PART-A</u>

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) = Σ m (0,2,4,5,6,7,10,13,14,15
 - b) Examine BCD 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 v/s Sequential Circuits. [CO-3] [L-4] 10

<u>PART-B</u>

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:	ïme: 3 hrs.					
Note:	Att qu cai	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) b) c)	Compare Combinational and sequential circuits. State Demorgan's theorem. Convert:- i) $(11110.11)_2 = ()_8$ ii) $(35)_8 = ()_2$ iii) $(1B5)_{16} = ()_2$ iv) $(234)_8 = ()_{16}$	[CO-3] [[CO-1,2] [[CO-2] [L-1] L-1] L-4]		
	d) e) f) g) h) i)	Draw XOR gate by using only four NAND gates. Design 2:4 decoder using gates. Design half subtractor circuit using PAL. Differentiate between latch and Flip-Flop. Define resolution for DAC. Convert the following into minterms: i) A'+CD ii) ABC+C'D	[CO-2] [[CO-2] [[CO-2] [[CO-3] [[CO-5] [[CO-2] [L-2] L-2] L-6] L-2] L-1] L-4]		
	j)	How many Flip flops are required to design MOD-12 counter. [C	CO-3] [L-3] 2	x10		
Q.2	a) b) c)	Perform the following subtraction using 2's complement: i) $(25)_{10} - (13)_{10}$ ii) $(18)_{10} - (24)_{10}$ Draw all logic gates by using i) Only NAND gates ii) Only NOR gates Write the Excess -3, BCD and Gray code for the following decimal number i) 32 ii) 26	[CO-2] [L-3] . [CO-2] [L-2] umbers: [CO-2] [L-3]] 6] 8] 6		
Q.3	a) b)	Minimize the following function using K-map & QM method: F(A,B,C,D)= Σ m (1,2,6,8,9,12) Design full adder using i) ROM ii) PAL iii) PLA.	[CO-2] [L-4] [CO-2] [L-6]] 10] 10		
Q.4	a) b)	Design 16:1 multiplexer using 8:1 Multiplexer. Design octal to binary encoder using gates? Mention its applications PART-B	[CO-2] [L-6] . [CO2] [L6]] 10] 10		
Q.5	a) b) c)	Design the following Asynchronous counter: i) MOD-5 ii) MOD-10 Draw and explain the working of Ring counter with its timing diagram Design and explain the working of 4- bit PISO shift register.	[CO-3] [L-6] m. [CO3] [L [CO-3] [L-5]] 10 2] 4] 6		
Q.6	a)	Mention different specifications of A/D converter.	[CO-4] [L-2]] 8		

- 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-3] **10** [CO-5] [L-6] **10**

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:

 b) Derive expression for stability factor of a transistor. c) Describe switching time of a PN junction diode. d) Draw h- parameters model of a transistor. e) The pinch off voltage for an – channel JFET is 10 V, when VGS = 1 V, the pinch – off occurs for VDS equal to 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. 	a)	Derive expression for I _{dc} of full wave rectifier.	[CO-1] [L-2]
 c) Describe switching time of a PN junction diode. d) Draw h- parameters model of a transistor. e) The pinch off voltage for an – channel JFET is 10 V, when VGS = 1 V, the pinch – off occurs for VDS equal to 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. 	b)	Derive expression for stability factor of a transistor.	[CO-1] [L-3]
 d) Draw h- parameters model of a transistor. [CO-2] [e) The pinch off voltage for an – channel JFET is 10 V, when VGS = 1 V, the pinch – off occurs for VDS equal to [CO-3] [f) Tabulate difference between BJT and FET. [CO-3] [g) Define 'cross over distortion'. [CO-4] [h) Draw circuit diagram for Operational amplifier as voltage follower. [CO-5] [i) State various coupling techniques of an amplifier. [CO-4] [j) Derive expression for gain of non-inverting configuration of Op-Amp. [CO-5] [c)	Describe switching time of a PN junction diode.	[CO-1] [L-1]
 e) The pinch off voltage for an – channel JFET is 10 V, when VGS = 1 V, the pinch – off occurs for VDS equal to [CO-3] [f) Tabulate difference between BJT and FET. [CO-3] [g) Define 'cross over distortion'. [CO-4] [h) Draw circuit diagram for Operational amplifier as voltage follower. [CO-5] [i) State various coupling techniques of an amplifier. [CO-4] [j) Derive expression for gain of non-inverting configuration of Op-Amp. [CO-5] [d)	Draw h- parameters model of a transistor.	[CO-2] [L-3]
pinch – off occurs for VDS equal to[CO-3] [f) Tabulate difference between BJT and FET.[CO-3] [g) Define 'cross over distortion'.[CO-4] [h) Draw circuit diagram for Operational amplifier as voltage follower.[CO-5] [i) State various coupling techniques of an amplifier.[CO-4] [j) Derive expression for gain of non-inverting configuration of Op-Amp.[CO-5] [22	e)	The pinch off voltage for an – channel JFET is 10 V, when VGS = 1	V, the
 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. 2 		pinch – off occurs for VDS equal to	[CO-3] [L-3]
 g) Define 'cross over distortion'. [CO-4] [h) Draw circuit diagram for Operational amplifier as voltage follower. i) State various coupling techniques of an amplifier. [CO-4] [j) Derive expression for gain of non-inverting configuration of Op-Amp. [CO-5] [f)	Tabulate difference between BJT and FET.	[CO-3] [L-2]
 h) Draw circuit diagram for Operational amplifier as voltage follower. [CO-5] [i) State various coupling techniques of an amplifier. [CO-4] [j) Derive expression for gain of non-inverting configuration of Op-Amp. [CO-5] [g)	Define 'cross over distortion'.	[CO-4] [L-1]
 i) State various coupling techniques of an amplifier. [CO-4] [j) Derive expression for gain of non-inverting configuration of Op-Amp. [CO-5] [2 	h)	Draw circuit diagram for Operational amplifier as voltage follower.	[CO-5] [L-2]
j) Derive expression for gain of non-inverting configuration of Op-Amp. [CO-5] [2:	i)	State various coupling techniques of an amplifier.	[CO-4] [L-1]
2	j)	Derive expression for gain of non-inverting configuration of Op-Amp.	[CO-5] [L-3]
			2x10

<u>PART-A</u>

Q.2 a) Calculate current through circuit shown in figure below if diode forward resistance is 0.50Ω . 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.
- Q.3 a) Describe Input and Output characteristics of common base configuration of BJT.
 - [CO-2] [L- 2, L-4] **10** b) For the device characteristics and circuit shown in the figure (a) & (b) calculate V_{CC}, R_B and R_C for the fixed bias circuit. [CO-2] [L-4] **10**

[CO-1] [L-5] **10**


- Q.4 a) The device parameters for an n-Channel JFET are: Maximum current IDSS = 10mA, Pinch off voltage, Vp = 4V Calculate the drain current for (a) VGS = 0 (b) VGS = 1.0v (c) VGS = 4V. [CO-3] [L-4] **10**
 - b) Tabulate difference between enhancement-mode-MOSFET and Depletionmode-MOSFET. [CO-3] [L-4] **10**

<u>PART-B</u>

- Q.5 a) Design and evaluate Zin, Zo and A for two stage RC coupled amplifier (where $Cb=20\mu$ F, R1=56K Ω , R2=5.6K Ω , Rc =1K Ω , Re=520 Ω , Ce=50 μ F, hie=1.1K Ω and hfe=120. [CO-4] [L-6] **12**
 - b) Reanalyze DC analysis of a dual input unbalanced output differential amplifier configuration. [CO-4] [L-5] **8**
- 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 = $\pm 15V$)

 $\label{eq:Vin} \begin{array}{ccc} \mbox{Vin} = +\ 20 \ \mbox{for} & 0 \le t \ \le T \\ \mbox{Vin} = -\ 20 \ \mbox{for} & T \le t \ \le 2T \end{array}$

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 B. Tech. – Third Semester BASIC ELECTRONICS (BEC-DS-312)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

Note:	Attempt	FIVE a	questions	in al	"; Q.1	is compl	ulsory	. Attempt	any 1	WO
	questions	s from	PART-A	and	TWO	questions	from	PART-B.	Marks	are
	indicated	' agains	t each que	estion	<i>.</i>					

Q.1 a)	Justify reason of preferring Silicon over Germanium.	[CO1][L-2]
b)	Evaluate I _{rms} for full-wave rectifier.	[CO1][L-5]
c)	Derive relation between a & β.	[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] 2×10

<u>PART-A</u>

Q.2	a) Explain V-I characteristics of PN junction diode.	[CO1][L-2] 10
	 The current flowing in PN junction diode at room temperature is 5x10⁻⁷ a when a large reverse biased voltage is applied. Evaluate the current flow when 0.1volt is applied. (Given V_T = 26mV at room temperature). b) Explain working of full wave rectifier. Also derive expression for ripple fa and efficiency of it. 	amp, wing [CO1][L-3] 10 actor [CO1][L2] 10
Q.3	Describe input and output characteristics of common emitter configuratio	n of
	DJI.	[CO 2][L2] 20
Q.4	Draw equivalent circuit of two stage RC coupled amplifier circuit. Also, explai	n its
	response.	[CO3] [L-2] 20
	<u>PART-B</u>	
Q.5	Derive expression for resonance frequency of RC phase shift oscillator.	[CO4][L-3] 20
Q.6	a) Explain advantage of negative feedback.b) Explain ideal characteristics of operational amplifier.	[CO4][L-3] 10 [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 B. Tech. – Third Semester 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 $x(t) = e^{jt}$.
 - 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?

<u>PART-A</u>

- Q.2 a) Define `LTI system'. Check the causality, time invariance and linearity of the $y(n) = x(n^2)$ 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.

$$u(n) = u(n) - u(n-1)$$

c) Describe the signals given in figure. [CO-1] [L-2] **5**



- Q.3 a) Consider an LTI system S and a signal $x(t) = 2e^{-3t}u(t-1)$. If $x(t) \rightarrow y(t)$ and $\frac{dx(t)}{dt} \rightarrow -3y(t) + e^{-2t}u(t)$ [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 $x(t) = te^{-t/RC}$ 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) = nu(n) [CO-2] [L-2] **5** Compute the response of this system to a unit step input x(n) = u(n).

2x10

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





[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

<u>PART-B</u>



 $x(t) = 2sin^2(2500\pi t)\cos(20000\pi t)$

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. [CO-4] [L-3] **5**

- b) Find the Fourier transform of the Gaussian pulse $f(t) = e^{-a^2t^2}$. [CO-4] [L-4] **5**
- c) State and prove time convolution and time differentiation properties of Fourier transform. [CO-4] [L-5] **10**
- Q.6 a) Verify Parseval's theorem:

$$\sum_{n=-\infty}^{\infty} x(n)x^*(n) = \frac{1}{2\pi} \int_{-\pi}^{\pi} X(e^{j\omega})X^*(e^{j\omega})d\omega$$

For the following sequence

$$x(n) = \left(\frac{1}{2}\right)^n u(n)$$
 [CO-4] [L-5] **10**

b) Find the DTFT of the following finite duration sequence of length L

$$x(n) = \begin{cases} A, & for \ 0 \le n \le L-1 \\ 0, & otherwise \end{cases}$$

Also, find the inverse DTFT to verify x(n) for L = 3 and A = 1V. [CO-4] [L-4] **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 $s(t) = (1 - e^{-t} - te^{-t})u(t)$. For a certain input x(t), the output is observed to be equal to $y(t) = (2 - 3e^t + e^{3t})u(t)$. What is x(t)? [CO-3] [L-3] **10**

End Semester Examination, Dec. 2022 B. Tech. – Third Semester SIGNALS AND SYSTEMS (BEC-DS-303)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

2x10

[CO-1] [L-3] **10**

[CO-2] [L-2] **12**

- 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.
- Answer the following in briefly: Q.1
 - a) Test periodicity of the signal, $x(t) = \sin 15 \pi t$
 - Find the energy and power of the signal $x(t) = \exp(-3|t|)$. b)
 - How would you check the linearity of the given system: c) $\mathbf{y(t)} = \frac{d x(t)}{dt} + x(t) + 4$
 - Define causal and non-causal systems. d)
 - Compute the Laplace transform of the given function: e) $x(t) = 10 + 5t + t^{2} - 4t^{3}$
 - State Dirichlet's conditions. f)
 - Find the Fourier Transform of $\delta(t)$, an impulse of unit strength. g)
 - 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)+2r(t-2)-r(t-3)-u(t-4)-2u(t-5)Find the even and odd part of this signal.

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.
- b) Determine whether the following is a LTI system. $y(n) = n \cos[x(n)]$ [CO-2][L-3] **8**
- a) Determine the laplace transform of $x(t)=(t^2-2t) u(t-1)$. Q.4 [CO-4] [L-3] **8** b) Find the Inverse Laplace Transform of: $X(s) = (s+4) / {s (s-1) (s^2+4)}$ [CO-4] [L-3] **7** c) State and prove Final Value theorem. [CO-4] [L-2] **5**

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. [CO-5] [L-4] **8** [CO-3] [L-3] **12**
 - b) Find the Fourier series expansion of the following signal:



Q.6	 a) Find Fourier transform of x(t) = exp(-a t). b) State and prove following properties of Fourier Transform. 	[CO-3] [L-4] 10	
	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: $x(n) = \{4, 1, 1, 2\}$ and $h(n) = \{1, 1, 2\}$	[CO-5] [L-5] 12	
	b) Find DTFT of the discrete sequence $x(n) = (3)^n u(n-1)$.	[CO-5] [L-3] 8	

B. Tech. – Third Semester DIGITAL ELECTRONICS (BEC-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	a) b) c) d)	 Differentiate between Counter and Register? Compare Analog and Digital signals? Write the gray code and BCD code for (35)₁₀ Convert the following hexadecimal number (A6.2F)₁₆ into its equivalent: Binary Decimal Octal number 					
	e) f) g) i) j)	Discuss with an example showing positive and negative logic systems? Design AND gate using NOR gate? List the applications of Multiplexer. Design half sub tractor circuit using ROM? Define resolution (step size) and % resolution of a D/A converter. Convert the following into minterms: i) A'B'C+ A'B+BCD	[CO-2] [CO-2] [CO-2] [CO-2] [CO-4]	[L-2] [L-6] [L-2] [L-6] [L-1]			
		ii) ABC+ D'C'		2x10			
		<u>PART-A</u>					
Q.2	a)	Simplify the following expression: i) $B(A+C) + A\overline{B} + B\overline{C} + BC$					
	b)	ii) $ABC + \overline{ABC} + A\overline{B}C + \overline{ABC} + AB\overline{C}$ [C The seven bit hamming code is received as 1011001. Assume that even has been used, check whether it is correct or not. If not, find the code?	D-2] [L-3 parity correct	3] 8			
	c)	[Construct the following decimal numbers using 1's complement?)-2] [L-2	2] 5			
		i) 15 from 32 ii) 28 from 17 [C	ጋ-2] [L-3	B] 7			
Q.3	a)	Minimize the following function using QM method: [Complexity of the following function $F(A,B,C,D) = \pi M(5,8,9,12,13,15) + d(3,10)$	ጋ-2] [L-₄	4] 10			
	b)	Design full Adder using i) ROM ii) PLA. [Co	ጋ-2] [L-€	5] 10			
Q.4	a)	Design the following using 4:1 Multiplexer:		-1 c			
	h)	$F(A, B, C, D) = \sum m(1, 2, 5, 6, 7)$ [C] Design hexadecimal to binary encoder using gates. Mention its application	J-2][L-t ons	o] 0			
	5)	[C	D-2] [L-6	5] 14			
		<u>PART-B</u>					
05	۶J	Convert the following flip flop conversion:	ר י	17 /			

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**

[CO-3] [L-6] **6**

- Q.6 a) Draw and explain the working of R/2R 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**

B. Tech. – Third Semester

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 β of a transistor and derive the relationship between them	. [CO4] [L-2]
	h) Differentiate between bipolar junction transistor and field effect transist	or. [CO4][L3]
	i) Why DC power supply in electronic circuits.	[CO-5] [L-3]
	i) Draw the pin configuration for 3 terminal IC regulators.	[CO-5] [L-5]
		2x10

PART-A

Q.2	a)	For	а	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
- a) The current flowing in PN junction diode at room temperature is 2×10^{-7} amp, Q.3 when a large reverse biased voltage equal to 0.1 Volt is applied. Evaluate the current flowing (Given $V_T = 26mV$ at room temperature) [CO-2] [L-3] **10** b) Explain the terms: solar cell, LED [CO-2] [L-2] **10**
- Q.4 a) A full wave centre tapped rectifier uses diode 1N4002 each having forward resistance of 25 ohm. The value of secondary value fed between centre tap to each end of secondary is 48V and load resistance is 1Kohm. 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 5V. Assume ideal diode condition. Also, identify circuit.[CO-3] [L-5] 5



Figure:1

c) Analyze Inductor filter with full wave rectifier.

<u>PART-B</u>

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. [CO-4] [L-5] **10**



Figure.2

- Q.6 a) Derive relation between transconductance, amplification factor and A.C drain resistance of JFET. [CO-4] [L-5] **10**
 - b) Tabulate difference between Enhancement mode MOSFET and Depletion mode MOSFET. [CO-4] [L-4] **10**
- Q.7 a) Design a regulated power supply using a full wave bridge rectifier of 10 diode 1N4007, capacitor filter (Cin =25 μ F and Cout= 10 μ F), IC regulator to provide an output of +12V. [CO-5] [L-6] **10**
 - b) Draw circuit diagram of transistor series feedback voltage regulator.

[CO-5] [L-3] 10

B. Tech. – Third Semester

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:

L		
	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 β of a transistor and derive the relationship between them	. [CO4] [L-2]
	h) Differentiate between bipolar junction transistor and field effect transist	or. [CO4][L3]
	i) Why DC power supply in electronic circuits.	[CO-5] [L-3]
	j) Draw the pin configuration for 3 terminal IC regulators.	[CO-5] [L-5]
		2x10

<u>PART-A</u>

Q.2	a)	For	а	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 2x10⁻⁷ amp, when a large reverse biased voltage equal to 0.1 Volt is applied. Evaluate the current flowing (Given V_T = 26mV at room temperature) [CO-2] [L-3] 10
 b) Explain the terms: solar cell, LED [CO-2] [L-2] 10
- Q.4 a) A full wave centre tapped rectifier uses diode 1N4002 each having forward resistance of 25 ohm. The value of secondary value fed between centre tap to each end of secondary is 48V and load resistance is 1Kohm. 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 5V. Assume ideal diode condition. Also, identify circuit.[CO-3] [L-5] 5



Figure:1

c) Analyze Inductor filter with full wave rectifier.

[CO-3] [L-4] **7** 552/4

<u>PART-B</u>

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. [CO-4] [L-5] **10**



Figure.2

- Q.6 a) Derive relation between transconductance, amplification factor and A.C drain resistance of JFET. [CO-4] [L-5] **10**
 - b) Tabulate difference between Enhancement mode MOSFET and Depletion mode MOSFET. [CO-4] [L-4] **10**
- Q.7 a) Design a regulated power supply using a full wave bridge rectifier of 10 diode 1N4007, capacitor filter (Cin =25 μ F and Cout= 10 μ F), IC regulator to provide an output of +12V. [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. - Second / Third Semester **IoT DESIGN WITH ARDUINO (BEC-DS-201)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

[CO-2] [L-2] [CO-4] [L-3]

[CO-5] [L-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.
- a) What is the use of setup() and loop() functions in an Arduino program? [CO2][L2] Q.1
 - b) Write a program to blink onboard LED of Arduino Uno board every 2.5 sec. [CO3][L3] [CO-1] [L-1]
 - c) What is baud rate?
 - d) What is the significance of analogRead() function?
 - e) What is I2C protocol?
 - f) What is the advantage of using Servo motor over DC motor?
 - q) 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] **2×10**

PART-A

- a) Differentiate between Arduino Uno and Arduino Nano boards with respect to Q.2 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**
- a) Write a program to compliment the state of pin 13 every time a data byte is Q.4 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] **10**
 - b) Discuss the interfacing of a 16x2 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.
 - b) Home automation.

[CO-5] [L-3] **10** [CO-5] [L-3] **10**

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.
- Answer the following in brief: Q.1 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] [CO-1] [L-1] c) Who are phishers? 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. [CO-2] [L-4] 2×10

<u>PART-A</u>

Q.2	a) Explain network architecture with the help of layered structure system interconnections. Define and explain each phase of BCM lifeb) What are the basic network utilities?	e in open cycle.[CO-1] [L-1] 10 [CO-1] [L-2] 10
Q.3	Write short notes on the following:a) Session hijacking.b) Viruses, worms and malware.	[CO-2] [L-4] 10 [CO-2] [L-3] 10
Q.4	 a) What do you understand by an investment fraud? Also, explain the of phishing. b) Write a note on cyber stalking, and ways to resolve. 	technique [CO-3] [L-2] 10 [CO-3] [L-3] 10
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.b) Describe the document trail in detail.	[CO-5] [L-3] 10 [CO-5] [L-2] 10
Q.7	a) What is the need of protection from cyber-crime?b) What is the scope and coverage of cyber laws?	[CO-6] [L-4] 10 [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.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.
- i) Explain the reason to implement a corba application with multi-threading? 2×10

PART-A

- a) Illustrate how packages are created and accessed in Java. Briefly explain the Q.2 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**

a) Explain applets and describe the Applet life cycle. What are the requirements Q.3 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.

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**

[CO-2] [L-6] **10**

PART-B

Q.5 a) What is SOAP? How do users utilize the facilities provided by SOAP? Give example.

[CO-4] [L-3] 10

- b) Differentiate between thread and a process. What are the two ways of implementing thread in java. Give suitable examples for both. [CO-5] [L-2] **10**
- 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. [CO-5] [L-5] **10**

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 IT BUSINESS CONTINUITY AND DISASTER RECOVERY (BCS-DS-

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,

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.

<u>PART-A</u>

Q.2 Explain disaster in IT industry. What are the different types of disasters?

[CO-1] [L-1] **20**

2×10

- 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**

<u>PART-B</u>

- 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.

[CO-6] [L-3] **20**

End Semester Examination, Dec. 2022 B. Tech. – Seventh Semester IT NETWORK SECURITY (BCS-DS-733)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-1][L-2]

[CO-2][L-1]

[CO-3][L-2]

[CO-4][L-3]

[CO-4][L-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) How hierarchical routing is better than other routing techniques? [CO-2][L-1]
 - b) Briefly explain the importance of penetration testing.
 - c) Briefly explain the special features of net-view.
 - d) Differentiate between table driven and on-demand routing protocols.
 - e) Explain the different types of VPN.
 - f) Differentiate between hot fixes, service packs and patches.

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.	[CO-4][L-3]
	2x10

<u>PART-A</u>

Q.2	a)	What functions are carried out by various layers of TCP/IP? Discuss help of a block diagram.	ss with the [CO-1][L-3] 10
	b)	Differentiate between the TCP header and UDP header with its app	lications. [CO-1][L-2] 10
Q.3	a) b)	Differentiate between RIP, OSPF and BGP protocols. What are the major weakness of LAN manager authentication proto	[CO-2][L-1] 10 cols? [CO-2][L-3] 10
Q.4	a) b)	Explain the architecture of Firewalls with various Firewall technologies. Explain the concept of protocols in network. How authentication prused in network security.	[CO-3][L-2] 10 otocols are [CO-3][L-4] 10
		<u>PART-B</u>	
Q.5	a) b)	Describe the various WAN technologies in detail. What is RAID? Explain it with the architecture.	[CO-4][L-4] 10 [CO-4][L-3] 10
Q.6	Wr a) b)	ite short notes on the following: Net manager. Open view.	[CO-5][L-2] 10 [CO-5][L-2] 10
Q.7	a) b)	What are the different types and methods of Penetration Testing? Explain the process of testing. Why and how the process of testing enhance the security of a network?	[CO-6][L-4] 10 is done to [CO-6][L-3] 10

560/4

End Semester Examination, Dec. 2022 B. Tech. – Seventh Semester 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?

2x10

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.
 b) Compare and contract between USIM card and SIM card
 - b) Compare and contrast between USIM card and SIM card. [CO-3] [L-4] **10**

<u>PART-B</u>

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 3G 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. Tech. – Seventh Semester 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//Answerthe following questions:
 - a) Which Apache system deals with ingesting streaming data to Hadoop. Also, discuss its tunctionality.
 - b) List out any two characteristics of stream processing language.
 - c)/Explain the importance of Rack Awareness/
 - dY/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 putpose of Zookeeper in the Hadoop ecosystem?
 - gy What does commodity Hardwate in the Hadoop world mean?
 - h) Illustrate the significance of partition in Hive.
 - Y/List/out/any/four/data/analysis/tools/used/in/Business/Intelligence.
 - 1) Discuss the key aspects of YARN.

<u>PART-A</u>

2.2 a) Discuss the five XV that contribute to the efficiency of Big Data Analytics. Also discuss the various benefits and drawbacks of Big Data. b) Acknowledge the effectiveness of the Big Data life cycle in weather forecasting.

CO-XXX/2V**10**

2x10

- - b) Extend examples to demonstrate the importance of HDFS and its subsequent components in Big Data Analytics.
 - 4/a) In Jagl, what does lazy evaluation imply? Describe how the soft 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 state-wise temperature analysis to demonstrate the difference between Hive and Pig.

CO4111.41.**10**

<u>PART-B</u>

- 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. b) Mention all of R's limitations and explain how Big R overcomes them. CO-5] [L-4] 10
- 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. 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

B. Tech. – Seventh Semester ADVANCED GAME PROGRAMMING (BCS-DS-729)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

4x5

- 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.
 - e) Discuss in detail how is sepia filter different from luminance filter? [CO-2][L-2]

<u>PART-A</u>

- 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. [CO-5][L-2]**10**
- 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

<u>PART-B</u>

- Q.5a) 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.
- Q.7 Discuss various transformations class in Unity and also explain various Rigid Body class methods in detail. [CO6][L1] **20**

[CO5][L2] **5x4**

End Semester Examination, Dec. 2022 B. Tech. – Seventh Semester 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

<u>PART-A</u>

Q.2			
	b)	Describe the architecture of an expert system.	[CO-1] [L-2] 10 [CO-1] [L-2] 10
Q.3	a) b)	Compare crisp set and fuzzy set with a suitable examples. Calculate different operations on Fuzzy Set: $A = \{(x1, 0.6), (x2, 0.7), (x3, 3)\}$ $B = \{(x1, 0.8), (x2, 0.2), (x3, 1)\}$ 1. Union 2.Intersection 3. Complement 4.Difference	[CO-2] [L-2] 10 [CO-2] [L-3] 10
Q.4	a) b)	Illustrate centre of sum method of defuzzification along with a suital Classify the different fuzzy relation operation. PART-B	ble example. [CO-3] [L-4] 10 [CO-3] [L-2] 10
Q.5	a) b)	Explain the architecture of Neuro-Fuzzy networks in detail. Illustrate Mamdani Fuzzy Inference System with a suitable example.	[CO-3] [L-2] 10 [CO-3] [L-4] 10
Q.6	a) b)	Illustrate unsupervised and reinforcement learning with a suitable ex Explain in detail about artificial neuron model with its activation func	xample. [CO-4] [L-4] 10 ttion. [CO-4] [L-2] 10
Q.7	a) b)	Discuss the main function of crossover operation in GA. Explain the basics concepts of Genetic Algorithm and steps involved	[CO-5] [L-2] 10 in its algorithm. [CO-5] [L-2] 10

B. Tech. – Seventh Semester **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'. b) Discuss the main purpose of expert system. c) Illustrate an example stating the concept of fuzzification. d) Describe fuzzy propositions with an example. e) Define 'fuzzy inference rule'. f) Compare 'fuzzification' and 'defuzzification'. g) List any five applications of ANN. h) Explain the term bias in neural networks. i) Describe fitness function in GA 	[CO-1] [L-2] [CO-2] [L-2] [CO-3] [L-3] [CO-3] [L-2] [CO-2] [L-1] [CO-3] [L-2] [CO-4] [L-2] [CO-4] [L-2] [CO-5] [L-2]
	j) Briefly explain mutation. [CO-5] [L-2] 2×10
	<u>PART-A</u>	
Q.2	a) Describe the knowledge representation and knowledge acquisition.b) Describe the architecture of an expert system.	[CO-1] [L-2] 10 [CO-1] [L-2] 10
Q.3	 a) Compare crisp set and fuzzy set with a suitable examples. b) Calculate different operations on Fuzzy Set: A = {(x1, 0.6), (x2, 0.7), (x3, 3)} B = {(x1, 0.8), (x2, 0.2), (x3, 1)} 	[CO-2] [L-2] 10
	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 example.	a suitable
	b) Classify the different fuzzy relation operation.	[CO-3] [L-4] 10 [CO-3] [L-2] 10
	<u>PART-B</u>	
Q.5	a) Explain the architecture of Neuro-Fuzzy networks in detail.b) Illustrate Mamdani Fuzzy Inference System with a suitable example	[CO-3] [L-2] 10 e. [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.

B. Tech. – Seventh Semester **DATA SCIENCE (BCS-DS-727)**

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) 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] [CO-4][L-2] e) Describe Predictive Modelling. f) Explain the role of matrices in linear algebra. [CO-2][L-2] q) 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] i) Write down the components of optimization problem. [CO-5][L-1] 2x10

<u>PART-A</u>

Q.2	a)	Discuss th	he features	and	applications	of	R	programming	language,	Also
		explain va	irious Data t	ypes i	in R.				[CO-1] [L-2] 10
	b) Create a vector with some of your friend's names:				[CO-1	L][L-3] 10				
		i) Get the	e lenath of a	bove	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-3y+6z=21
 3x+2y-5z=-30
 2x-5y+2z=-6
- Q.4 a) Describe constrained and unconstrained optimization problem. [CO- 3] [L- 2] 10
 b) Apply multivariate optimization technique to find min and max. [CO- 3] [L- 3] 10

Problem: min $x_1 + 2x_2 + 4x_1^2 - x_1x_2 + 2x_2^2$

<u>PART-B</u>

Q.5 a) Calculate the line of regression of *x* and *y* coefficients for the following data values:
 X: 1 2 3 4 5 6 7 8

Y: 7 10 12 14 17 20 24 28

- [CO-4] [L-3] **10**
- b) Describe the Parameters of Confusion Matrix. Also compute the Accuracy, Precision, Recall for the given Matrix. [CO-5] [L-3] **10**

n=165	Predicted: NO	Predicted: YES
Actual: NO	50	10
Actual: 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 DISTRIBUTED OPERATING SYSTEM (BCS-DS-726)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-1] [L-1] [CO-1] [L-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) 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.
 - d) Discuss atomicity meaning in group communication.
 - e) Discuss the concept of clock synchronisation in distributed environment of computation.

<u>PART-A</u>

- Q.2a) Illustrate the various issues related to group communication. Discuss closed
v/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.
 - [CO-3] [L-2] **10**
 - b) Analyze the design issues for real time distributed systems. [CO-3] [L-4] **10**

<u>PART-B</u>

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. A	lso, 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

B. Tech. – Seventh Semester

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.

c) Infrastructure for Network Management.

- i) Explain the difference between public and private cryptography.
- j) Discuss the role of the Pail-Fence technique in cryptography.

2×10

<u>PART-A</u>

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

<u>PART-B</u>

Q.5	a) Distinguish between 'MDS' and 'SHA' algorithm.b) Explain the Authentication system and elaborate on its functions requirements in detail.	[CO4] [L4] 10 and its [CO4] [L2] 10
Q.6	a) Compare SSL and TLS in detail with its procedure.b) Explain different kinds of data compression techniques in detail.	[CO5] [L2] 10 [CO5] [L2] 10
Q.7	Write short notes on <i>(any two):</i> a) Risk Management. b) SNMP.	

570/4

[CO6] [L1] **10×2**

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

[CO-6] [L-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.
 - 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? [CO-5] [L-2]
 - e) Explain the term: Social Media Content Creation Process. [CO-1] [L-1] 4x5

<u>PART-A</u>

- 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] 10b) Define a 'conversion'. How micro and macro conversion can be measured?

[CO-2][L-2] **10**

[CO-3] [L-1] **5x2**

[CO-4] [L-1] 5x2

- 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.

<u>PART-B</u>

Q.5 a) How a mobile customer behavior can be analyzed? Explain with an example. [CO-4] [L-1] **10**

- b) Discuss the following:
 - i) Explain the importance of WAP gateway.
 - ii) Determine the role of GGSN support.
- 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?

[CO-5] [L-1] **10**

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

B. Tech. - Seventh Semester

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.

2x10

<u>PART-A</u>

- 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**

<u>PART-B</u>

- 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.6a) Discuss about various deformer elements. Analyze different types of
animation techniques.[CO-5] [L-1] 10
 - 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

[CO-4]

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

[CO1][L2]

[CO 4] [L2]

[CO 3] [L2]

[CO 2] [L2] **21/2 x 8**

- 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.
 - 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] [CO 3] [L2]
 - e) Discuss the use of gluOrtho2D with complete syntax in OpenGL.
 - f) Discuss the use of Depth Buffer in detail with example.
 - q) Discuss the use of control points in curve drawing.
 - 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) P1(70, 20) and P2(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**

- a) Explain the two basic projection methods with the help of suitable diagram Q.4 and matrix-representation. [CO1] [L3] **10**
 - b) Discuss Cohen Sutherland Line clipping Algorithm in detail with suitable example.

[CO 3] [L3] **10**

PART-B

- a) Discuss the characteristics of Bezier curve and also state the differences Q.5 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), P1 (8,8), P2 (16,4) 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**
 - 575/4

- 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**
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.

2x10

<u>PART-A</u>

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

<u>PART-B</u>

- 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. [CO-3] [L-3] 10
 - 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] **10**

- b) Explain volume rendering. Discuss volumetric data and all grid types in it. Also express indirect volume rendering algorithm. [CO-4] [L-1] **10**
- 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. [CO-6] [L-1] **10**

B. Tech. – Seventh Semester SECURITY IN CLOUD (BCS-DS-701)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO6] [L4]

[CO1] [L1]

[CO5] [L2]

[CO3] [L1]

[CO5] [L1]

[CO4] [L2]

[CO5] [L2]

[CO5] [L 4]

[CO1] [L1]

[CO3] [L2] **2x10**

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.
 - b) What do you mean by System Threats?
 - c) Who uses SSL? Explain in brief.
 - d) List out the authorization requirements.
 - e) Define 'Non Repudiation'.
 - f) Discuss the responsibility of application layer to secure user data.
 - g) Discuss Security Risks with an example.
 - h) Differentiate between PGP and X.509.
 - i) Define 'Trojan Horse'.
 - j) Describe Virtualization.

<u>PART-A</u>

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

<u>PART-B</u>

Q.5 a) Discuss how Public key signature provides authentication and Data integrity.

b) Discuss IAM tools and IAM transformation in detail. [CO4][L2] **5**

Q.6 a) How is digital Signature different from digital certificate? Give any four reasons.

b) *Define 'Cryptography'. How does cryptography work in detail?* [CO5][L4] **10** [CO5][L1] **10**

Q.7 a) Explain Secure Socket Layer Crypto Algorithm with its working and security technology.

b) Write a short note on 'Message Digest'.

[CO6][L2] **15** [CO6][L1] **5**

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? **2×10**

<u>PART-A</u>

Q.2	a) Differentiate between linear and nonlinear spatial filters.	[CO-1] [L-6] 10
	b) Explain the components of IP systems.	[CO-1] [L-2] 10

- 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).

 $X1[m, n] = \begin{bmatrix} 1 & 5 \\ 2 & 4 \end{bmatrix}, X2[m, n] = \begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix}$ [CO-2] [L-2] **10**

- Q.4 a) Draw the block diagram for image restoration and also discuss its need in brief.
 - b) Explain edge detection techniques using first order derivatives. [CO-3] [L-5] **10**

<u>PART-B</u>

- 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.
- Q.6 a) Explain the concept of LZW compression and decompression techniques

[CO-5] [L-2] **10**

[CO-4] [L-2,4] **5×4**

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.

[CO-6] [L-6] **2½×4**

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

4×5

- 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) 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.

<u>PART-A</u>

Q.2	a) Draw information security framework and discuss why it is required.b) Explain BISA and discuss the use of scorecards in BISA.	[CO-1] [L-2] 10 [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 update anti-virus software or program" in detail. b) Explain the implementation process of PCI-DSS standard in detail. 	regulatory [CO-3] [L-1] 10 [CO-3] [L-2] 10
	<u>PART-B</u>	
Q.5	a) Describe UASL agreement in security in telecom sector.b) Describe IT Act of India and advantages of cyber law.	[CO—4] [L-2] 10 [CO-4] [L-2] 10
Q.6	Explain business skills, communication skills and interpersonal skills for Discuss each in detail with the help of example.	r auditors. [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 B. Tech. – Sixth Semester BA AS SERVICE (CLOUD) (BCS-DS-627)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

2×10

- 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. [CO-2] [L-4] **10**
- Q.4a) Classify cloud deployment models. Explain them briefly.[CO-3] [L-4] 10b) Explain the major components of cloud.[CO-5] [L-2] 10

<u>PART-B</u>

- 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. [CO-4] [L-5] 8
- 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. [CO-6] [L-2] **10**

B. Tech. – Sixth Semester MANAGING THE CLOUD (BCS-DS-626)

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 all the questions:
 - a) Define 'ARIMA'. [CO-1] [L-1] [CO-1] [L-4] b) Differentiate between cloud users and cloud operators. 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. [CO-2] [L-2] 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] 2×10

<u>PART-A</u>

Q.2	a) Difference between polling agent and monitoring agent.b) Discuss smart metering with its architecture and use cases.	[CO-1] [L-4] 10 [CO-1] [L-2] 10
Q.3	a) Discuss the role of system administration.b) Discuss the reasons that slow down the computer.	[CO-2] [L-2] 10 [CO-2] [L-2] 10
0.4	a) Discuss the five percets of design that need to be conside	rad for comiles

- 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**

<u>PART-B</u>

- Q.5a) 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] 10
 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

- a) State the security and privacy issues in public cloud.b) State the security practices for private cloud. Q.7

[CO-6]	[L-2]	10
[CO-6]	[L-2]	10

End Semester Examination, Dec. 2022 B. Tech. – Sixth Semester 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: $Z \rightarrow d$, $Y \rightarrow \epsilon$, $X \rightarrow Y$, $Z \rightarrow X Y Z$, $Y \rightarrow c$, $X \rightarrow a$.
 - h) List the issues to be considered during code generation.
 - i) What is left factoring? Give example.
 - j) Explain synthesized and inherited attributes.

<u>PART-A</u>

a) What are elementary data types? Discuss in details about the specification Q.2 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. [CO-2] [L-1] **10** 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: $E \rightarrow E + T/T$ $T \rightarrow T F/F$ F->(E)/id [CO-3] [L-6] **10** b) Calculate operator precedence relation for the grammar: $E \rightarrow E + E/E - E/E^*E/(E)/-E/id$ and apply it to parse the string [CO-3] [L-3] 10 w = id + id * id Using grammarPART-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.

587/4

2×10

(4*7 +1)* 2.

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: $a = b^{*}-c + b^{*}-c''$ [CO-5] [L-3] **5**

B. Tech. – Sixth Semester

ADVANCED DATABASE MANAGEMENT SYSTEMS (BCS-DS-622A)

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) 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.

2×10

<u>PART-A</u>

- Q.2 a) Draw symbols for following in ER diagram:
 - i) Weak entity.
 - ii) Derived attribute.
 - iii) Relationship.
 - iv) Multivalued attribute.
 - 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. [CO-4] [L-2] 20
- Q.4 a) Discuss about various types of failures. What steps should be taken for failure recovery? [CO-3] [L- 2] **10**
 - b) Explain various locking mechanisms used during concurrency control.

[CO-3] [L-2] **10**

[CO-2] [L-1] **5**

<u>PART-B</u>

- 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. [CO-3] [L-4] **10×2**
- Q.7 Explain deductive database systems and deductive object oriented database systems.

[CO-5] [L-2] **20**

B. Tech. – Fourth Semester

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.

- Explain your answer: Q.1
 - Explain the important components of unity 3D. a)
 - Recall the four pillars of an object oriented language. b)
 - Explain how to create unity game objects? c)
 - Argue on your understanding of shadows in Unity. d)
 - e) Can two game objects, each with only an sphere collider, both set as trigger and raise on trigger events? 4×5

PART-A

Q.2	a) b)	What are various kind of memory in the java heap segment? How does garbage collection works? [CO-1] [L-4] 10 Discuss diamond inheritance problem. How does C++ handle this problem?
	- /	[CO-4] [L-3] 10
Q.3	a) b)	Explain the important components of unity 3D.[CO-2 [L-2] 10Identify key characteristics of victory conditions. Name at least five conditionsfor victory that games use.for victory that games use.[CO-3][L-1] 10
Q.4	a)	What are the key principles used for game design and development?
	b)	[CO-2][L-3] 10 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
		<u>PART-B</u>

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 why time 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**
- a) What is the significance to timelines with respect to Animation? Discuss in Q.7 detail.
 - [CO-3][L-2] 10 b) Write a short note on Animation state machine. [CO-2] [L-3] 10

B. Tech. – Sixth Semester COMPUTER ANIMATION ALGORITHM AND TECHNIQUES (BCS-DS-606)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

[CO-1] [L-1]

[CO-1] [L-2] [CO-2] [L-1]

[CO-3] [L-1] [CO-4] [L-1]

[CO-4] [L-2]

[CO-4] [L-1]

[CO-5] [L-1] [CO-5] [L-1]

[CO-6] [L-2]

2×10

- 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.
 - b) Give two differences between flicker and blur?
 - c) Who invented the first GUI and also name the program invented?
 - d) Name two applications of visualization.
 - e) Name two action units associated with orbicular is or is.
 - 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?

<u>PART-A</u>

- 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

<u>PART-B</u>

- 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. [CO-5] [L-4] **10**
 - b) Justify why hair animation is difficult. Summarize the steps used to perform hair animation. [CO-5] [L-5] **10**

Q.7 a) Differentiate between polygonal and patch representations for representing virtual humans. Illustrate different types of coverings that humans have on their person.

b) Explain deformable bodies along with different types of techniques of deformations.

[[]CO-6] [L-4] **10**

[[]CO-6] [L-2] **10**

B. Tech. – Third / Sixth Semester 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? b) Discuss two applications of M2M communication. c) Discuss two applications of IoT. d) Differentiate between 'industry' and 'consumer'. e) Mention two specifications of Zigbee. f) What is Botnet? g) Explain the generic block diagram of an IoT device. h) Define types of IoT platforms. i) Differentiate between 'edge' and 'fog computing'. j) Explain the reasons to select MQTT over CoAP. 	[CO-1] [L-1] [CO-2] [L-2] [CO-2] [L-2] [CO-1] [L-4] [CO-2] [L-2] [CO-5] [L-1] [CO-1] [L-1] [CO-4] [L-1] [CO-5] [L-4] [CO-4] [L-2] 2×10
	<u>PART-A</u>	
Q.2	a) Sketch the schematics of MQTT, CoAP.b) Explain in detail the various connectivity technologies of IoT.	[CO-2] [L-3] 10 [CO-3] [L-3] 10
Q.3	a) List down the various points of difference between machine communication and internet of things.b) Describe in detail the various components of a sensor node.	to machine [CO-1] [L-2] 10 [CO-3] [L-2] 10
Q.4	a) Discuss various IoT enabling technologies.b) Elaborate the architecture of a wireless sensor node and its role in	[CO-2] [L-2] 10 n IoT.
	<u>PART-B</u>	[CO-2] [L-3] 10
Q.5	a) Draw architecture of Fog computing including its requir architecture.	ement and
	b) Explain Hardware components in IoT application development.	[CO-4] [L-4] 10 [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 B. Tech. — Sixth Semester 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.	
	J) Explain the reasons to select MQTT over COAP.	[CO4][L2] 2×10
	<u>PART-A</u>	
Q.2	a) Sketch the schematics of MQTT, CoAP.	[CO2][L3] 10
-	b) Explain in detail the various connectivity technologies of IoT.	[CO3][L3] 10
0.2	a) List down the various points of difference between machine to	, maa ahin a
Q.3	a) List down the various points of difference between machine to	
	b) Describe in detail the various components of a sensor node	
	b) Describe in detail the valious components of a sensor hode.	
0.4	a) Discuss various IoT enabling technologies.	[CO2][L2] 10
C	b) Elaborate the architecture of a wireless sensor node and its role in I	оТ.[CO2][L3] 10
	<u>PART-B</u>	

Q.5	a) Draw architecture of Fog computing including its requirem architecture.	ent and
	b) Explain hardware components in IoT application development.	[CO4][L4] 10 [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 tra	icking for

B. Tech. – Sixth Semester

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.

- Answer the following: Q.1
 - 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

- a) A patient takes a lab test and the result comes back positive. It is known that Q.2 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?
 - [CO-2] [L-3] **10** [CO-2] [L-2] **10** b) Discuss various types of measurement with the help of example.
- a) What is Machine Learning? Explain different perspectives and issues in Q.3 machine learning. [CO-1] [L-1] **10**

b) Explain feature selection and feature extraction method for dimensionality reduction.

[CO-1] [L-2] **10**

a) Discuss the random forest model in detail. What are the features of random Q.4 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

2x10

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**

<u>PART-B</u>

- Q.5 a) Find the three clusters for the following eight examples using the k-means algorithm and Euclidean distance A1=(2,10), A2=(2,5), A3=(8,4), A4=(5,8), A5=(7,5), A6=(6,4), A7=(1,2), A8=(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.

[CO-6] [L-1] **5x2**

End Semester Examination, Dec. 2022 B. Tech. – Sixth Semester MACHINE LEARNING (BCS-DS-602)

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

2×10

- 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.

<u>PART-A</u>

- 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	15	Less than 50	106
Less than 20	35	Less than 60	120
Less than 30	60	Less than 70	125
Less than 40	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. [CO-3] [L-4] **8**
- 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. [CO-3] [L-3] **5**

b) Calculate probability of car theft (red, SUV, domestic) using naïve Bayes classifier.

Example No.	Color	Type	Origin	Stolen?
1	Red	Sports	Domestic	Yes
2	Red	Sports	Domestic	No
3	Red	Sports	Domestic	Yes
4	Yellow	Sports	Domestic	No
5	Yellow	Sports	Imported	Yes
6	Yellow	SUV	Imported	No
7	Yellow	SUV	Imported	Yes
8	Yellow	SUV	Domestic	No
9	Red	SUV	Imported	No
10	Red	Sports	Imported	Yes

[CO-3] [L-4] **15**

<u>PART-B</u>

- Q.5 a) Calculate the dissimilarity between two data points x1(2,3,4) and x2(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.

<u>PART-A</u>

2×10

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. **10**
- Q.4a) Discuss the importance of disaster recovery.10b) Illustrate the terminologies of networking and communication.10

<u>PART-B</u>

Q.5	a) Illustrate the terminologies of availability.b) Compare the business continuity and disaster recovery.	10 10
Q.6	a) Describe the remote replication in various operations.b) Construct the disaster recover tree.	10 10
Q.7	 a) Describe the local replica in various operations. b) Differentiate between 'consolidation' and 'cascade topology'. 	10 10

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.
 2×10

<u>PART-A</u>

- 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

<u>PART-B</u>

- 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? [CO-5] [L-1] **10**
 - b) List the solutions for secure mobile communication and data management. Also discuss IPSec framework. [CO-5] [L-2] **10**

600/4

[CO-4] [L-6] **10×2**

- 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. [CO-6] [L-2] **10**

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. [CO-2] [L-1]
 - c) Discuss GPU in brief. [CO-4] [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**

<u>PART-A</u>

- 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 form-controls in HTML. Write the complete code for the above form. [CO-2][L-4] 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**

<u>PART-B</u>

- 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.

[CO-4] [L-1] **10**

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?

2x10

<u>PART-A</u>

- 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**

<u>PART-B</u>

- 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?

[CO-4] [L-2] **10**

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**

B. Tech. – Fifth Semester

BUSINESS STRATEGY AND ANALYTICS (BCS-DS-528)

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 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.

<u>PART-A</u>

Q.2 a) Explain the strategic management framework with the help of a diagram.

[CO1][L2] **10**

2x10

- b) Design a SWOT matrix by taking a suitable business example and discuss it thoroughly. [CO1][L5] **10**
- Q.3a) Determine the need of cross functional collaboration planning.[CO2][L2] 8b) 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**

<u>PART-B</u>

- 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. [CO6][L2] **10**

606/4

B. Tech. - Fifth Semester

CLOUD COMPUTING ARCHITECTURE AND DEPLOYMENT MODEL (BCS-DS-527)

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

[CO-2] [L-1]

[CO-2] [L-4]

[CO-1] [L-1]

[CO-1] [L-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.

b) Explain the following scenario:

- 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. [CO-2] [L-2]
- g) Differentiate between the Windows OS and Linux OS. Can an openstack be installed on Windows OS? [CO-4] [L-4]
- h) Name any two virtual machine monitor platforms.
- i) Discuss the role of CMDB (Configuration Management Database) in anatomy of Cloud. [CO-1] [L-2]
- j) Discuss Multi-tenancy in terms of cloud computing environment.

2×10

<u>PART-A</u>

- Q.2 a) Discuss the scenario, If an organization is planning to transform their infrastructure to cloud through three stages of evolution. [CO-1] [L-2] 10
 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] 10
 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.

	-	-			-					
[C)().	-3]	[L	-4]	1	0	
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[CO-3] [L-2] **10**



<u>PART-B</u>

Q.5	a) Compare the advantages and disadvantages of public cloud and private cloud.				
	b) Discuss the role of SLA between cloud provider and cloud consumer.	[CO-5] [L-4] 14 [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.b) Differentiate between openstack and devstack in terms implementation.	[CO-4] [L-2] 14 of cloud			
		[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

<u>PART-A</u>

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.

[CO2][L2] **5**

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:

a) Cloud Consumer SLA1 Cloud Provider SLA2 Cloud Carrier SLA between cloud consumer and cloud provider SLA between cloud provider and cloud carrier b) Cloud Consumer Cloud Broker Cloud Provider 1 Cloud Provider 2 10

<u>PART-B</u>

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	l number of
		complex classes?	[CO-2] [L-2]
	g)	How is the use case model useful in every phase of software deve	elopment?
			[CO-3,4] [L-1]
	h)	Differentiate between coupling with cohesion.	[CO-2] [L-2]
	i)	How relationships are created in rational rose?	[CO-1,3] [L-2]
	j)	Define aggregation and generalization.	[CO-2] [L-1] 2×10

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

<u>PART-B</u>

b) Explain in detail logical and component view.

Q.5	a) Draw sequence diagram and corresponding collaboratio	Draw sequence diagram and corresponding collaboration diagram for student				
-	registration system.	[CO-4] [L-2] 10				
	b) Explain different types of interaction diagrams with exam	nple. [CO-4] [L-2] 10				
Q.6	a) Elaborate on the consistency checking in "Model refinem	ient". [CO-5] [L-2] 10				

613/4

[CO-5] [L-2] **10**

- 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.

[CO-2] [L-2] **10**

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester 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 2D 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 x 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**

<u>PART-A</u>

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 10units.

[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).

[CO1] [L3] **10**

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 ABCD A(0,0) , B(0,4) C(4,4) and D(4,0). Find the co-ordinates of the square after rotating it by 45degree 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**

<u>PART-B</u>

Q.5	a) Given a 3D triangle with points (0, 0, 0), (1, 1, 2) and (1, 1, 3). A parameter 2 on X axis, 2 on Y axis and 3 on Z axis and find out	Apply shear ut the new
	coordinates of the object.	[CO4] [L2] 10
	b) Explain 3d transformation matrix representation.	[CO4] [L2] 10
Q.6	 a) Explain Bezier curve algorithm with its properties. b) Discuss B-Spline curves with a suitable example. [CO5] [L2] 10 	[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.



24%

36%

• L1 • L2 • L3 • L4 • L5

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	con	npulse	ory . Atter	npt an	y TWO
	questions	s from	PART-A	and	Τ₩Ο	ques	tions	from	PART-B.	Each (question
	carries eq	qual ma	arks.								

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'.	[CO-4] [L-4]
	d) Define the security assessment.	[CO-3] [L-2]
	e) Discuss the operating system hardening.	[CO-4] [L-2]
	f) Define the physical security audit.	[CO-3] [L-2]
	g) Define the stages of fire.	[CO-3] [L-2]
	i) Define \\ulberterning	
	i) Explain the CCTV biometrics characteristics access control	
	j) Explain the CCTV biometrics characteristics access control.	
	<u>PART-A</u>	
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
0.4	a) Explain the characteristics of exterior physical security.	[CO-3] [L-2] 10
L	b) Discuss the techniques of fire suppression in detail.	[CO-3] [L-2] 10
	<u>PART-B</u>	
0.5	a) Discuss the levels of physical security.	[CO-4] [I -2] 10
۹.5	b) Discuss the various mechanisms of light.	[CO-4] [L-2] 10
	,	
Q.6	Explain the following:	
	a) Access control roasters.	
	b) Various Alarm Systems.	[CO-5] [L-2] 10×2
0.7	a) Discuss the hazard assessment and also its common structure.	[CO-6] [I -2] 10
- L	b) Explain the fire safety inspection.	[CO-6] [L-2] 10
	· · ·	·

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**. Marks are indicated against each question.

Q.1 Answer the following in briefly:

		2x10
j)	List the number and function of guards.	[CO-6] [L-2]
i)	Define "Cyber Security".	[CO-1] [L-2]
h)	Give an insight into "UI-Rated Combination Locks".	[CO-4] [L-2]
g)	Explain sprinkler system inspection phase.	[CO-6] [L-1]
f)	Interpret the statement "Duress Code".	[CO-5] [L-3]
e)	What are top ten security threats?	[CO-3] [L-2]
d)	Identify the nine points of security concern.	[CO-3] [L-2]
c)	Give the working of Bullet-Resistant Glazing for a secure workplace.	[CO-2] [L-2]
b)	Appraise with "Vandals Who Damage for Fun".	[CO-1] [L-2]
a)	What is Risk Assessment?	[CO-2] [L-1]

<u>PART-A</u>

Q.2	a) Give an a	[CO1] [L4] 10	
	b)	Analyze the statement "Crime Prevention through enviror	nmental

design".

[CO1] [L4] **10**

Q.3 a) Explain risk management and the vulnerability assessment. [CO2] [L2] 10
 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

<u>PART-B</u>

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.

[CO4] [L2] **10**

Q.6	a)	Give an insight into card/badge specifications, sign/countersign word.	and code
	b)	Explain the security controls of packages. What are security plannin standards?	[CO5] [L2] 10 g of fence [CO5][L2] 10
Q.7	a) b)	Explain all the phases of fire safety inspection. Write a short note on: 'Hazard Assessment'.	[CO6] [L2] 10 [CO6] [L2] 10

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester 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**

4x5

 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**

<u>PART-B</u>

- Q.5 a) What are the various risks that may be faced during business Intelligence? Also discuss various risk mitigation techniques. [CO-4] [L-2] 10
 b) With a neat diagram explain database design activities. [CO-4] [L-2] 10
- 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**

B. Tech. – Third / Fifth Semester 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.

<u>PART-A</u>

- Q.2 a) What are the various problem characteristics which are used to identify the type of
 - production system to be deployed for solving an AI problem?
 - b) Explain the program structure of Prolog.
- 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.



[CO-2] [L-3] **20**

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

<u>PART-B</u>

Q.5 a) Consider an incandescent bulb manufacturing unit. Here machines M1, M2 and M3

make 30%, 40% and 30% of the total bulbs. Of their output, let's assume

623/4

2×10

[CO-2] [L-2] 10

[CO-1] [L-1] **10**

that 2%, 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. [CO-6][L-2] **10** 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 AI techniques with suitable examples [CO-1] [L-2] **10**
 - 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

<u>PART-B</u>

- Q.5 a) Examine the applicability of Baye's theorem in handling Uncertain Information. Given that P(A)=0.2, P(B)=0.4, P(B|A)=0.5. Find P(A|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] 1b) Differentiate between Monotonic and Non-Monotonic Reasoning systems.

[CO-5][L-2] 10

625/4

2x10

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

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.

Answer the following in brief: Q.1

 a) Difference between uninformed and informed searches. b) Explain the limitations of monotonic system. c) Discuss the Turing test of artificial intelligence. 	[CO-2] [L-2] [CO-4] [L-2] [CO-1] [L-2]
 d) Differentiate between is-a and instance relationship. 	[CO-3] [L-2]
e) Explain the importance of heuristics.	[CO-2] [L-2]
f) Compare human expert and an expert system.	[CO-6] [L-3]
g) Given that P(A)=0.5, P(B)=0.45, P(B A)=0.55. Find P(A B).	[CO-4] [L-3]
 b) Briefly discuss the concept of an intelligent agent. 	[CO-5] [L-2]
i) List various applications of AI?	[CO-6] [L-2]
j) List the four categories of production systems.	[CO-4] [L-2] 2×10

PART-A

a) Design the solution of the eight-puzzle problem using DFS and BFS. Which Q.2 one is better and why?



[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 [CO-1][L-2] 4
- c) Discuss the characteristics of a good control strategy.
- 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.



627/4

- 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.
 [CO-3][L-3] 10
- 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**

<u>PART-B</u>

- Q.5a) 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. [CO-4][L-3] 8
 - 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 ▲ is for max move and ▼ is for min move.



b) Explain the key components of a robot. Discuss how information is processed by a robot? [L-4][CO-2] **5**

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 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 {a. b}all strings containing at most 2a's. [CO3 L4]
 - d) If G is the grammar S \rightarrow *SbS*/*a*, show that G is ambiguous. [CO3 L3]
 - e) Convert the grammar S→aSb/ A, A →bSa /S /Ato a pda that accepts the same language by empty stack. [CO4 L3] **5x4**

<u>PART A</u>

- Q.2 a) Let L be the set of all palindromes over {a. 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	
	a = 0		a = 1	
	state	output	state	output
$\rightarrow q_1$	<i>q</i> 1	1	<i>q</i> ₂	0
<i>Q</i> ₂	q_4	1	q_4	1
<i>q</i> ₃	<i>q</i> ₂	1	q_3	1
<i>q</i> 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+aa)*b)*a(b+aa)*a instead of (a+a(b+aa)*b)*b)*arb+aa)*a [CO-3, L5] **10**



b) Give the statement for pumping lemma of regular expression. Also, show that $\mathcal{L} = \{O^i \mid i > 1\}$ is not regular. [CO-3, L5] **10**

<u>PART-B</u>

- Q.5 a) Reduce the grammars to Greibach normal form: [CO-4, L4] **10** $S \rightarrow 0S0|1S1|A, A \rightarrow 2B3, B \rightarrow 2B3|3$ b) Design a PDA for L= aⁿbⁿ⁺³| n>0. [CO-4, L4] **10**
- Q.6 a) Design a Turing machine for language $L = wcw^T | w = \{a,b\}^*$. [CO-5, L3] **10** b) Design a Turing Machine for language $\{ L = a^n b^{2n} | n>0 \}$ [CO-5, L3] **10**

Q.7 a) State PCP does the PCP with X =(b^3 , ab^2) and Y =(b^3 , bab^3) have a solution? [CO-6, L4] **10**

b) Show that if language L1 and L2 both are recursive then their intersection L1∩L2 is also recursive. [CO-6, L3] 10

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 $\Sigma = \{ 0,1 \}$ 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 --->a |abSb |aAb, A \rightarrow bS |aAAb 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. $S \rightarrow aSb|ab$

2×10

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= $\{a^{j}b^{n}c^{n} | n \ge 1, j \ge 0\}$. [CO- 1] [L-6] **6**
 - c) Find the language generated by the following grammar: S->0A|0S|0|1 A-> 1A|1S|1 [CO- 1] [L-5] 6
- Q.3 a) Construct minimum state automaton equivalent to given finite automata:

<u>State</u>	<u>I/p=</u> <i>a</i>	<u>I/p=</u> 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:

<u>Present</u>	a = 0		a = 1	
<u>State</u>	Next	o/p	Next	o/p
	State		State	
$\rightarrow q_1$	q_{1}	1	q_{2}	0
q_{2}	q_4	1	q_4	1
q_3	q_2	1	q_3	1
q_4	q_3	0	q_{1}	1

[CO-2] [L-

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)

61 **6**

b) Find the regular expression corresponding to the given automata:



[CO-3] [L-5] **8**

[CO-3] [L-6] 8

c) Show that the set $L = \{a^p \mid p \text{ is a prime}\}\$ is not regular. [CO-3] [L-2] **4**

PART-B

- a) Construct the PDA accepting the language L= $\{a^{2n} b^n | n \ge 1\}$ accepted by Q.5 [CO-4] [L-6] **8** final state.
 - b) Convert the following grammar into an equivalent one with no unit productions and no useless symbols: S→ABA A→aAA|aBC|bB $B \rightarrow A|bB|Cb$ C→CC|Cc
 - c) Convert the following grammar into CNF: $S \rightarrow ABC \mid BaB$

[CO-4][L-5] **6**

 $A \rightarrow aA|BaC|aaa$ $B \rightarrow bBb|a$ [CO-4] [L-5] **6**

- Q.6 a) Design a Turing machine for the language $L(G) = \{X^n Y^n, where n > 1\}$. Also, show the processing of string x^3y^3 . [CO- 5] [L-5] **14**
 - b) Define 'Turing machine' with its tuples. Also, explain the variations of Turing machine. [CO-5] [L-1] **6**
- Q.7 a) State and prove halting problem of Turing machine. [CO-6] [L-1] 8
 b) Does the PCP with two lists X=(b,bab³,ba) and Y = (b³,ba,b) has a solution? [CO-6] [L-1] 4
 - c) Explain the properties of recursive and recursive enumerable language. [CO6][L-1] **8**

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. [CO6][L3]
 - c) Compare branch and bound with backtracking and explain how it is efficient.
 - [CO4][L2]

[CO6][L4]

d) Explain with pseudo-code how you will solve the MST problem using Prim's approach.



[CO1][L5]

e) Summarize the concept of P and NP hard-Problems to justify the difference.

[CO2][L1] **5x4**

PART-A

a) Solve the following recurrence relation using recursion tree and find the Q.2 complexity. Also, cross-verify the obtained value with help of Master Theorem method: T(n)=2T(n/2)+2n

[CO1][L2] **10**

- b) Write down the algorithm for insertion sort and compare it's time and space complexity with other sorting algorithms in detail. [CO6][L1] **10**
- 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
Ъ	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?

3] **10**

[CO-2] [L-

- b) Explain the matrix-chain multiplication algorithm and find an optimal parenthesization for the sequence of dimensions is <5, 10, 3, 12, 5, 50, 6 >. [CO4][L6] **10**
- Q.4 a) Evaluate the given data for 0/1 Knapsack problem using branch and bound method: W=10, P = {40,50, 100,95,30}, 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 M=30, W={5,10,12,13,15,18}. [CO2][L3] 10

<u>PART-B</u>

- 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:



[CO-2] [L-

3] **10**

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. [CO4][L6] 12
- 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.

[CO-6] [L-1] **10** b) Write the Class of problems beyond NP – P SPACE and justify it with the help of an example. [CO-6] [L-6] **10**

End Semester Examination, Dec. 2022 B. Tech. – Fourth Semester 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.

2x10

<u>PART-A</u>

Q.2	a) Explain the blockchain architecture and the working of blockcha	ain with the
	layered diagram. b) Discuss proof-of-work. Suggest alternate consensus mechanisms.	[CO-1] [L-2] 10 [CO-2] [L-3] 10
Q.3	a) Explain different types of smart contracts? Create smart contract using	for e-voting
	solidity. b) What is double spending problem? How it can be prevented?	[CO-3] [L-3] 10 [CO-4] [L-1] 10
Q.4	a) Explain PBFT protocol with the help of neat diagram. What is its can't be use	use? Why it d in place of PoW?
	b) Discuss any two of the following terms:i) Solidity-smart contracts.ii) Web3	
	iii) Ethereum virtual machine.	[CO-2] [L-2] 5×2
	<u>PART-B</u>	
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 namew	[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.

[CO-4] [L-2] **10×2**

B. Tech. – Fourth Semester **PYTHON – I (BCS-DS-427A)**

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) 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.	[CO-3] [L-3]
d) What are local and global variables in python?	[CO-1] [L-2]
e) How to reshape arrays and what does it mean?	[CO-4] [L-2]
f) What is the purpose of 'r' as prefix in the given statement?	
f = open(r, "d: color flower.txt")	[CO-5] [L-2]
g) What is an abstract class in Python?	[CO-2] [L-2]
h) Explain pickling and how import pickle works.	[CO-5] [L-3]
i) What are the uses of file object?	[CO-4] [L-2]
j) Discuss why Python is called as dynamic and strongly typed language	5.
[CC	D-5] [L-3] 2×10

<u>PART-A</u>

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 A
- >= 0.8 B
- >= 0.7 C

>= 0.6 D < 0.6 F

[CO-1] [L-4] **10**

[CO-1] [L-3] **10**

b) How the decision controls are to be used during programming using Python? How

many conditions can be specified in an IF block?

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**

639/4

Q.4 a) Write a function which receives a variable number of strings as arguments. Find [CO-3] [L-3] **10**

unique characters in each string.

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 strina

and prints the letters in decreasing order of frequency. Use dictionaries.

[CO-4] [L-3] **10**

a) Consider a file called "workfile". Write python program to read and print each Q.6 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**

- a) Program to demonstrate the overriding of the base class method in the Q.7 derived class.
 - [CO-2] [L-3] **10** b) Write python program to demonstrate multiple inheritance. [CO-2] [L-3] **10**

End Semester Examination, Dec. 2022 B. Tech. – Third Semester 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

<u>PART-A</u>

Q.2	a) Discuss the ways in which phishing attack can be done. Sugnitigation of such attacks.b) Analyze features of any 4 types of Malware	ggest the [CO1] [L2] 10 [CO1] [L2] 10
Q.3	a) Explain the threats to networked devices.b) Differentiate between Active and Passive capturing.	[CO2] [L1] 10 [CO2] [L2] 10
Q.4	a) Assess the hardware based mechanism for protecting data.b) Review the social engineering attacks and its prevention.	[CO3] [L2] 10 [CO3] [L2] 10
	<u>PART-B</u>	
Q.5	a) Compare the Data Erasure and Data Masking.b) Examine the various types of SQL injection	[CO4] [L2] 10 [CO4] [L2] 10
Q.6	a) Write the steps for penetration testing.b) Examine the various types of database security.	[CO5] [L2] 10 [CO5] [L2] 10
Q.7	a) Describe the process of data Backups.b) Discuss the importance of rainbow table, how it is useful in gracking.	[CO6] [L2] 10 password
	Cracking.	[CO6] [L2] 10

B. Tech. – Fourth Semester COMPUTER NETWORKS (BCS-DS-405)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

2×10

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.

<u>PART-A</u>

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.	[CO-2] [L-2] 10 [CO-2] [L-4] 10
Q.4	a) Mention and explain the four SONET layers.b) What is the relationship between TPs. VPs and VCs?c) Why no sequence numbers are there in frame relax'?	[CO-3] [L-2] 10 [CO-3] [L-] 10 [CO-3] [L-] 10
	<u>PART-B</u>	
Q.5	a) What is the purpose of RIP? What are the functions of a RIP message?	
	b) What is the difference between connection- <i>less</i> and connection services? Which type of service is provided by IPv4 and IPv6?	[CO-4] [L-] 10 n-oriented [CO-4] [L-] 10
Q.6	 a) Write short notes on: i) SMTP ii) Voice over IP (VoIP) 	
	iii) DNSb) Why do we need POP3 or IMAP4 for electronic mail?	[CO-5] [L-] 15 [CO-5] [L-] 5
Q.7	a) What is V-LAN? Explain its architecture.b) Write in brief about IPSec.	[CO-6] [L-] 10 [CO-6] [L-] 10

B. Tech. – Fourth Semester **COMPUTER NETWORKS (BCS-DS-405)**

Time: 3 hrs.

Max Marks: 100 No. of pages: 1

2×10

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

- Distinguish between TCP/IP and OSI reference model. Which model is more Q.2 popular and why? [CO-1] [L-3] **20**
- Q.3 What do you mean by switching? Explain circuit switching and packet switching techniques with suitable diagram [CO-2] [L-4] **20**
- Explain the stop and wait protocol. A channel has a bit rate 4 kbps and a Q.4 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**
- What are the three frame types supported by HDLC, describe each? Draw and Q.6 explain control field associated with each type of frame. [CO-3] [L-5] **20**
- Draw a 7 bit hamming code structure. If the hamming code word received by a Q.7 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 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?

<u>PART-A</u>

Q.2 a) Discuss 3-tier architecture with a labeled diagram. Also explain data independence.

[CO-1] [L-2] **10**

2x10

- b) Compare network, hierarchical and relational model on the basis of storage and redundancy. [CO-2] [L-4] **10**
- 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) Lict the names of customers who have ordered items
 - 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 B+ trees. [CO-3] [L-3] 10

<u>PART-B</u>

- Q.5a) 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? [CO-3] [L-2] **10** 644/4

b) Discuss the authorization and authentication access control. [CO-3] [L-1] **10**

- Q.7 a) What are object relational databases? How object oriented databases are different than object relational databases? [CO-6] [L-2] **10** [CO-6] [L-1] **10**
 - b) Explain the various steps involved in Data Mining.

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:
 - 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.
 - d) Explain the term domain with example.
 - 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]

 $\sigma_{dept_name="CSE"}(\sigma_{year=2009}(instructor \bowtie teaches))$

4×5

[CO1 L1]

[CO2 L1]

<u>PART-A</u>

- 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

<u>PART-B</u>

- 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. [CO3L2] **20**
- Q.7 Write short notes on:
 - a) Data mining and its applications.
 - b) Object oriented and object relational databases.

[CO6 L1] **10×2**

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:
 - 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]

 $\sigma_{dept_name="CSE"}(\sigma_{year=2009}(instructor \bowtie teaches))$

4×5

<u>PART-A</u>

- 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
- Design a detailed E-R diagram for student management system assuming the Q.3 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 gueries 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**

<u>PART-B</u>

- a) Explain 2-phase locking protocol. What benefits do strict two-phase locking Q.5 protocol provides? Discuss its disadvantages. [CO3 L2] **10**
 - b) Define "Deadlock". Mention the mechanism for deadlock detection and [CO3 L1] **10** recovery.
- Q.6 Summarize authentication, authorization and access control mechanisms for database security. [CO3L2] **20**
- Q.7 Write short notes on:
 - a) Data mining and its applications.
 - b) Object oriented and object relational databases.

[CO6 L1] **10×2**

B. Tech. – Fourth Semester

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**. 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?

<u>PART-A</u>

Q.2 a) Explain DBMS architecture in detail along with different level mappings.

[CO-1] [L-1] **10**

[CO1] [L1] **10**

[CO-4] [L-5] **10**

[CO3] [L-3] **10**

2×10

b) Explain the concept of DBMS in detail. Also explain 3-tier architecture of DBMS.

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.

b) Explain various types of anomalies in database. How can they be removed from

database?

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**

<u>PART-B</u>

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 conflicts	such that are
	avoided to maintain the consistency of the database?	[CO-2] [L-2] 10
Q.6	a) Discuss how DBA ensures database security.b) What are DAC, MAC and RBAC model in data security?	[CO-5] [L-1] 10 [CO-5] [L-2] 10
Q.7	a) What are distributed databases? Why distributed databases are n than	nore secure

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. [CO- 6] [L-2] **10**

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?

2x10

<u>PART-A</u>

Q.2	a) Define 'operating system'. Explain the operating system architecture in details
	and

also mention the services offered by an operating system. [CO-2] [L-1] **10**

- b) Define the terms:
 - i) Multitasking.
 - ii) Multiuser.
 - iii) Multithreading.
 - iv) Multiprocessing.

Q.3 a) What are schedulers? Explain the different types of schedulers stating their function

and scheduling criteria.

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**

[CO-1] [L-1] **10**

[CO-3] [L-2] **10**

- a) What is race condition? Explain various algorithm based solution for critical Q.4 section problem. [CO-4] [L-2] **10**
 - b) State and explain the Peterson's Solution for 2 process problem. [CO-3] [L-3] **10**

PART-B

Q.5 Consider the following snapshot of a system. Where A, B, C are different types of resources:

Process	s Allocation Max			Available					
	А	В	С	Α	В	С	Α	В	С
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

- a) Consider the following page reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, Q.6 7, 3,
 - 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 [CO-4] [L-4] 15

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.

[CO-5] [L-2] **5**

[CO-6] [L-2] **5**

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.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: xy+xy' [CO-1] [L-1]
 - b) Design the block diagram of the hardware that implements the following register transfer statement: Y'T': R3<-R2, R2<-R3
 - c) Create the sequence of register transfer corresponding to instruction fetch.
 - d) Describe the functionality of arithmetic unit in CPU. [CO-2] [L-6]
 - 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] [CO-3] [L-1]
 - g) Describe stored program concept used in computer system.
 - 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.
 - i) Describe different types of semi-conductor memory used as the main memory in a computer. [CO-5] [L-4]
 - j) Describe n-dimensional hypercube.

<u>PART-A</u>

- 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 + cd)(c + bd)
 - ii) (cd + b'c + bd')(b + d)
 - iii) (c' + d) (b + c')
 - iv) bd' + acd' + ab'c + a'c'

[CO-1] [L-2] **10**

[CO-6] [L-1] 2×10

Q.3 a) Design the timing diagram by assuming that SC is cleared to 0 at time T4 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. [CO-2] [L-5] 10
- 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? [CO-3] [L-5]
- 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? [CO-3] [L-2]
- e) Formulate a control word for the following instruction R1<-R2+R3. [CO-3] [L-2] 4×5

<u>PART-B</u>

- 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**

[CO-3] [L-2]

- Q.6a) What is the need for memory hierarchy? Draw and explain the block diagram
of memory hierarchy in computer system.[CO-5] [L-2] 10
 - b) Explain in details different types of cache mapping organizations. [CO-5] [L-2] **10**
- 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] **10**
 - b) A non-pipeline system takes 50ns to process a task. The same task can be processed in a six-segment pipeline with a clock cycle of 10ns. Determine the speedup ratio of the pipeline for 100 tasks. What is the maximum speed up that can be achieved?

B. Tech. – Fourth Semester

Time: 3 hrs.

COMPUTER ORGANIZATION AND ARCHITECTURE (BCS-DS-402)

NI-1		No. of pages: 1
Note:	auestions from PART-A and TWO auestions from PART-B. Ma	arks are
	indicated against each question.	
Q.1	 a) Differentiate between computer architecture and organization. b) Explain ROM organization with the help of chip diagram. c) What is D3T4: SC<=0 in timing and control unit? d) Draw the block diagram of decoder. e) Explain peripheral devices and their characteristics? f) Give an example of one-address instruction. g) What is micro-architecture? h) Differentiate between privileged and non-privileged instructions. i) Define throughput and speedup in pipelining. j) Design the control word for R₁ ¬ R₆+ R₇ for general register organiz 	[CO-1] [L-1] [CO-6] [L-2] [CO-2] [L-1] [CO-2] [L-1] [CO-6] [L-1] [CO-3] [L-1] [CO-3] [L-1] [CO-4] [L-4] [CO-5] [L-1] zation.
	<u>PART-A</u>	
Q.2	a) Draw block diagram of a computer architecture explaining all its con	cepts.
	b) Explain common bus system design (using tri-state buffers).	[CO-1] [L-2] 10 [CO-1] [L-2] 10
Q.3	a) Compare RISC with CISC.b) What do you understand by instruction formats? Explain in detail.	[CO-2] [L-4] 10 [CO-2] [L-1] 10
Q.4	 a) Differentiate between hardwired and micro programmed control mer b) Sketch the block diagram of 8086 microprocessor's architecture along its functional blocks. 	mory. [CO-3] [L-4] 10 in detail with [CO-3] [L-3] 10
0.5	a) Signify the role of interrupts in process state transitions.	[CO-4] [I -2] 10
2.5	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.b) Combine all necessary steps for concurrent access to memory and can be accessed as a statement of the statement o	[CO-5] [L-2] 10 ache. [CO-5] [L-6] 10
Q.7	a) What is the need of memory hierarchy? Also, explain locality of	reference
	b) Write about different replacement algorithms and write policies.	[CO-6] [L-1] 10 [CO-6] [L-2] 10

Max Marks: **100**

B. Tech. – Fourth Semester

Time: 3 hrs.

COMPUTER ORGANIZATION AND ARCHITECTURE (BCS-DS-402)

Notor	Attempt FIVE questions in all O 1 is compulsory. Attempt on	No. of pages: 1
note.	questions from PART-A and TWO questions from PART-B . Ma indicated against each question.	arks are
Q.1	 a) Differentiate between computer architecture and organization. b) Explain ROM organization with the help of chip diagram. c) What is D3T4: SC<=0 in timing and control unit? d) Draw the block diagram of decoder. e) Explain peripheral devices and their characteristics? f) Give an example of one-address instruction. g) What is micro-architecture? h) Differentiate between privileged and non-privileged instructions. i) Define throughput and speedup in pipelining. j) Design the control word for R₁ ¬ R₆+ R₇ for general register organiz 	[CO-1] [L-1] [CO-6] [L-2] [CO-2] [L-1] [CO-2] [L-1] [CO-6] [L-1] [CO-2] [L-1] [CO-3] [L-1] [CO-4] [L-4] [CO-5] [L-1] zation.
	<u>PART-A</u>	J-2][L-1] 2×10
Q.2	a) Draw block diagram of a computer architecture explaining all its condb) Explain common bus system design (using tri-state buffers).	cepts. [CO-1] [L-2] 10 [CO-1] [L-2] 10
Q.3	a) Compare RISC with CISC.b) What do you understand by instruction formats? Explain in detail.	[CO-2] [L-4] 10 [CO-2] [L-1] 10
Q.4	 a) Differentiate between hardwired and micro programmed control mer b) Sketch the block diagram of 8086 microprocessor's architecture along its functional blocks. 	nory. [CO-3] [L-4] 10 in detail with [CO-3] [L-3] 10
Q.5	 a) Signify the role of interrupts in process state transitions. b) Explain microinstruction sequencing of control memory in detail. 	[CO-4] [L-2] 10 [CO-4] [L-2] 10
Q.6	a) Explain pipelining in detail with the help of an example.b) Combine all necessary steps for concurrent access to memory and can be addressed as a statement of the statement	[CO-5] [L-2] 10 ache. [CO-5] [L-6] 10
Q.7	a) What is the need of memory hierarchy? Also, explain locality of principle.	reference
	b) Write about different replacement algorithms and write policies.	[CO-6] [L-1] 10 [CO-6] [L-2] 10

Max Marks: **100**

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'.

2×10

<u>PART-A</u>

Q.2	a) Draw explains 4X1 de-multiplexer with the help of block dia differentiate between de-multiplexer & amp; decoder.b) Explain in detail instruction set architecture of a CPU.	gram. Also [CO-1] [L-2] 10 [CO-1] [L-2] 10
Q.3	a) Explain different types of addressing modes in detail.b) What do you understand by instruction formats? Explain in detail.	[CO-2] [L-2] 10 [CO-2] [L-2] 10
Q.4	a) Explain the Fetch-Decode-Execute cycle with the help of diagram.b) Sketch the block diagram of 8086 microprocessor's architectur alongwith its functional blocks.	[CO- 3] [L-2] 10 re in detail [CO- 3] [L-2] 10
	<u>PART-B</u>	
Q.5	a) Describe peripheral devices and their characteristics: input-output s I/O device interface.b) Describe different I/O device interfaces.	subsystems, [CO-4] [L-2] 10 [CO-4] [L-2] 10
Q.6	a) Explain three major difficulties occurred in instruction pipeline and how will these difficulties be handled by computers?b) Explain different types of interrupts in details.	also explain [CO-5] [L-2] 10 [CO-5] [L-2] 10
Q.7	a) Explain different types of control memory.b) Explain different types of mapping techniques used in cache memo	[CO-6] [L-2] 10 ry. [CO-6] [L-2] 10

B. Tech. – Fourth Semester

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: $a_r - 2a_{r-1} + 4a_{r-2} = 7$
- e) Let ring $Z_{30} = \{0, 1, 2, 3, \dots, 29\}$ 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.

<u>PART-A</u>

- 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 $p \land (q \lor r) \equiv (p \land q) \lor (p \land r)$. **10**
 - b) Explain Tautologies and Contradictions in detail and also explain their difference with the help of suitable examples in detail. **10**
- 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.

<u>PART-B</u>

Q.5 a) Solve the following recurrence relation for r>=2

10

2×10

10

10

10

10

- b) Find the particular solution of $a_r - 2a_{r-1} + a_{r-2} = 4$
- a) Let Ring $Z_{10} = \{0, 1, 2, 3, ..., 9\}$ of integer modulo 10. Then find. Q.6 i) Find units of Z_{10}
 - ii) find -3, -8
 - iii) Find inverse of 3 and 9 iv) find roots of the eq: $2x^2 + 4x + 4$ 10
 - b) Explain and compare monoid and sub-monoid in detail and its properties with the help of suitable examples. 10
- 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.



10

10

10

B. Tech. – Third / Fourth Semester

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.

Answer the following in brief: Q.1 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'. [CO-5] [L-1] q) What is vertex buffer? [CO-4] [L-2] 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] 2×10

<u>PART-A</u>

- 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?
 - b) What is WebGL? Explain the properties of WebGl. [CO-2][L-2] **10** [CO-2][L-3] **10**
- Q.4a) Explain uniform and attribute variables in Shader language.[CO-3] [L-1] 10b) What is Inter Shader Communication?[CO-3] [L-2] 10

<u>PART-B</u>

- 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".

[CO-6][L-3] 10

End Semester Examination, Dec. 2022 B. Tech. – Third Semester 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) b) c) d) e)	Mention challenges and constraints of internet Governance. Differentiate between threats and vulnerability. Describe 'Ethical hacking'. Define 'Malwares and their working'. Compare between authentication and authorization.	[CO-1] [L-2] [CO-1] [L-3] [CO-2] [L-2] [CO-3] [L-1] [CO-3] [L-2] 4x5	
		<u>PART-A</u>		
Q.2	a) b)	Define `threats and its types' with the help of suitable examples. Explain the need for a comprehensive cyber security policy.	[CO-1] [L-1] 10 [CO-1] [L-2] 10	
Q.3	a)	Describe 'Weak Authentication'. How one organization strengthen it	?	
	b)	Why an organization required Cyber Security Safeguards? Explain with the help of some examples.	[CO-2] [L-3] 10 any two [CO-2] [L-2] 10	
Q.4	a)	Give brief introduction to basic security for HTTP Applications and Security	ervices.	
	b)	Write down various security considerations and challenges.	[CO-3] [L-3] 10 [CO-3] [L-2] 10	
		<u>PART-B</u>		
Q.5	a) b)	Explain 'intrusion detection' and its prevention techniques in detail. Describe the importance of session analysis and types of information find for a session.	[CO-3] [L-1] 10 on one can [CO-4] [L-2] 10	
Q.6	a) b)	What you mean by cryptography? Also describe symmetric asymmetric key cryptography and their applications. Explain how Packet Filtering is different from Stateful Packet	key and [CO-4] [L-2] 10 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**

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*

[CO-3] [L-1]

[CO-6] [L-2]

[CO-3] [L-2]

[CO-1] [L-1]

[CO-5] [L-1]

[CO-1] [L-2]

[CO-2] [L-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.
- b) Discuss the features of blender graphics tools.
- c) Differentiate back end verses Front End with example.
- d) Discuss the use of frame buffering detail.
- e) Discuss the minimum system requirement of GIMPS graphics tool.
- 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] 21/2×8

<u>PART-A</u>

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**

<u>PART-B</u>

- 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.[CO-6] [L-2] 10

5x4

b) Define 'animation production'. Explain various principles of animation in detail.

[CO-6] [L-2] **10**

B. Tech. – Third Semester

INFORMATION SECURITY FUNDAMENTALS (CF) (BCS-DS-305)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

2×10

10

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?
 - q) 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

- a) Discuss in detail concept of information security. What are issues associated Q.2 with it? [CO-1] [L-2] **10**
 - b) What is CIA triad and why is it important?
- 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
- a) Explain in detail the physical threat faced while dealing with physical security. Q.4

[CO-3] [L-3] **10** b) What are various methods to protect networks and network resources against the [CO-3] [L-3] **10**

array of threats?

PART-B

Q.5	a) Discuss methods by which we can mitigate the various the vulnerabilities	reats and for
	operating system security.	[CO-4] [L-3] 10
	b) What is a vector for malware propagation? Explain Email, instant n	nessaging,
	removable media for malware propagation.	[CO-4] [L-3] 10
Q.6	a) Discuss the functions and importance of various information security	/ models.
	b) Discuss various auditing standards in information security audit.	[CO-5] [L-2] 10

a) Define 'GRC'. What are the various pillars of GRC? Q.7

[CO-6] [L-3] **10** 666/4

b) What are the various approaches of information security audit? Explain information

audit process.

[CO-6] [L-3] **10**

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.

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.	(CO5/L1)
f) Discuss in brief vulnerability scanning.	(C05/L1)
g) Differentiate virus and worms.	(CO4/L2)
h) Define 'Tailgating'.	(CO3/L1)
i) Discuss the Sarbanes –Oxley.	(CO6/L1)
j) Define 'Database security'.	(CO4/L1)
	2x10
	 Answer the following in briefly: a) Discuss the Data in Motion. b) Differentiate Data at Rest and Data in use. c) Define 'Authorization'. d) Describe the Internal Audit. 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'.

<u>PART-A</u>

Q.2	a) Define	`information	security'.	What	are	issues	associated	to	it?	Discuss	
Demming Cycle.									Ε	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**

<u>PART-B</u>

- 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 undersphilities proposited with detabase. Also suggest data base
 - 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. [CO-4] [L-1] 10
 b) Discuss the shellower effective lag means security
 - b) Discuss the challenges affecting log management. [CO-4] [L-1] **10**
- Q.7a) Define GRC. Discuss its pillars. Discuss the significance of GRC to business?
How it can benefit an organization?[CO-6] [L-2] 10

b) Explain the Addressing Multiple Regulations for Information Security Technical Frameworks for IT Audits. [CO-6] [L-2] **10**

B. Tech. – Third Semester INTRODUCTION TO IT INFRASTRUCTURE LANDSCAPE (BCS-DS-303)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

2x10

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?

<u>PART-A</u>

Q.2	a)	What is a sub-query? How it is implemented using from clause? Write the syntax.	7			
	D) C)	plain the difference between an inner join and outer join using an example. 6 nat is JDBC? State the steps to connect to the database in java. 7				
Q.3	a) b)	Discuss Storage Network technology. Differentiate between SAN and NAS. Write notes on:	10			
	-	i) Switched Fabric. ii) Storage virtualization. 5	x2			
Q.4	a)	Describe virtualization. Justify how it is beneficial? Discuss in detail about Hypervisors.	10			
	b)	Discuss the steps carried out for server deployment and server management.	10			
<u>PART-B</u>						
Q.5	a)	Draw and explain the architecture of LDAP protocol in detail. How LDAP inheritance works?	14			
	a)	What is LDIF? Create directory entries using LDIF.	6			
Q.6	a)	Write notes on:				
	b)	Define 'routing'. How different types of routing methods are useful in networking?	' X Z			

10

- Q.7 a) Define MQ SERIES and its applications. Is this a Middlewar? Discuss. What products does MQ SERIES contains. **10**
 - b) Explain briefly OLAP. Justify all its operations with the help of an example. **10**

B. Tech. – Third Semester OBJECT ORIENTED PROGRAMMING SYSTEM (BCS-DS-302/CS-304A)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-1] [L-2]

[CO-1] [L-1]

[CO-2] [L-2]

[CO-6] [L-2]

[CO-1] [L-2]

[CO-1] [L-1]

[CO-1] [L-1] [CO-3] [L-1]

[CO-2] [L-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) Discuss how a pointer can be initialized.
 - b) List any two object based languages.
 - c) Define reference variable. Give its syntax.
 - d) Differentiate between a bug and an error with examples.
 - e) Describe data members and member functions?
 - f) Define the term: 'object' with an example.
 - g) List any four applications of Object oriented programming.
 - h) Name the operators that cannot be overloaded.
 - i) Differentiate between 'Constructor' and 'Destructor' with syntax.
 - j) Compare Object oriented language and Object based language. [CO-1] [L-4] 2x10

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 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**

<u>PART-B</u>

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. [CO-5] [L-4] 10b) 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 C++ with the help of an example. [CO-6] [L-3] **10**

B. Tech. – Third Semester

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.
 - b) List any two Object based languages.
 - c) Define reference variable. Give its syntax.
 - d) Differentiate between an error and an exception with example.
 - e) Describe data members and member functions?
 - f) Define 'class' with example.
 - 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.
 - j) Discuss how a pointer can be declared and initialized.

<u>PART-A</u>

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.

[CO-1] [L-2] **10**

b) Which operator is used for dynamic memory allocation and de-allocation in 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 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**

<u>PART-B</u>

[CO6][L4] [CO1][L2] [CO1][L1] [CO3][L1]

[CO1][L1]

[CO1][L1]

[CO2][L2]

[CO2][L4]

[CO1][L4]

[CO1][L2] **2x10**

- 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. [CO4][L3] 10
- 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 C++ with the help of an example. [CO6][L2] **10**

End Semester Examination, Dec. 2022 B. Tech. – Third Semester DATA STRUCTURES AND ALGORITHMS (BCS-DS-301)

Time: 3 hrs.

Max Marks: 100

2x10

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.

<u>PART-A</u>

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 K + L M*N + (O^P) * W/U/V * T + 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**

<u>PART-B</u>

- Q.5Discuss the concept of Minimum Spanning Tree. Also, explain MST using
Kruskal's algorithm support with example.[CO-4] [L-2] 20
- Q.6Discuss Bubble sort algorithm in detail, with its limitation and advantages?
Exhibit all the passes to sort the given list using Bubble sort technique.
[12 23 45 8 99 66 30 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.

[CO-6] [L- 2] **10x2**

BCA - Second Semester

SOFTWARE ENGINEERING (BCA-DS-203/BCA-405A (CB)/BCA-

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.
- a) _____ is a software development activity that is not a part of software Q.1 processes. i) Validation ii) Specification
 - iii) Development

- iv) Dependence
- b) _____ is defined as the process of generating analysis and designing documents?
 - i) Re-engineering

ii) Reverse engineering iv) Science and engineering

ii) Software Design Life Cycle

iv) System Development Life cycle

- iii) Software re-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
 - iii) Software Development Life Cycle
- e) Who proposed the spiral model?
 - i) Barry Boehm
 - iii) Royce

- ii) Pressman
- iv) IBM
- ______ suits the Manifesto for Agile Software Development. f)
 - i) Customer collaboration
 - iii) Working software

- ii) Individuals and interactions iv) All of the mentioned
- q) Software Debugging is known as ____
 - 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)

[CO- 1,2,3,4,5] [L-3] **2x10**

PART-A

Q.2 a) Define software process? How is it different from a software product? Discuss any

[CO-1,2] [L-1] **10** two software process models. b) Discuss advantages and disadvantages of prototyping model over evolutionary

[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

- How is testing integrated with the life cycle of a software product? Is it sufficient Q.5 to test a software product only at the end of its life cycle? Explain [CO-4] [L-4] **20**
- a) Enumerate the important steps involved in developing a software system Q.6 usina

object-oriented methodology.

model of software development.

[CO-5] [L-2] **10** b) Outline the criteria for selecting a software design method. [CO-5] [L-2] **10**

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 INTRODUCTION TO OPEN-SOURCE SOFTWARE AND OPEN STANDARDS (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.

[CO-1,2,4,5,6][L-1,2,3,4] **2×10**

<u>PART-A</u>

- 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.
 - b) Justify the vision of OSI with example.
- 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.

<u>PART-B</u>

- 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.
 - 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.
 [CO-4][L-4] 10

[CO-5][L-5] **5×2**

[CO-3][L-2] **5×2**

[CO-4][L-4] 10

[CO-2][L-6] **10**

- 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.

[CO-6][L-3] **5×2**

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] [CO2] [L2] b) What is Algorithm and Flowchart? 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] q) Discuss 1D and 2D array. [CO2] [L1] h) What is Library Files? [CO3] [L1] i) What is Ternary Operator? [CO4] [L2] i) What is a Syntax error? [CO5] [L1] **2x10** PART-A 0.2 a) What is a flow chart? Draw a flow chart for any program of your choice

Q	a) matrix a non charter bran a non charter any program of your choicer					
		[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.b) Explain bitwise operators with an example from each one.	[CO3] [L2] 10 [CO2] [L2] 10				
Q.4	a) Write a program of addition of 2 Matrix using arrayb) Create a student structure and store details of five students in structure.	[CO4] [L3] 10 it using				
		[CO3] [L2] 10				
<u>PART-B</u>						
Q.5	What are functions call-by-value and call-by-reference? Expla programming examples.	in with [CO2] [L2] 20				

- 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**

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 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?	[CO-2] [L-2]				
d) Define one and two dimensional array with suitable examples.	[CO-2] [L-1]				
e) What are the various operations performed by a compiler?	[CO-5] [L-2]				
f) How to pass the parameters in function.	[CO-2] [L-2]				
g) Write any four relational operators with the specifications.	[CO-1] [L-1]				
h) What are the various searching techniques? Which is the best t	echnique for				
the search operation?	[CO-3] [L-2]				
i) Define 'Pointers'.	[CO-3] [L-2]				
j) Write any two uses of recursion.	[CO-3][L-2] 2×10				
<u>PART-A</u>					

- 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**

<u>PART-B</u>

- 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? [CO-4] [L-5]**10**

- Q.6 a) Explain different types of sorting techniques and give the reasons for better sorting techniques. [CO-5] [L-3]**10**
 - b) Define the complexity. Write the program for the following equation $\mathbf{x} = (-\mathbf{b} \pm \sqrt{(\mathbf{b}^2 - 4\mathbf{ac})})/2\mathbf{a}$ [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)**

[CO-2] [L-6] **10** [CO-3] [L- 2] **10×2** [CO-4] [L-3] **10** a) Illustrate the concept of strings? Explain the two-dimensional arrays in C [CO-5] [L-4] **10** b) Explain the concept of linked lists. Show the implementation of a linked list [CO-5] [L-5] **10** 684/4

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.
- a) What is the syntax of for-loop statement? Q.1 [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. [CO-4] [L-2] q) Illustrate the memory allocation of character arrays in C. [CO-2] [L-3]
 - h) Mention any five string functions in C programming language.
 - i) Explain the need of operating system, with example.
 - i) Illustrate with suitable example, the concept of sorting.

PART-A

- a) Write a pseudocode to find the top five salaries of 50 employees in an Q.2 organization,
 - using conditional statements. [CO-1] [L-3] **10**
 - b) Explain with suitable example, the various types of operating systems, used
 - in

Q.6

using

pointers.

Time: 3 hrs.

computer system?

Q.3 a) Compare and contrast, built-in functions and user-defined functions, and justify [CO-2] [L-2] **10**

with example?

b) Write a C program using the concept of recursive functions to find out the factorial

of a number entered by the user.

- Explain the following terms with respect to C programming language. Q.4
 - a) Operator precedence.

programming, with example.

b) C comments.

PART-B

a) Illustrate binary search algorithm? Explain with example. Q.5 b) What do you mean by time and space complexity of any algorithm? [CO-4] [L-5] **10**

[CO-1] [L-2]

[CO-1] [L-2]

[CO-4] [L-3] **2×10**

[CO-1] [L-2] **10**
Q.7	a) Illustrate the purpose of file handling in C. Write a program existing	to open an text
	file and delete its contents.	[CO-4] [L-5] 10
	b) Discuss with suitable example, the use of structures in C.	[CO-4] [L-3] 10

B. Tech. – First Semester

PROGRAMMING FOR PROBLEM SOLVING (BCS-101)

Time: 3 hrs.

Max Marks: 100 No. of pages: 2

[CO-1] [L-1]

[CO-1] [L-2]

[CO-2] [L-3]

[CO-2] [L-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 Answer the following questions:
 - a) Specify the role of an "operating system" in a computer system.
 - b) Differentiate between compiler and interpreter.
 - c) Evaluate the following expression: a = 10 * 2 / 4 6 / 2 + 1
 - 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.
- q) 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.

i) List benefits of using pointers. Give an example of pointer declaration.

PART-A

- a) List out basic operations performed by a computer system. Draw a neat Q.2 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**
- a) Write a program that reads a number and determines, if the number is zero, Q.3 positive or negative. [CO-3] [L-6]
 - b) Differentiate between while and do-while loop with the help of a program. [CO-3] [L-4]

[CO-3] [L-3] [CO-6] [L-2] [CO-4] [L-1]

[CO-5] [L-2]

[CO-1] [L-3] [CO-6] [L-2]

2x10

c) Write a program to display the following pattern:

- 1 12 123
- 1234
- d) Explain the syntax and usage of a switch statement. Write a program to check the divisibility
- 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.
 [CO-4] [L-4] 10

<u>PART-B</u>

- 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-by-value" 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) scanf() and fscanf()
 - ii) printf() and fprintf()
 - 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.

B. Tech. – Third Semester

PROGRAMMING FOR PROBLEM SOLVING (BCS-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) 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.

<u>PART-A</u>

Q.2	a) b) c)	Give the steps of algorithm to test the primness of an integer. Also draw the flow chart for the same. Discuss syntax, logical and runtime errors with examples. Describe the role of a CPU, explaining functions of each sub unit.	10 5 5
Q.3	a) b)	Design a C function to print a given number in reverse. Write a C program to Fibonacci series up to nth term.	10 10
Q.4	a) b)	Write an algorithm to sort a list of numbers using bubble sort. Explain each step considering an example. Write a C function to implement linear search.	10 10
		<u>PART-B</u>	
Q.5	a) b)	Explain function parameter passing methods. 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	10
		of two matrices.	10
Q.6	b)	 Differentiate between the following <i>(any two):</i> i) Call by value and call by reference. ii) Actual and formal parameters. 	
	ь)	III) Recursion and iteration.	5x2
	U)	while a program to demonstrate array of structure.	TU.

688/4

2×10

Q.7	a) How a pointer is declared? How it is used in linked list?	10
	b) Explain the purpose of the following (any five):	
	fopen(), fclose(), fprintf(), fscanf(), r+, w+, eof.	10

B. Tech. – First Semester

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'. [0	CO-1][L-3] 2×10
	<u>PART-A</u>	
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
	<u>PART-B</u>	
0.5	a) Discuss the application of Artificial Intelligence in banking sector.	[CO- 5] [L-2] 10
τ-	b) What are Limitations of Artificial Intelligence?	[CO-5] [L-3] 10
06	What are the various Production rules for solving the Water Jug Problem?	Illuctrate with
Q.0	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.2] 10	[CO-3] [L-

B. Tech. – First Semester ARTIFICIAL INTELLIGENCE FOR ENGINEERS (BCS-100/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**. Each question carries equal marks.

Q.1 Answer the following in brief: a) Difference between human and machine intelligence. [CO-3] [L-2] b) Differentiate between spatial intelligence and musical intelligence. [CO-2] [L-2] c) List the applications of artificial intelligence. [CO-4] [L-3] d) Define an 'environment'. [CO-3] [L-2] e) What are production rules? [CO-2] [L-2] f) Describe the four categories under which AI is classified with examples. [CO-1] [L-3] [CO-3] [L-2] g) What are the components of the intelligence? h) Explain travelling salesman problem'. [CO-2] [L-2] i) Discuss the ethical issues/concerns in AI. [CO-1] [L-3] i) When was social humanoid robot developed? [CO-4] [L-2]**2×10**

<u>PART-A</u>

Q.2	a) Define 'intelligence'. Explain the musical and linguistic intelligence in	detail.
	b) What are the general problem solving components?	[CO-1] [L-2] 10 [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?b) Describe the key components in artificial intelligence.	[CO-3] [L-1] 10 [CO-2] [L-2] 10
	<u>PART-B</u>	
Q.5	a) Discuss the application of artificial intelligence in banking sector.b) What are limitations of artificial intelligence?	[CO-5] [L-2] 10 [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.b) Explain the nature and structure of intelligent agents.	[CO-1] [L-2] 10 [CO-3] [L-2] 10

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 CaCl₂ 15.2 mg/l and MgSO₄ 16 mg/l. [CO-3] [L-3] c) Write any two applications of Eutectic system. [CO-1] [L-3] [CO-1] [L-2] d) List the applications of phase rule system. 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] q) 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 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]

<u>PART-A</u>

- Q.2 a) A standard hard water contains 1 gm of CaCO3/I, 50 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 CO_2 produced from burning 100 g of butane (C₄H₁₀).

[CO-3] [L-2] **10** b) The following is the percentage composition of fuel on mass basis. C = 78, $H_2 = 2$, $O_2 = 3$ and S = 0.7 and remaining is ash. Calculate theoretical air required for combustion of 100g 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] 10b) Express the number of phases, components and degree of freedom in following:
 - i) $2NO_2$ (gas) \Leftrightarrow N_2O_2 (gas)

ii) $CuSO_45H_2O$ (solid) \Rightarrow $CuSO_43H_2O$ (solid) + $2H_2O$ (solid)

iii) $PCl_5(gas) \Leftrightarrow PCl_3(gas) + Cl_2(gas)$ [C

[CO-1] [L-4] **10**

<u>PART-B</u>

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 $[Ni(H_2O)_6]^{2+}$ and $[Ni (CN)_6]^{2-}$ using CFT. Why $[Ni(H_2O)_6]^{2+}$ is paramagnetic and $[Ni (CN)_6]^{2-}$ diamagnetic though both are octahedral complexes?

[CO-2] [L-3] 10

[CO-1] [L-4] **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. [CO-2] [L-3] **10**
 - 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.
- a) Why Metal-EDTA complex is more stable than Metal-EBT complex? Q.1 [CO-3] [L-2]
 - b) Calculate the variance of system at triple point of water. [CO-1] [L-2] [CO-1] [L-3]
 - c) Is Eutectic a mixture or compound? Justify.

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 d^4 , octahedral high spin complex. [CO-2] [L-3]
- f) Draw the most stable conformer of C_4H_{10} . [CO-1] [L-3]
- q) 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 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] **2×10**

<u>PART-A</u>

- 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**

- a) If electricity demand in one particular year is 2.0 x 10¹³ KJ and energy is Q.3 generated from combustion of 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 CH₄ is890 kJ/mole. [CO-3] [L-3] **10**
 - b) The following is the percentage composition of fuel on mass basis. C = 80, H_2 = 3, O_2 = 4.4 and S = 0.9 and remaining is ash. Calculate theoretical air required for combustion of 1kg of fuel completely. [CO-3] [L-4] **10**
- a) Draw the labelled phase diagram of any one component system and explain Q.4 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

PART-B

694/4

- a) Calculate the lowest three energy levels of a particle of mass 10^{-26} Kg in a Q.5 box of length $L = 10^{-9}$ m. [CO-1] [L-4] **10**
 - b) Predict the magnetic nature of $[Zn(NH3)_4]^{2+}$ and $[Cr(H2O)_6]^{3+}$ using crystal field theory. [CO-2] [L-3] 10
- a) Draw possible conformations of C_2H_6 and comment on their stability. Also, Q.6 draw P.E plot for conformers. [CO-1] [L-3] **10** [CO-1] [L-4] **10**
 - b) Assign the R/*S* or E/Z configuration:

COOH

CH

NH₂



- Q.7 a) HCl vibrational absorption line is observed at 2990 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 CHEMISTRY FOR ENGINEERS (BCH-106)

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

[CO-3] [L-2]

[CO-1] [L-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 brief:
 - a) Find the bond order of N_2 and O_2 molecule as per MOT. [CO-2] [L-2]
 - b) Which ions are responsible for temporary and permanent hardness in water?
 - c) Is Eutectic a mixture or compound? Justify.
 - d) Calculate the variance of system at eutectic point of two component system.
 - e) Differentiate dry and wet cells with examples. [CO-1] [L-2] [CO-3] [L-2]
 - f) Draw crystal field splitting diagram with filling of electrons in the d orbital's in the d⁶, octahedral low spin complex. [CO-2] [L-3]
 - g) Draw the least and most stable conformer of C_2H_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 HCL, NH₃, CL₂ and CH₄. [CO-2] [L-3] **2×10**

<u>PART-A</u>

- Q.2 a) Explain the zeolite process with the help equations and well labeled diagram.
 - [CO-3] [L-3] **10**
 - b) 100ml of water simple required 4 ml of H₂SO₄ 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 1kg of fuel completely having percentage composition on mass basis. C = 70, H= 20, O = 7 and 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 Pb-Ag and explain all the important features.

[CO-1] [L-3] **10**

[CO-1] [L-4] **10**

- b) Find the degree of freedom, component and phase of following systems:
 - i) $N_2(g) + O_2(g) \leftrightarrow 2NO(g)$
 - ii) $CaCO_3(S) \leftrightarrow CaO(S) + CO_2(g)$
 - iii) $Fe(S)+H_2O(I) \leftrightarrow FeO(S) + H_2(g)$
 - iv) Saturated solution of sodium chloride.

<u>PART-B</u>

 Q.5
 a) Derive the expression for the energy of particles in one dimension box in terms of mass, length and plank's constant.
 [CO-1] [L-4] 10

 696/4

- b) Calculate the magnetic moment of $[Ni(CN)_6]^{4-}$ and $[Co(H_2O)_6]^{3+}$ using crystal [CO-2] [L-3] **10** field splitting diagram.
- a) Draw well labeled potential energy diagram of all conformations of C₄H₁₀ and Q.6 comment on their stability? [CO-1] [L-3] **10** [CO-1] [L-4] **10**
 - b) Find the R/S or E/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

[CO-2] [L-3] [CO-2] [L-4]

[CO-2] [L-2]

[CO-1] [L-2]

[CO-3] [L-5]

[CO-4] [L-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) Discuss the penetration power of an electron, in a multi-electron atom. [CO-2] [L-1]
 - b) Apply the factors that Influence Polarizability.
 - c) Which of the followings are aromatic and anti-aromatic molecules?



- d) Explain the features that distinguish between hard and soft acids.
- e) Find out the number of unpaired electrons are there in $[Ni (H_2O)_6]^{2+}$.
- f) Which group in each pair has the highest priority? CH₃Br or -CH₂CH₂Br
- g) In an atom, which electrons tend to do the most shielding (core electrons or valence electrons). [CO-2] [L-3]
- h) Differentiate between dry and wet corrosion.
- i) Analyze absorption, spectroscopy and emission spectroscopy.
- j) How will you convert benzene into m-nitro chloro benzene? [CO-6

<u>PART-A</u>

- Q.2 a) Why crystal field splitting in octahedral complexes is different in comparison to tetrahedral complexes? Discuss with suitable example. [CO-1] [L-2] **10**
 - b) i) Calculate the lowest three energy levels of a particle of mass 10^{-26} Kg in a box of length $L = 10^{-9}$ 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.
 - 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

]	CC)-5] [L	4]
[6	[L	-2]	2 ×	• 10

[CO-2] [L-2] 10



Name the following compounds E and Z nomenclature:



<u>PART-B</u>

- 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 princip out various types of transitions involved in this technique with one e	le and list example in
	b)	each case. Give a brief note on SEM technique with suitable block diagram. Als	[CO-5] [L-2] 10 so write its
	,	applications in different fields.	[CO-5] [L-2] 10
07	a)	Discuss the synthesis and purification method of Aspirin	[CO-6] [I -2] 10

b) Justify SN1 and SN2 reactions with suitable examples. [CO-6] [L-2] **10**

End Semester Examination, Dec. 2022 **OPEN ELECTIVE – COMMAN FOR ALL BRANCHES** SOLID WASTE MANAGEMENT (BCE-OE-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.

- Answer the following in brief: Q.1
 - a) List two sources contributing to commercial waste.
 - b) No landfill site should be constructed within m of any lake or pond. [CO-5] [L-3]
 - c) Give atleast one benefit of waste to energy projects. [CO-4] [L-2] [CO-2] [L-1]
 - 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. [CO-4,5] [L-2] **2×10**

PART-A

- Q.2 Explain the type-based classification system of waste.
- a) How is density of waste useful in planning and designing of solid waste Q.3 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	А	672	4
2	В	471	3
3	С	389	5
4	D	524	4
5	E	731	5
6	F	389	3
7	G	564	4
8	Н	280	5

[CO-5] [L-4] **12**

- a) Compute the number of 8.5 m³ containers required for storing the waste Q.4 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 kg/person/day
 - Uncompacted specific volume = 150 kg/m³
 - Compacted volume = 250 kg/m³
 - Also compute the waste quantity in terms of biodegradable, non-biodegradable and inert. [CO-5] [L-4] 10 [CO-5] [L-3] **10**
 - b) Discuss the benefits of waste minimization.

[CO-2] [L-4] **20**

[CO1][L2]

[CO-2] [L-2]

[CO-2] [L-1]

<u>PART-B</u>

Q.5	a) Explain the process of bio-methanation.b) List the key considerations of MSW Incineration process.	[CO-4] [L-3] 10 [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**

B. Tech – Seventh Semester **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. [CO-1] [L-5]
- 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.
- e) Describe the various conditions for obtaining maximum moment while designing Box Culvert. [CO-3] [L-1]

f) Compare the different arrangements of pylons in a Cable – Stayed Bridge.

[CO-4] [L-2]

[CO- 3] [L-3]

- 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]
- i) With the help of a neat sketch, define the various shapes of Pier.

[CO-5] [L-2] **2x10**

PART-A

- a) Summarize the Preliminary Data to be collected by an Engineer in Charge Q.2 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.
- Q.3 As per Section II of Indian Road Congress (IRC) Bridge Code, write a note on: [CO-1] [L-2] **12**
 - a) IRC Class 70R Loading
 - 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 :7 m
 - 2 Lane width Roadway
 - 1.5 m footpaths on either side of roadway

[CO-1] [L-2] 8

[CO-1] [L-2] **8**

•	Wearing Coat	: 85 mm
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- Width of bearing : 400 mm
- IRC Class A Loading
- M 25 grade concrete and Fe 415 Steel

[CO-3] [L-6] **20**

<u>PART-B</u>

- 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**

[CO-5] [L-4] 15

[CO-5] [L-2] **5**

- Q.6 a) Illustrate the features and different types of Shear Connectors in Composite Bridges. [CO-6] [L-4] **10**
 - b) Frame the Design Principles for a typical Plate Girder Bridge. [CO-6] [L-4]**10**

: 2.5 m

:9 m

- 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
 - Width at Bearing Level : 1.2 m
 - Length of Pier
 - Maximum Mean Velocity of current : 3.7 m/s
 - M 20 Grade of Concrete
 - Class AA Wheeled Vehicle
 - b) Summarize the two different categories of bearings.

B. Tech. – Seventh Semester

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.
- 0.1 Answer the following in briefly:

country.

a) Briefly discuss the role of transportation in the economic and social activities

of the

- [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]

[CO5, L-3]

- 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
- 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. [CO6, L-3]
 - i) Briefly explain the engineering surveys needed for locating a new highway.

[CO2, L-2] **2x10**

PART-A

a) Explain with sketches the various factors controlling the alignment of road. Q.2

[CO1, L-2] **10**

- b) Prepare a DPR for the construction of new 2-Lane highway with paved shoulders from Km 0+000 (Bathinda) to Km 97+000 (Sirsa) of NH-152 in the State of Punjab and Haryana. [CO1, L-4] **10**
- a) Define sight distance and factors causing restrictions to sight distance. Also Q.3 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

<u>PART-B</u>

- 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. [CO5, L-4] 10
- 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 x 10⁵ Kg/cm²
 Poisson's ratio of concrete =0.15
 Thickness of concrete pavement = 25 cm
 Modulus of subgrade reaction = 12 Kg/cm³
 Wheel load = 5100 Kg
 Radius of loaded area =16 cm
 [CO5] [L- 4] 10
 b) "The repeated application of heavy load effects the design of rigid pavement"
 - b) "The repeated application of heavy load effects the design of rigid pavement". Make supportive justifications.
 [CO5] [L- 5] 10

B. Tech. – Seventh Semester MASONRY STRUCTURE (BCE-DS-721)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-3] [L-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.

- Answer the following questions: Q.1
 - 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] [CO-1] [L-2]
 - c) What do you mean by reinforced and prestressed masonry?
 - d) What is High fatigue resistance?
 - 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 215mm×365mm to carry a moment of 24kNm assuming that the characteristic strength of the material is 19.2N/mm². Assume also that Υ_{mm} =2.0 and f_v =250N/mm². [CO-5] [L-5] [CO-2] [L-3]
 - q) What is Explosive Load?
 - h) Write a short note on 'Impact Load'. [CO-2] [L-3]
 - i) Briefly explain about Function and workability of concrete masonry unit. [CO3] [L2]
 - i) Write a Brief note on methods of pre-stressing. [CO-5] [L-2] **2x10**

PART-A

- Explain Complex arrangements and Double Cross-wall systems with the help of Q.2 Cross section channel. [CO-1] [L-1] **20**
- What does one understand about the Flexural tensile strength of Masonry Bricks? Q.3 Illustrate with a diagram. [CO-2] [L-2] **20**
- Describe Masonry Assemblage and effect of bed materials on brick prism Q.4 strength

[CO-3] [L-2] 20

PART-B

- A brickwork column of section 460mm×460mm is to carry an axial load of 800kN Q.5 and a moment of 50kNm. Assuming that the reinforcement is placed such that $d_2=d_1=130$ mm design the column for (1) an effective height of 4.5 m and (2) an effective height of 6.0m. Take $f_k=13N/mm^2$, $f_y=460N/mm^2$, $\Upsilon_{mm}=2.3$. [CO4][L5] **20**
- Q.6 Describe the technique and methods of Pre-stressing of masonry. [CO-5] [L-4] **20**
- Q.7 Consider a cavity wall of length 5m with an inner load bearing leaf of thickness 170mm and a total thickness 272mm. Assume that the clear height between restraints is 3.0m and that the characteristic steel strength is 250N/mm².[CO-6] [L-4] 20

B. Tech. – Seventh Semester

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) 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] [CO-2] [L-2]
 - c) Enumerate different types of shear test specimens.
 - d) Write Earthquake Resistant Design and Construction Masonry IS Codes.
 - [CO-2] [L-2]

[CO-3] [L-3]

[CO-5] [L-3]

- e) Design a simply supported brickwork beam of span 4 m and of section 215mm×365mm to carry a moment of 24kNm assuming that the characteristic strength of the material is $19.2N/mm^2$. Assume also that Y_{mm} =2.0 and f_v =250N/mm². [CO-4] [L-5]
- [CO-3] [L-4] f) What do you mean by reinforced and prestressed masonry?
- q) Briefly explain the methods of prestressing concrete.
- h) What kind of advantages does prestressing offer over reinforced masonry? [CO-5] [L-2]
- i) Write a short text regarding Accidental Loading.
- i) Briefly explain the efforts made to reduce the accident death statistics.

[CO-6] [L-4] **2×10**

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**
- a) Explain the Shear strength of different types of brickwork beams of a similar Q.6 cross-section. [CO-4] [L-3] 10

- b) Consider a cavity wall of length 5m with an inner load bearing leaf of thickness 170mm and a total thickness 272mm. Assume that the clear height between restraints is 3.0m and that the characteristic steel strength is 250N/mm². 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. [CO-6] [L-4] **10**

B. Tech. – Seventh Semester

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) What is basic design consideration in Masonry Structure? [CO-1] [L-1]
 - k) Enlist different types of foundations in Masonry Structure. [CO-1] [L-1] [CO-2] [L-2]
 - I) Enumerate different types of shear test specimens.
 - m) Write Earthquake Resistant Design and Construction Masonry IS Codes.
 - [CO-2] [L-2]

[CO-3] [L-3]

[CO-5] [L-3]

- n) Design a simply supported brickwork beam of span 4 m and of section 215mm×365mm to carry a moment of 24kNm assuming that the characteristic strength of the material is $19.2N/mm^2$. Assume also that Y_{mm} =2.0 and f_v =250N/mm². [CO-4] [L-5]
- [CO-3] [L-4] o) What do you mean by reinforced and prestressed masonry?
- p) Briefly explain the methods of prestressing concrete.
- g) What kind of advantages does prestressing offer over reinforced masonry? [CO-5] [L-2]
- r) Write a short text regarding Accidental Loading.
- s) Briefly explain the efforts made to reduce the accident death statistics.

[CO-6] [L-4] **2×10**

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**
- a) Explain the Shear strength of different types of brickwork beams of a similar Q.6 cross-section. [CO-4] [L-3] 10

- b) Consider a cavity wall of length 5m with an inner load bearing leaf of thickness 170mm and a total thickness 272mm. Assume that the clear height between restraints is 3.0m and that the characteristic steel strength is 250N/mm². 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. [CO-6] [L-4] **10**

End Semester Examination, Dec. 2022 B. Tech. – Seventh Semester FOUNDATION ENGINEERING (BCE-DS-703)

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) 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]

[CO2, L2]

[CO4, L2]

- 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'.
- f) List various types of anchorages used in sheet pile walls.
- 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**

<u>PART-A</u>

- 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 3m is founded at a depth of 2m below the ground surface in a (c- Φ) soil having a cohesion c= 30 kN/m² and angle of shearing resistance Φ =35⁰. The water table is at a depth of 5m below the ground level. The moist weight of soil above the water table is 17.25 kN/m³ Determine the ultimate bearing capacity of the soil b) the net bearing capacity of soil. Use General shear failure. N_c=57.8, N_q=14.4, N_Y=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**

<u>PART-B</u>

- 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? [CO5, L5] 15

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 5m below the ground surface. The soil properties are given below $\Phi = 15^{\circ}$, cu=12 kN/m², e=1.0, 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**

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. [CO5,L:3] 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] q) 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] i) 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.

<u>PART-B</u>

- Q.5 Write short notes on:
 - a) Desalination by evaporation.
 - b) Applications of treated wastewater.
- 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** 713/4

[CO5, L-4]. 10x2

End Semester Examination, Dec. 2022 B. Tech. – Sixth Semester DESIGN OF STEEL STRUCTURES (BCE-DS-627)

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

[CO-3] [L-2]

[CO-6] [L-2]

[CO-5] [L-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-1] [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.
 - e) Define "lacing" with regards to design of columns. [CO-3] [L-3]
 - f) State the different elements of Plate Girder.
 - g) Explain the terms: "purlins" and "Rafters".
 - 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] [CO-2] [L-2] **2×10**

j) Describe the application of Built-up sections.

<u>PART-A</u>

- Q.2 Explain with proper detailing, the various methods of fabrications for structural steel designs. [CO-1] [L-2] **20**
- Q.3 Assuming fy as 400 N/mm2, design a splice for tension member sections 180 x 10 mm and 250 x 14 mm. The member is subjected to a pull of 400 kN. [CO-2] [L-6] **20**
- Q.4 Calculate the strength of a discontinuous strut of length 5 m. The strut consists of two unequal angles 100 mm x 75 mm x 8 mm, with long legs connected and placed:
 - a) on the opposite side of a 10mm thick gusset plate
 - b) on the same side of the gusset plate (10mm thick) [CO-3] [L-4] 20

<u>PART-B</u>

- Q.5 Design a welded plate girder of span 30m to carry superimposed load of 40 kN/m. Avoid use of bearing and intermediate stiffeners. [CO-4] [L-5] **20**
- 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 m c/c. The rise of the truss is 1/4 of span. Roofing is of AC sheets of dead weight 160 N/m². The wind load normal to the roof truss is 925 N/m²



[[]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 15m 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 kN/m

[CO-6] [L-5] **20**

B. Tech. – Sixth Semester

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 T-Beam 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? [CO-4] [L-2]
 - h) Classify columns on the basis of reinforcement type and slenderness ratio.
 - i) State the limit states at which the structure ceases to function. [CO-5] [L-1]
 - 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. [CO-6] [L-1]

PART-A

Q.2 a) State the Advantages of limit state method over the other methods of RCC design.

[CO-1] [L-2] **10**

2x10

- 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 mm, D = 650 mm, Effective Cover = 50 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 mm × 600 mm is subjected to a load of 60 kN/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

<u>PART-B</u>

- Q.5 Design a slab of dimensions 5m X 11m supported on 230mm thick walls and is supposed to carry a live load of 4kN/m². 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 [CO-5] [L-5] **20**
- Q.7 Design a RCC footing for a column of 500 mm x500 mm carrying an axial load of 450 kN under service loads. Assume safe bearing capacity of soil as 350 kN/m² at a depth of 1 m below the ground level. Use M 20 and Fe 415 for the design. Draw the reinforcement details. [CO-6] [L-3] **20**

B. Tech. – Sixth Semester

HYDROLOGY AND WATER RESOURCES ENGINEERING (BCE-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**. Marks are indicated against each question.
- Q.1 a) Explain Hydrological cycle. [CO-1] [L-2] b) Define the following terms: Interception, Transpiration, ø-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] q) Write an expression for discharge in area-velocity method. [CO-1] [L-3] [CO-6] [L-2] h) List various factors affecting runoff.
 - i) Distinguish between confined and unconfined aguifer,
 - j) Write properties of aquifer?

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**

[CO-6] [L-2]

[CO-6] [L-2] 2×10

- Q.3 a) Describe briefly the various measures to reduce loss of water due to evaporation in reservoir.
 b) Explain step by step Penman's equation method.
- 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 capacity (cm/hr)	10.5	5.65	3.20	2.18	1.50	1.25	1.10	1.0	1.0

[CO-3] [L-5] **10**

<u>PART-B</u>

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 A, B, and

was 75, 55, and 85 mm respectively. If the average annual rainfall of the stations $$\mathsf{A}$,$

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.

[CO-4] [L-5] **10** [CO-4] [L-3] **10** 718/4 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.

[CO-5] [L-5] **10**

Q.7 a) What is Darcy's law? What are its limitations? How will you measure the coefficient

of permeability of soil?

b) Describe a method of determining the yield from an open well.

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.

[CO3] [L-2]

- 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]
 2×10

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 [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.

[CO2] [L-4] **10×2**

Q.4 Correlate LEEDs as one of the measures of green building rating tools. [CO3][L-4] 20
PART-B

- a) Write a well detailed note on "Life cycle assessment". Q.5
 - [CO4] [L-2] **10** b) Describe the various steps involved in the Life - cycle assessment of a concrete column of size 500 mm x 550 mm. [CO4] [L-4] **10**
- 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. [CO5] [L-4] **10**
- 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. 10×2

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]

[CO6]

2x10

- 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:
 - Fineness of Cement by Dry Sieving. i.)
 - Plain and Reinforced Concrete Code of Practice. ii.) [CO6] [L-1]

PART-A

- a) Compare the different ingredients of cement on the basis of their function. 0.2
 - [CO1] [L-2] **10** b) Explain Bogue's Compounds in detail. [CO1] [L-1] 10
- 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**

<u>PART-B</u>

- 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
 - Exposure Condition
 : Very Severe
 - Workability
 - : 80 mm

Make suitable assumptions . [CO6] [L-6] **20** : 20 mm

B. Tech. – Fifth Semester

PROFESSIONAL PRACTICE, LAW AND ETHICS (BCE-DS-504)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

(CO2) (L-4)

(CO2) (L-4)

(CO5) (L-1)

(CO2) (L-4)

(CO6) (L-2) **5x4**

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.
 - b) Analyze the needs of Self ('I') and 'Body'.
 - c) List the differences between society and crowd.
 - d) Analyze the need of natural acceptance of human values.
 - e) Discuss the learning from the "story of stuff".

<u>PART-A</u>

- 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**

<u>PART-B</u>

- 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 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. [CO1] [L-2]
 - c) List the basic sources of building loads.
 - d) Evaluate the Static Indeterminacy for the following Howe Truss:



[CO1] [L-3]

[CO2] [L-1]

- 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 100x150x12 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 mm X 550 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 mm. (by using WSM) [CO2] [L-5] 10

b) Compare static and kinematic degree of indeterminacy for the following figure:



[CO1] [L-2] **10**

<u>PART-B</u>

- Q.5 Using LSM, design a doubly reinforced beam section for the following data:
 - b = 300 mm
 - D = 600 mm

Q.6

- Clear Cover = 25 mm
- M_u = 350 kNm
- M20 and Fe 415

Assume other relevant data.

[CO1] [L-6] **20**

- 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 3.5m x 8m. The thickness of the walls is 250 mm all around. Assume a Live Load of 4 kN/m² and floor finish of 1 kN/m². 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. [CO6] [L-4] 10

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. [CO-1] [L-2]
 - 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. [CO-3] [L-2]
- 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". [CO-6] [L-1] 2×10

<u>PART-A</u>

- a) Discuss the role/functions of: i) Structural Engineer; and ii) Architects. Q.2
 - [CO-1] [L-2] **10** b) Classify the various Civil Engineering Structures. [CO-1] [L-2] **10**
- a) Explain in detail the basic sources of building loads giving specific importance Q.3 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** [CO-2] [L-4] **12** b) Compare Static and Kinematic indeterminacy for the figure below:



<u>PART-B</u>

- 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 10m subjected to LL of 40 kN/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 kN/m. Find effective depth and A_{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?
 - c) What are advantages of triaxial test over direct shear test? (CO6) (L-2)
 - d) Differentiate between primary and secondary consolidation.
 - 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)

(CO2) (L-3)

(CO2) (L-3) 2x10

(CO6) (L-1)

(CO5) (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?
- j) What is placement water content?

<u>PART-A</u>

- 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 cm3 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) 10
 b) Calculate the horizontal and vertical permeability of a soil deposits consisting of four layers 3 m, 1 m, 1.5 m and 3 m thick with permeabilities 0.2, 3 x 10⁻⁴, 0.06, and 5 x 10⁻⁷ cm/sec respectively.
- Q.4a) Discuss the effect of compaction on various properties of soil.(CO3) (L-3) 10b) What is compaction curve? Give its salient features.(CO3) (L-3) 10

<u>PART-B</u>

Q.5a) 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 kN Find incremental vertical pressure at depths 4m and 8m directly under the load and at a distance 5m radially away from the load axis on these depths.
 (CO4) (L-5) 10
- Q.6 What are different causes of preconsolidation? How is it determined? What is the effect of preconsolidation on the settlement? (CO5) (L-3) **20**
- Q.7 a) Define slow, quick and consolidated quick triaxial shear test, illustrating their use by atleast one field example.
 (CO3) (L-3) 10
 - b) Describe unconfined compressive strength test. What are its merits and demerits?

(CO3) (L-3) **10**

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'.
- [CO-1] [L1]
- c) Describe viscosity.

- [CO-1] [L1]
- 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

<u>PART-A</u>

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° 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 m/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 µ.[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 m/s. Take Chezy's constant, C = 70.



[[]CO-2] [L3] **20**

<u>PART-B</u>

- Q.5 The discharge of water through a rectangular channel of width 8m, is 15 m/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**

B. Tech. – Fourth Semester **BUILDING CONSTRUCTION (BCE-DS-407)**

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

Time: 3 hrs.

indicated against each question.

Q.1	 a) Name any four tools required for construction of brick masonry. 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. L parts. 	[CO-1] [L-1] [CO-3] [L-1] [CO-2] [L-2] [CO-3] [L-2] [CO-3] [L-2] [CO-4] [L-3] [CO-4] [L-1] ist various
	i) What are the benefits of rainwater harvesting?j) What precautions tobe adopted in fire resistant Buildings? [Output for the second secon	[CO-5] [L-3] [CO-6] [L-2] CO-6] [L-3] 2×10
	<u>PART-A</u>	
Q.2	a) Compare brick masonry and stone masonry on the basis of cost, durability	strength ,
	and appearance.b) Supposing you are supervising the construction of residential build good	[CO-1] [L-2] 10 Iding in a
	locality, write the general principles you would expect the brick	k layer to
	observe during construction of brick masonry.	[CO-1] [L-2] 10
Q.3	a) Explain the salient features of load bearing and framed structure.b) Write short notes on:	[CO-2] [L-2] 10
	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 dependent	s? [CO-3] [I -2] 10
	b) Suggest relevant type of foundation with sketch for commercial b	puilding on
	soil with justification	[CO-3] [L-3] 10
	<u>PART-B</u>	
Q.5	a) Distinguish between a lintel and an Arch.b) Explain the necessity of lintel along with its classification by material labeled	[CO-4] [L-1] 10 al. Draw a

[CO-4] [L-4] **10** sketch of reinforced concrete lintel with chajja projection.

734/4

Max Marks: **100** No. of pages: 1 Q.6 a) Describe the procedure of any two types of flooring along with its suitability in building construction

[CO-5] [L-3] **10**

- b) With the help of neat sketches discuss the different types of roofs. [CO-5] [L-3] 10
- 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, four

star and five star as per GRIHA?

[CO-6] [L-4] **10**

B. Tech. – Fourth Semester TRANSPORTATION ENGINEERING (BCE-DS-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 a) Explain classification of roads as per Nagpur road plan. [CO-1] [L-2]
 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.
 [CO-6] [L-2]
 - e) Describe the purpose of each layer of flexible pavement. [CO-4] [L-2]
 - f) Define the following terms: modulus of sub grade reaction, radius of relative stiffness, equivalent radius of resisting section. [CO-4] [L-1]

- [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] [CO-1] [L-2] **2×10**

j) Explain the uses of map study.

<u>PART-A</u>

- 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] **10**
 - 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. [CO-5] [L-2] 10

g) Explain the uses of bitumen emulsion. Also list the tests carried out on emulsion.

b) Classify different types of signals along with its advantages and disadvantages.

<u>PART-B</u>

- 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**

[CO-6] [L-3] **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 kg/cm² and 7.5 kg/cm², respectively. Design the thickness requirement of flexible pavement for a wheel load of 6000 kg with tyre pressure of 8.0 kg/cm² 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, $E=3.0 \times 10^5 \text{ Kg/cm}^2$

Poisson's ratio of concrete =0.15

Thickness of concrete pavement, h=18 cm

Modulus of subgrade reaction, $K = 6.0 \text{ Kg/cm}^3$

Wheel load, P = 5100 Kg

Radius of loaded area, a=15cm

[CO-4] [L-3] **10**

End Semester Examination, Dec. 2022 B. Tech. – Fourth Semester MATERIAL TESTING AND EVALUATION (BCE-DS-404A)

h) i) i)	How is consistency different from workability? What are nanomaterials? What are limitations of ultrasonic test?	[CO-5] [L-2] [CO-2] [L-1] [CO-6] [L-2] 2×10
])	PART-A	
a) b)	What are the criteria's for choosing material for construction? "The earth is losing its carrying capacity due to unsustainable pr consumption"– Can engineers help regain the carrying capacity you agree or disagree? State the reasons for your answer.	[CO-1] [L-2] 10 oduction and of earth? Do [CO-1] [L-2] 10
a) b)	Summarize various stages of manufacturing of cement. What are properties of Hardened concrete? Explain in Brief?	[CO-2] [L-2] 10 [CO-2] [L-3] 10
Wr a) b) c) d)	ite short note on: Carbon fiber reinforced concrete. Nanomaterials. Shape-memory. 3D printing of materials.	[CO-3] [L-5] 5×4
	<u>PART-B</u>	
a) b)	Discuss the relevance of structural integrity assessment. What is torsion? Why is it necessary for structural design? Exp laboratory method to determine it.	[CO-4] [L-6] 5 Ilain any one [CO-4] [L-4] 15
a) b) c)	What are the various methods used for curing? How 28 day conc can be predicted in one day? Describe the factors affecting strength of concrete. Describe the methods of testing fresh concrete.	rete strength [CO-4] [L-4] 5 [CO-4] [L-4] 5 [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.

[CO-6] [L-5] **15** 738/4

[CO-1] [L-1]

[CO-1] [L-1]

[CO-2] [L-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

Time: 3 hrs. Max Marks: **100** carries equal marks.

No. of pages: 1

a) List any three sustainable materials for buildings. b) What are three principles of Green engineering?

- c) State the function of sand in mortar.
- 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)
- i)
- j)
- Q.2 a)
 - b)
- Q.3 a) b)
- W Q.4

Q.5

Q.6

Q.1

- a) b)
- c)
- d)

B. Tech. – Third Semester SURVEYING AND GEOMATICS (BCE-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. Each question carries equal marks.
- Q.1 Answer the following in brief:

	5	
a)	What do you understand by the term "Levelling"?	[CO-1] [L-2]
1 \		

- b) Compare "Accumulative Error" and "Compensating Error". [CO-1] [L-2] [CO-2] [L-3]
- c) Represent N 85⁰ E in Whole Circle System of Bearing.
- d) Justify the statement: "Sum of all the Deflected Angles for a Closed Traverse is 360⁰. " [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. [CO-4] [L-2]
- g) Define the concept of "Oblique Photograph".
- h) Summarize the applications of remote sensing in surveying.
- i) List the different purposes of geographical information system. [CO-6] [L-1]
- i) What do you understand by the term "geographical positioning system"? [CO6] [L-2]

2×10

[CO-4] [L-1]

[CO-5] [L-2]

PART-A

- a) Write a well explanatory note on "Theory of Weights". Q.2 [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	- 2222.04	1/10/00	010023	100016-00	232.460	B.M. 1
2	1.650		2	0.020			
3		2.105	0.000000	2144	?		
4	7		1.960	7	1		
5	2.050		1.925		0.300		
6		?		?		232.255	B.M. 2
7	1.690		?	0.340		0.0000000000000000000000000000000000000	
8	2.865		2.100		?		
9			?	7	1.1.1	233.425	B.M. 3

Q.3 a) Determine the missing values for a Closed Traverse:

> Length (m) Lines Bearings 72⁰ AB Х 146° BC 160 214⁰ CD Υ 325⁰ DE 310 14^{0} EA 190

[CO-2] [L-5] **10**

- b) With the help of neat sketch, compare the different systems of bearings in compass surveying. [CO-2] [L-2] 10
- 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**

<u>PART-B</u>

- 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 cm X 25 cm with longitudinal and side overlaps be 35 % and 25 % respectively. [CO-4] [L-4] 12
- Q.6a) Explain the features of Energy Interaction with Earth's surface.[CO-5] [L-2] 10b) Write a short note on "Rayleigh Scatter".[CO-5] [L-2] 10
- Q.7a) Distinguish between the two data structures for GIS.[CO-6] [L-2] 10b) Correlate the concept of "User Equipment Segment" in GPS.[CO-6] [L-2] 10

B. Tech. – Fourth Semester INTRODUCTION TO SOLID MECHANICS (BCE-DS-402)

Max Marks: 100
No. of pages: 1
ny TWO
question
[CO-1] [L-2]
[CO-1] [L-2]
oment.
[CO-2] [L-2]
orted beam
[CO-2] [L-1]
[CO-3] [L-2]
)mm.
[CO-4] [L-2]
[CO-4] [L-2]
[CO-6] [L-2]
[CO-5] [L-1]
[CO-6] [L-1]
2×10

<u>PART-A</u>

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**

<u>PART-B</u>

- 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**

B. Tech. - Fourth Semester **INTRODUCTION TO FLUID MECHANICS (BCE-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. 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 2.5mm diameter when immersed vertically in water and mercury. Take specific tension 0.0725N/m for water and

0.52N/m for mercury in contact with air. The specific gravity of mercury is 13.6 and [CO-2] [L-4] **15**

angle of contact is 130°.

- Calculate the pressure due to a column of 0.3 of : Q.3
 - a) Water
 - b) An oil of specific gravity 0.8.
 - c) Mercury of specific gravity 13.6. Density of water = 1000kg/m3 [CO-1,2] [L-5] **20**
- Derive continuity equation in 3 dimensions cartesian coordinates. [CO-3] [L-6] **20** Q.4

PART-B

- Derive Bernoulli's equation of motion and discuss its practical applications. Q.5 [CO2,4][L6] **20**
- Q.6 An orificemeter with orifice dia 10cm is inserted in a pipe of 20cm dia. The pressure gauges fitted upstream and downstream of the orifice meter gives the readings of 19.62N/cm2 and 9.81N/cm2 respectively. Co-efficient of discharge [CO-1,5] [L-5] **20** for the meter is 0.6. Find the discharge of water through pipe.
- Q.7 a) State Buckingham pi theorem.
 - b) The efficiency η of fan depends on density ρ , dynamic viscosity μ of fluid, angular velocity ω , diameter D of rotor and discharge Q. Express n in terms of dimensionless parameters. [CO-6] [L-6] **16**

742/4

[CO-6] [L-4] **4**

2×10

B. Tech. - Fourth Semester **INTRODUCTION TO FLUID MECHANICS (BCE-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. 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 2.5mm diameter when immersed vertically in water and mercury. Take specific tension 0.0725N/m for water and

0.52N/m for mercury in contact with air. The specific gravity of mercury is 13.6 and [CO-2] [L-4] **15**

angle of contact is 130°.

- Calculate the pressure due to a column of 0.3 of : Q.3
 - a) Water
 - b) An oil of specific gravity 0.8.
 - c) Mercury of specific gravity 13.6. Density of water = 1000kg/m3 [CO-1,2] [L-5] **20**
- Derive continuity equation in 3 dimensions cartesian coordinates. Q.4 [CO-3] [L-6] **20**

PART-B

- Derive Bernoulli's equation of motion and discuss its practical applications. Q.5 [CO2,4][L6] **20**
- Q.6 An orificemeter with orifice dia 10cm is inserted in a pipe of 20cm dia. The pressure gauges fitted upstream and downstream of the orifice meter gives the readings of 19.62N/cm2 and 9.81N/cm2 respectively. Co-efficient of discharge [CO-1,5] [L-5] **20** for the meter is 0.6. Find the discharge of water through pipe.
- Q.7 a) State Buckingham pi theorem.
 - b) The efficiency η of fan depends on density ρ , dynamic viscosity μ of fluid, angular velocity ω , diameter D of rotor and discharge Q. Express n in terms of dimensionless parameters. [CO-6] [L-6] **16**

743/4

[CO-6] [L-4] **4**

2×10

B. Tech. – Third Semester INTRODUCTION TO MATERIALS SCIENCE (BCE-DS-306)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

744/4

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) Give electron configurations for the Fe^{3+} and 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?	[CO-4] [L-2]
	i) Explain proportional limit.	[CO-4] [L-2]
	j) What is the difference between electronic and ionic conduction?	[CO-5] [L-2]
		2x10

<u>PART-A</u>

Q.2	a) b)	Explain why covalently bonded materials are generally less de ionically or metallically bonded ones. Describe ionic, covalent, metallic and van der Waals bonds.	ense than [CO-1] [L-2] [CO-1] [L-2]	8 12
Q.3	a) b) c)	Draw sketches illustrating for Miller indices (111), (100) and (110). Calculate the atomic packing factor for simple cubic. A simple cubic crystal has atomic radius of 1.75 Å. Determine the planes having Miller indices (200) and (111).	[CO-3] [L-3] [CO-3] [L-3] spacing of [CO-3] [L-4]	6 8 6
Q.4	a) b) c)	Differentiate between interstitial and substitutional defects. Explain the Frenkel defects in details. Describe the atomic structure within the vicinity of grain boundary.	[CO-2] [L-2] [CO-2] [L-2] [CO-2] [L-2]	6 6 8
Q.5	a) b) c)	PART-B With the help of a diagram, explain the mechanism of diffusion. Differentiate between steady-state and nonsteady-state diffusion. Schematically sketch simple isomorphous phase diagram.	[CO-2] [L-4] [CO-2] [L-2] [CO-2] [L-4]	8 6 6
Q.6	a) b) c)	Differentiate between elastic deformation and plastic deformation b materials. Name the two hardness-testing techniques and differentiate betwee Write short note on tensile strength.	ehavior of [CO-4] [L-2] in them. [CO-4] [L-2] [CO-4] [L-2]	8 8 4
Q.7	a) b)	Write short note on ferroelectricity and piezoelectricity? Explain the behaviour of dielectrics in an external field.	[CO-5] [L-2] [CO-5] [L-2]	8 4

c) Explain the paramagnetism, ferromagnetism, antiferromagnetism and ferrimagnetism with suitable examples. [CO-5] [L-2] **8**

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 Fe^{3+} and 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?	[CO-4] [L-2]
	i)	Explain proportional limit.	[CO-4] [L-2]
	j)	What is the difference between electronic and ionic conduction?	[CO-5] [L-2]
			2x10
		<u>PART-A</u>	
Q.2	a)	Explain why covalently bonded materials are generally less c	lense than
	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 Å. Determine the spacing of
 - planes having Miller indices (200) and (111). [CO-3] [L-4] **6**
- a) Differentiate between interstitial and substitutional defects. [CO-2] [L-2] **6** Q.4 [CO-2][L-2] **6**
 - b) Explain the Frenkel defects in details.
 - c) Describe the atomic structure within the vicinity of grain boundary. [CO-2] [L-2] 8

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. [CO-4] [L-2] **8** [CO-4] [L-2] **4** c) Write a note on 'tensile strength'. 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. [CO-5] [L-2] **8**

B. Tech. – Third Semester ENGINEERING GEOLOGY (BCE-DS-305)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-6] [L-3] [CO-4] [L-2]

[CO-4] [L-2]

[CO-1] [L-1]

[CO-4] [L-3] [CO-5] [L-3]

[CO-5] [L-3]

[CO-6] [L-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) Evolution of the peak of Mt. Everest is attributed to which process.
 - b) Differentiate between elastic and ductile deformation.
 - c) Draw a neat sketch of anticline and syncline fold.
 - d) Define 'streak'.
 - e) Give two examples of basic rocks.
 - f) Compile a list of any four processes used for treatment of rocks.
 - g) Give the need of an artificial slope.
 - h) List any two natural causes of a landslide.

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**

<u>PART-A</u>

		PART-B		
Q.4	a) D b) D	Discuss the factors that affect weathering. Discuss desert landform and their features.	[CO-4] [L-3] 10 [CO-5] [L-4] 10)
Q.3	a) W b) E si	Vith the help of a neat sketch describe the rock cycle. Explain the process of formation of sedimentary rocks and the ignificance of these rocks.	[CO-3] [L-3] 10 economic [CO-3] [L-3] 10)
	b) W	Vith the help of a neat sketch explain the interior of earth.	[CO-0] [L-3] 10 [CO-1] [L-3] 10)
Q.2	a) S	summarize the importance of engineering geology for civil engineers		

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

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.
- Answer the following in briefly: Q.1
 - a) What do you understand by the term "Disaster Planning"? [CO-1] [L-2]
 - b) Justify the importance of "Vulnerability and Reliability Analysis". [CO-1] [L-2] [CO-2] [L-2]
 - c) Describe "Man made Disaster" with suitable examples.
 - d) Comment on the Post Disaster Environmental Response w.r.t. Waste [CO-2] [L-1] Management and Sanitation.
 - 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]
 - q) With the help of neat sketch, illustrate the components of Disaster Management in brief. [CO-4] [L-2] [CO-6] [L-2]
 - h) Summarize the responsibilities of NDMA.
 - i) Define "Disaster Mitigation".
 - [CO-6] [L-1] 2x10 j) Illustrate the impact of Dams on disaster and its management.

PART-A

Q.4	Discuss the various objectives of Disaster management.	[CO-1] [L-4] 20
Q.3	Elaborate the repercussions of disaster's impact on the ecology.	[CO-3] [L-3] 20
Q.2	Explain in detail the "Natural Disaster" in Indian context.	[CO-2] [L-3] 20

PAKI-B

Q.5 Illustrate the Emerging Trends in Disaster Planning, Preparedness and Mitigation.

[CO-4] [L-3] **20**

[CO-5] [L-1]

- Write an explanatory note on holistic approach in reconstruction and Q.6 development methods. [CO-6] [L-3] **20**
- Q.7 Summarize the Disaster Risk reduction programs in India. [CO-5] [L-3] **20**

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.
 - d) Write the assumptions used in the analysis of a truss.
 - e) Write the Moment of Inertia about centroidal Y-Axis.



[CO-1] [L-2]

[CO-2] [L-1]

[CO-2] [L-1]

[CO-3] [L-1]

- f) When is the work done by a force is positive, zero and negative. [CO-4] [L-2]
- q) 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 BC. [CO-1] [L-3]



- 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] [CO-6] [L-1]
- i) What are free vibrations?

PART-A

Determine the magnitude of P and F necessary to keep the concurrent force Q.2 system in Fig. below in equilibrium. [CO-1] [L-3] **20**

750/4

2x10



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 BC, CH and HG in the truss given below. [CO-3] [L-5] **20**



<u>PART-B</u>

Q.5 A 80-kg block rests on a horizontal plane. Find the magnitude of the force P required to give the block an acceleration of 5 m/s^2 to the right. The coefficient of kinetic friction between the block and plane is = 0.25. Write De-Alembert's equations. [CO-5] [L-3] **20**



Q.6 A sack slides off the ramp with a horizontal velocity of 12m/s. If the height of the ramp is 6m 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. [CO-6] [L-4] 20

End Semester Examination, Dec. 2022 B. Tech. – Sixth Semester MULTIMEDIA AND ANIMATION (BCA-603A/BCA-DS-604)

Time: 3 hrs.

Note:	Att qu ag	tempt FIVE questions in all; Q.1 is vestions from Part-A and TWO question vainst each question.	No. of pag compulsory. Attempt any TWO as from Part-B . Marks are indicated	ges: 2
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) Z		
	۲۲	III) 4 In Crow ecolo colour mode, we get	IV) b	
	u)	i) 2.24		
		1) 2 27	ii) 20	
	۵)	audio/video refers to the u	ise of the internet for interactive	
	c) au	dio/video		
	uu	applications		
		i) Interactive	ii) Streaming Live	
		iii) Streaming Stored	iv) none of the above	
	f)	All of the following are technologies u	sed to gather information about you	
	ón	line	2	
		except		
		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 w	hich of these orientations?	
		i) newscape	II) portrait	
	:\	III) TIAT-TILE	IV) x-neight	
	I)	How many step process for creating a 3		
		1) Z iii) A	II) 5 iv) 5	
	i)	A series of slides displayed in a particula	iv) 5 or sequence is called	
	1)	i) Placeholder	ii) Template	
		iii) Lavout	iv) Slide show	2x10
			,	

<u>PART-A</u>

- Q.2What do you understand by the term Multimedia? Explain the impact of
Multimedia on social platforms.[CO-1] [L-1] 20
- Q.3 a) Explain the need of Hypermedia and Hypertext applications. Give their advantages.

Max Marks: **100**

[CO-2] [L-2] **10** [CO-2] [L-2] **10**

Q.4 a) Elaborate on the various attributes of Sound and images used in multimedia.

b) Differentiate between MIDI and Digital Audio. [CO-3] [L-3] **10** [CO-3] [L-4] **10**

<u>PART-B</u>

- Q.5 a) What is Animation? Explain its types. Mention various Principles of Animation. [CO-4] [L-2] **20**
- 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

[CO-5] [L-2] **5×10**

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.

[CO-6] [L-2] **10**

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 β -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	n. [CO-4] [L-1]
i) What are Meisenheimer complexes?	[CO-1] [L-1]
j) Which genes are responsible for microbial degradation of PC	Bs? [CO-5] [L-1]
•	2x10

<u>PART-A</u>

- 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**

755/4

- 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**

<u>PART-B</u>

- 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.[CO-3] [L-6] 10

b) Discuss the different strategies of microbial remediation of nitroaromatics in detail.

[CO-6] [L-4] **10**
End Semester Examination, Dec. 2022 B. Tech. – Seventh Semester 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.
- Answer the following questions: Q.1 (CO1) (L2) a) Differentiate between Therapy and Molecular Therapy. 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) q) 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) 2x10

<u>PART-A</u>

- 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) **20**
- 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**

- Q.5 Give an account of various steps and important considerations in assigning immunotherapy. (CO14, 5) (L3) **20**
- Q.6Gene 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**

B. Tech. – Seventh Semester 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.	[CO-6][L-2] 2x10

<u>PART-A</u>

- 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**

- 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] 20
- Q.7Homology modeling is widely used in 3D structure prediction. Discuss using
suitable example.[CO-6] [L-2] 20

B. Tech. – Seventh Semester 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.

<u>PART-A</u>

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**

2x10

Q.4a) 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**

<u>PART-B</u>

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. [CO-3] [L-2] 5
- 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] 10

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**

B. Tech. – Sixth Semester 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	[CO-2] [L-2]
	c) Differentiate between PCR and qPCR.	[CO-2] [L-2]
	d) Mention the types of blotting techniques.	[CO-3] [L-2]
	e) Justify the role of immunology in diagnostics.	[CO-3] [L-2]
	f) ELISA refers to	[CO-4] [L-2]
	g) Demarcate the importance of prenatal diagnosis.	[CO-5] [L-2]
	h) What is genotyping?	[CO-5] [L-2]
	i) Differentiate between heteroduplex and homoduplex.	[CO-6] [L-2]
	j) What is HCG and AFP?	[CO-6] [L-2] 2×10

<u>PART-A</u>

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**

<u>PART-B</u>

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.

[CO-6] [L-2] **20**

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 VIROLOGY (BBT-DS-523)

Time: 3 hrs.

Q.:

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.

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)
	 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

<u>PART-A</u>

- 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**

- 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.6a) Give an account of different types of viral vectors.(CO4, CO6) (L2) 10b) Elaborate on the various biosafety levels adopted for virological laboratories.(CO4, CO6) (L2) 10(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. (CO5,6) (L2) **20**

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester 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 A	nswer the following:	
ā) What is the difference between viroid and virus?	[CO1) L2]
ł) What are the major events in viral life cycle?	[CO2) L2]
C) What is receptor mediated endocytosis?	[CO3) L2]
C) Why does a virus undergo uncoating?	[CO3) L2]
e) What is candling?	[CO4) L2]
f) What are antivirals?	[CO6) L2]
ç) What is passive immunity?	[CO4) L2]
ł) Mention the taxonomy of Chikungunya Virus.	[CO5) L2]
i	Name the two most common vaccine delivery methods.	[CO5) L2]
j) What is meant by biosafety?	[CO6) L2] 2x10

<u>PART-A</u>

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**

- 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. **10**b) Elaborate on the various biosafety levels adopted for virological laboratories. (CO4, 6) (L2) **10**
- Q.7Discuss about the structure, diagnosis and treatment for SARS Virus. Illustrate
the structure with the help of diagram.CO5, 6) (L2) 20

B. Tech. – Fifth Semester

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] **2x10**

<u>PART-A</u>

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**

<u>PART-B</u>

- 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**

End Semester Examination, Dec. 2022 B. Tech. (Biotechnology) – Fifth Semester ANIMAL BIOTECHNOLOGY (BBT-DS-503)

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

[CO1] [L2]

[CO1] [L1]

[CO1] [L1]

[CO1] [L2]

[CO1] [L1]

[CO1] [L1]

[CO1] [L2]

- 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?

- b) What is animal biotechnology?
- c) What is cryopreservation?
- d) Why was penicillin a game changer during 2nd world war?
- 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?
- g) What is an immortalized cell?
- h) Which phase of growth curve is crucial for adaptation of cells to their environment? [CO1] [L2]
- i) What is Glass Transition temperature?
- j) Name the two classes of promoters used in mammalian expression vectors. [CO1] [L2] **2x10**

<u>PART-A</u>

- 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)? [C01,3] [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.

[CO4] [L5] **4**

d) Name the 4 types of 3D spheroid structures and explain the properties of any two. [CO3] [L4] **6**

- 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? [CO5] [L2] **5**
- 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**

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	f foods. [CO2L2]
c)	Elaborate the spoilage of fresh and processed meats.	[CO3 L1]
d)	Discuss the food additives of fermentation origin.	[CO4 L2]
e)	Give the temperature effect on milk.	[CO4 L2]
f)	What are flavor potentiators, explain with suitable examples?	[CO4 L3]
g)	Discuss the fermentative production of riboflavin.	[CO5 L2]
h)	Name five microbial enzymes used as food additives with their app	lications.
		[CO6 L1]
i)	What are the functional properties of single cell protein (SCP)?	[CO5 L2]
j)	Expand MPN and DMC.	[CO2 L1] 2x10

<u>PART-A</u>

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**

[CO2] [L2] **10**

- Q.3 a) Elaborate the determination and detection of microorganism in food.
 - 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**

<u>PART-B</u>

- 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. [CO4] [L3] **20**
- 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.7Give the effect of proteolytic enzymes on protein quality of foods. Discuss some
important enzymatic reactions in food fermentations.[CO6] [L4] 20

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester RECOMBINANT DNA TECHNOLOGY (BBT-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 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] [CO2] [L2]

- i) How Northern blotting is different from Souther blotting.
- j) Which vectors are used for cloning very large pieces of DNA?

[CO3] [L2] **2x10**

- 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

a) What is the principle of Sangers method of sequencing? How it is different Q.5 from chemical method? [CO4] [L3] **14** b) What is receptor mediated endocytosis?

[CO5] [L3] **6**

- 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** [CO6] [L5] 8

b) How PCR product can be quantified?

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 A

and B). Which population has the maximum range?



[CO-3] [L-3,4]

772/4

d) Observe the histograms given below and identify them according to their kurtosis.



e) Two samples were drawn from the population and their coefficient of variance (C.V.)

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 final probability given below: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ [CO-4] [L-3,4,5]

i) For the three normal distributions given below, what is the nature of mean and

variance?



[CO-3] [L-3,4]

[CO-5] [L-3,4]

[CO-1] [L-1,2]

j) Identify the type of normal distribution given below:



[CO-3] [L-2,3] 2×10



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
- [CO-1,2,3] [L-6] [CO-1,2,3,4] [L-4] [CO-1,2,3,4] [L-4] [CO-1,2,3,4] [L-4] **5×4**
- 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 is

more variable?

[CO-1,2,3,5] [L-4,5] **5**

[CO-5] [BTL5]

[CO-5] [L-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

ii) Diagnoses of patients seen in the emergency department of a large city hospital

iii) Weights of high-school male basketball players.

[CO-5] [L-5] 3×2 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 will instructor

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:
- (CO-5) (L5)
- (CO-5) (L5) (CO-5)(L5) 1×3

ii) Mode<Median<Mean iii) Mean<Median<Mode

i) Mean=Median=Mode

e) A simple random sample of 11 subjects was drawn from the population. The age (in years) of the 11 subjects is as follows:

 $x_1=10$, $x_2=15$, $x_3=20$, $x_4=17$, $x_5=18$, $x_6=9$, $x_7=13$, $x_8=11$, $x_9=12$, $x_{10}=6$, x₁₁=19

Calculate:

- i) Mean (CO-1,2) (L3)
- ii) Median iii) Mode

- (CO-1,2) (L3) (CO-1,2) (BTL3) **1×3**
- 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).

Frequency of Fandly History of Mood Disorder

Family History of Mood Disorders	Early - 10(E)	Later > 10(L)	Rota
Negative 640	26	36	00
Maporalar eligeneedure 1.MT	10	38	81.27
Uninpollar (Cl)	-0.7		1010
Uniperiar area bipostar (E)	15.31	60	41.26
Total	141	177	1216

"Early logs of Dilast as a Blat Farter for Pase Discourse of Ripetar Disket of Psychiatric Research, 37 (2000), 597-003.

Answer the following questions:

i) What is the probability that this personwill be 18 years old or younger?

- 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)?
 (CO-1,2,3,5)
- 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)

- 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.
 - iii) Estimate the predictive value positive
 - iv) Estimate the predictive value negative.

<u>PART-B</u>

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

(CO-1,2,3, 5) (BTL3)

(CO-1,2,3, 5) (BTL3)

(CO-1,2,3, 5) (BTL3)

(CO-1,2,3, 5) (BTL3) 21/2×4

⁽CO-1,2,3, 5) (L5,6)

^{1×10}

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 Children in Head Start Programs in 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? (CO-1,2,3, 4) (L5)
- d) What is the probability that a randomly selected family used either one or two programs? (CO-1,2,3, 4) (L5)
- 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) 2×10
- 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) 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 is consistent to be 18.7%.
 - (CO-1,2,3,5) (L5) (CO-1,2,3,5) (L5) (CO-1,2,3,5) (L5)

(CO-1,2,3, 4) (L6)

(CO-1,2,3, 4) (L6)

iii) More than one

ii) Exactly one

- iv) Two or fewer
- v) Exactly three

- 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
 - ii) at least seven
 - iii) No more than five
 - iv) Between six and nine, inclusive
 - v) More than 4, inclusive
- 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 λ =12 incidents per year in Norway. Find the probability that in the next year, among patients receiving rocuronium:
 - i) exactly 3 will experience anaphylaxis
 - ii) at least 3 patients
 - iii) more than 2
 - iv) less than 7
 - v) between 4 and 5
- d) Find area of the shaded region under the standard normal distribution: i) (CO-1,2,3,4,5) (L4)



(CO-1,2,3,4,5) (L4)

(CO-1,2,3,4,5) (L4)

(CO-1,2,3,5) (L5) (CO-1,2,3,5) (L5) **1×5**

(CO-1,2,3,5) (L5)

(CO-1,2,3,5) (L5)

(CO-1,2,3,5) (L5)

(CO-1,2,3,5) (L5)

(CO-1,2,3,5) (L5) **1×5**

- (CO-1,2,3,5) (L5)
- (CO-1,2,3,5) (L5)
- (CO-1,2,3,5) (L5)
- (CO-1,2,3,5) (L5)
- (CO-1,2,3,5) (L5) **1×5**







- 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. (CO-5) (L5)
 - 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. (CO-5) (L5)
 - vi) A hospital patient's vital signs recorded as normal or not normal. (CO-5) (L5) 2×6 b) Given the standard normal distribution find

Giver		
i.)	P (z ≥ 0.66)	(CO-1,2,3,4) (L4)
ii.)	P (z ≥ -0.66)	(CO-1,2,3,4) (L4)
iii.)	$P(z \le -1.33)$	(CO-1,2,3,4) (L4)
iv.)	$P(z \le 1.33)$	(CO-1,2,3,4) (L4)
v.)	P (-1.76 ≤ z ≤ 2.33)	(CO-1,2,3,4) (L4)
vi.)	P (-2.33 ≤ z ≤ 1.76)	(CO-1,2,3,4) (L4)
vii.)	P (z=0.65)	(CO-1,2,3,4) (L4)
viii.)	P (-1.25 ≤ z ≤ 1.25)	(CO-1,2,3,4)(L4)
		1×8

Table1 **Cumulative Binomial Probability Distribution**

n = 5										
X	.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	.99999	.9999	.9998	.9997	.9995
4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
X	.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
X	.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	.5907	.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
X	.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	.6997	.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

				<i>n</i> =	15 (cont	inued)				
×	.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	8000.	.0006	.0005
2	.0227	.0189	.0157	.0130	.0107	.0087	.0071	.0057	.0046	.0037
3	.0785	.0678	.0583	.0498	.0424	.0359	.0303	.0254	.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	7795	7490	7233	6964
9	.9596	.9521	.9435	.9339	.9231	.9110	.8976	.8829	.8667	.8491
10	0884	9857	9896	9789	9745	9695	9697	9570	9494	9408
11	9075	9969	0200	0040	9037	0001	9003	0891	9955	0924
10	0006	0005	0002	0001	0090	0096	0087	0077	0071	0063
12	1.0000	1.0000	0000	0000	0000	0000	0008	0007	0006	0005
14	1.0000	1.0000	1.0000.1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
					n = 16	1				- 2025-07
-	1	50.02	15-16		n - 15	10055	190		10.187	- 22
X	.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	0000.1	1.0000	1.0000	1.0000	.99999	.9998	.9995	.9990	.9981	.9967
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.99999	.99999	.9997	.9995
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.99999
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
X	.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	.9189
6	0001	0005	9976	9969	0044	9990	9888	9847	9796	9739
7	0000	0008	9006	0002	9080	0084	9076	9964	9949	0030
0	1 0000	1,0000	0000	0000	9009	9997	9006	9002	0000	0084
0	1.0000	1.0000	1.0000	1.0000	1 0000	1 0000	99999	0000	9998	9999
9	1 1 1 1 1 1 1 1 1 1	The second se	and the second sec		a second s	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				

Table 2

Cumulative Poisson Distribution $P(X \le X \lambda)$. 1000 Times the								
Probability of	X or Fewe	r Occurrences	of Event	That Has	Average	Number of	of	
Occurrences Ec	qual to λ							

~	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5
1	001	001	000	000	000	000	000	000
2	006	004	003	002	001	100	001	000
3	021	015	010	007	005	003	002	002
4	055	040	029	021	015	011	008	005
5	116	089	067	050	038	028	020	015
6	207	165	130	102	079	060	046	035
7	324	269	220	179	143	114	090	070
8	456	392	333	279	232	191	155	125
9	587	522	458	397	341	289	242	201
10	706	645	583	521	460	402	347	297
11	803	752	697	639	579	520	462	406
12	876	836	792	742	689	633	576	519
13	926	898	864	825	781	733	682	628
14	959	940	917	888	854	815	772	725
15	978	967	951	932	907	878	844	806
16	989	982	973	960	944	924	899	869
17	995	991	986	978	968	954	937	916
18	998	996	993	988	982	974	963	948
19	999	998	997	994	991	986	979	969
20	1000	999	998	997	995	992	988	983
21	110203152	1000	999	999	998	996	994	991
22			1000	999	999	998	997	995
23				1000	1000	999	999	998
24						1000	999	999
25							1000	999
26								1000

Table 3

Normal Curve Areas $P(z \le z_0)$. Entries in the Body of the Table Are Areas Between $-\infty$ and z

2	-0.09	-0.08	-0.07	-0.06	-0.05	-0.04	-0.03	-0.02	-0.01	0.00	z
- 3.80	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	-3.80
-3.70	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	-3.70
-3.60	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0002	.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	.0006	.0006	.0006	.0006	.0006	.0007	.0007	-3.20
-3.10	.0007	.0007	.0008	.0008	.0008	.0008	.0009	.0009	.0009	.0010	-3.10
-3.00	.0010	.0010	.0011	.0011	.0011	.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	0029	0030	0031	0032	0033	0034	0035	-2.70
-2.60	.0036	.0037	.0038	.0039	.0040	.0041	.0043	.0044	.0045	.0047	-2.60
-2.50	0048	0049	0051	0052	0054	0055	0057	0059	0060	0062	-2.50
-2.40	0064	0066	8300	0069	0071	0073	0075	0078	0080	0082	-2 40
-2 30	0084	0087	0080	0001	0094	0096	0000	0102	0104	0107	-2 30
-2.20	0110	0113	0116	0110	0122	0125	0120	0132	0136	0130	-2.20
-2.10	.0143	.0146	.0150	.0154	.0158	.0162	.0166	.0170	.0174	.0179	-2.10
-2.00	0183	0188	0192	0197	0202	0207	0212	0217	0222	0228	-2.00
-1.90	0233	0239	0244	0250	0256	0262	0268	0274	0281	0287	-1.90
-1.80	0294	0301	0307	0314	0322	6929	0336	0344	0351	0359	-1.80
-1.70	0367	0375	0394	0302	0401	0409	0418	0497	0436	0446	-1.70
-1.60	0455	0465	0475	0495	0405	0505	0516	0596	0537	0549	-1.60
1.00	.0133	.0105	.0475	.0465	.0495	.0303	.0310	.0320	.0337	.0310	-1.00
-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	.4483	.4522	.4562	.4602	-0.10
0.00	.4641	.4681	.4721	.4761	.4801	.4840	.4880	.4920	.4960	.5000	0.00

TABLE D (continued)

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	2
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	.6700	.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	.9875	.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	.99999	.99999	.99999	.9999	.9999	.99999	.99999	.99999	3.60
3.70	.9999	.9999	.99999	.99999	.99999	.99999	,9999	,9999	.99999	.99999	3.70
3.80	.99999	.99999	.99999	.99999	.99999	.9999	.99999	.99999	.9999	.99999	3.80

End Semester Examination, Dec. 2022 B. Tech. - Fourth Semester **MOLECULAR BIOLOGY (BBT-DS-401)**

Time: 3 hrs

Max Marks: **100**

No. of pages: 1

[CO1][L2]

[CO5][L3]

[CO5][L3] **2^{1/2}×8**

- 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?
 - c) What are histone proteins?
 - [CO2][L2] d) The base sequence of an mRNA is: 3' 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?

PART-A

- Q.2 How the genetic material of prokaryotes and eukaryotes undergo compaction to fit within the cell? [CO-1] [L-2] **20**
- a) Discuss the process of replication in bacteria. Indicate the role of the major Q.3 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**

a) How RNA polymerase carries out the process of transcription in prokaryotes? Q.4 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

- How lactose is utilized as a carbon source inside a bacterial cell? How this Q.5 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**
- Give a brief account of transposable elements in bacteria. What is the Q.7 evolutionary significance of transposons? [CO-3] [L-3] **20**

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?

<u>PART-A</u>

- Q.2 a) Bioinformatics is an amalgamation of different fields. Justify the statement.
 - 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**

[CO-1] [L-2] **10**

[CO-1] [L-2] **10**

2x10

Q.4 Evaluate the given sequences using distance matrix and show cladogram. ATATCGGGCCCC, CCGCTACGGTTT, ATCGACTCTAAT, CCCCCCCCCTT ATGCTACATCGA, TCCCGGGGGAAA [CO-3] [L-5] **20**

- Q.5 a) Explain different secondary structure component present in a protein.
 - 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. [CO-4] [L-4] **20**
- Q.7 Design an appropriate experiment to show the applications of peptide mass fingerprinting. [CO-6] [L-2] **20**

B. Tech. – Third Semester BIOANALYTICAL TECHNIQUES (BBT-DS-304A)

Time: 3 hrs.

Max Marks: **100** *No. of pages: 1*

2×10

- 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.

<u>PART-A</u>

- Q.2a) 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. [CO-3] [L-3] **10**

<u>PART-B</u>

- Q.5a) Develop an electrophoretic technique to separate proteins.[CO-6] [L-6] **10**b) Describe briefly the technique of 2-D Gel electrophoresis.[CO-5] [L-2] **10**
- Q.6a) 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.[CO-4] [L-4] **10**
- 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 BIOANALYTICAL TECHNIQUES (BBT-DS-304)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-6][L-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, β and γ rays.
 - 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

<u>PART-A</u>

Q.2 a) Describe the meaning of the following performance indicators of an instrument:

i) Sensitivity ii) Resolution iii) Threshold. [CO-1][L-2] **10**

- 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**

- Q.5a) 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] **10**
- Q.7a) How do scintillation counters work?[CO-6][L-2] 10b) List the differences between Geiger Muller counting and scintillation counting.[CO-6][L-2] 10[CO-6][L-2] 10

End Semester Examination, Dec. 2022 B. Tech. – Third Semester 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?

<u>PART-A</u>

- 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**

2x10

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

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) b)	Distinguish between glycolysis and gluconeogenesis. Identify the mechanism of oxidative phosphorylation and explain the	[CO-4] [L-4] 10 e coupling
		of redox reactions.	[CO-6] [L-3] 10
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 B. Tech. – Third Semester 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.

2x10

<u>PART-A</u>

- 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.3a) 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 X 10³ cells /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?

<u>PART-B</u>

- 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.)

[CO-3] [L-5] **12**

10

10

Explain	how	specializ	ed	transduction	occurs?	What	can	you	conclude	about	the
linkage	and o	order of t	the	genes?							

Compounds added to minimal medium	Presence (+) or absence (-) of colonies
CDE	-
BDE	—
BCE	+
BCD	+
ADE	-
ACE	
ACD	<u> </u>
ABE	-
ABD	+
ABC	2 00 1

[CO-5] [L-5] **20**

- Q.7 a) How phenol coefficient method is used to determine the efficacy of
disinfecting agent?[CO-6] [L-3] 4
 - 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

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?	[CO-3] [L-1]
	e) Illustrate the diagram of the bacteriophage.	[CO-3] [L-2]
	f) Name the various types of pigments found in Algae.	[CO-1] [L-1]
	 g) Names the various modes of nutrition in fungi. 	[CO-3] [L-1]
	 h) List any two criteria used for the classification of bacteria. 	[CO-2] [L-1]
	i) What is genetic transformation?	[CO-3] [L-1]
	j) What are antenna pigments? [0	CO-3] [L-1] 2x10
	<u>PART-A</u>	
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
	<u>PART-B</u>	
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. b) Summarize the idea of the classification of microbes based on putril 	[CO-3] [L-2] 10
		[CO-3] [L-2] 10

End Semester Examination, Dec. 2022 B. Tech. – Third Semester 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.
- Answer the following in briefly: Q.1 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] [CO-3] [L-1] c) Define 'apoptosis'. d) Illustrate the GPCR signaling pathway. [CO-3] [L-2] e) Explain the functions of nucleus. [CO-2] [L-1] f) Write a short note on the lysosomes. [CO-2] [L-1] g) List the cell membrane proteins. [CO-1] [L-1] h) Compare convergence and divergence mode of cell signaling. [CO-4] [L-5] i) Explain the neurotransmitters. [CO-4] [L-5] j) Define 'Extracellular matrix'. [CO-4] [L-1] 2x10

<u>PART-A</u>

Q.2 Compare between Endoplasmic reticulum and Golgi complex structure and functions.

		[CO-2] [L-4] 20
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
	<u>PART-B</u>	
Q.5	Explain various receptors of the cell signaling.	[CO-1] [L-2] 20
Q.6	Describe the cell junctions and adhesion.	[CO-4] [L-2] 20
Q.7	a) Illustrate the structure and function of neurons.	[CO-6] [L-2] 10
	b) Discuss the structural proteins of the muscles.	[CO-4] [L-6] 10
End Semester Examination, Dec. 2022 B. Tech. – Second Semester

BIOLOGY FOR ENGINEERS (BBT-100)

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 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

<u>PART-A</u>

Q.2	a) Explain the characteristics which distinguish living things from the no things.	on-living
	b) Demonstrate the structural organization of a plant cell.	[CO-2] [L-2] 10 [CO-2] [L-3] 10
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.b) Elaborate the properties and dietary significance of proteins.	[CO-3] [L-4] 10 [CO-3] [L-2] 10
	<u>PART-B</u>	
Q.5	a) Discuss the characteristics and functions of epithelial tissue.b) Explain the process of digestion in humans.	[CO-3] [L-6] 10 [CO-3] [L-2] 10
Q.6	a) How is Blood Pressure measured? What does it indicate?b) Assess various modes of microbial infections in humans and suggest prevent them.	[CO-4] [L-2] 10 ways to [CO-4] [L-5] 10
0.7	a) Describe Mendelian inheritance.	[CO-4] [L-2] 10

b) Explain epigenetic modifications and their consequences. [CO-4] [L-2] **10**

End Semester Examination, Dec. 2022 B. Tech. – Second Semester 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] **2×10**

<u>PART-A</u>

Q.2	a) b)	Elaborate upon the five kingdom classification of living organisms. Describe the structure of a prokaryotic cell.	[CO-2] [L-2] 10 [CO-2] [L-2] 10
Q.3	a) b)	Illustrate the life cycle of a microbial biofilm. Evaluate the applications of microbes in environmental cleaning.	[CO-2] [L-3] 10 [CO-2] [L-5] 10
Q.4	a) b)	Broadly classify lipids and give examples of each class. Illustrate various levels of structural organization of proteins.	[CO-3] [L-4] 10 [CO-3] [L-3] 10
		<u>PART-B</u>	
Q.5	a) b)	Categorize human tissues mentioning their salient features and funct Explain the path of food in gastro-intestinal tract and mention the f	tions. [CO-3] [L-4] 10 unction of
Q.6	a) b)	Demonstrate the ABO system of blood groups in humans. Analyze the role of body fluids and electrolytes in maintaining home	[CO-3] [L-2] 10 [CO-4] [L-2] 10 ostasis. [CO-4] [L-4] 10
Q.7	a) b)	Elaborate the process of flow of information within a biological syste Assess the importance of computational methods in biological data a	m. [CO-4] [L-6] 10 analysis.

[CÓ-4] [L-5] **10**

End Semester Examination, Dec. 2022 OPEN ELECTIVE – COMMON FOR ALL BRANCHES ELECTRIC MOBILITY (OPEN ELECTIVE) (BAU-OE-001)

Time: 3 l	nrs. M	ax Marks: 100
Note: Ata fra ea	tempt FIVE questions in all; Q.1 is compulsory. Attempt any is om PART-A and TWO questions from PART-B. Marks are ind ach question.	o. of Pages: 1 TWO questions dicated against
Q.1 Ar a)	nswer in brief: Calculate air resistance at 30 Kmph if the air resistance at 10km	nph is W. [CO-3]
b)	[L-3] A car has a weight of 7000 N Calculate rolling resistance if con resistance is 0.20. 21[L-2]	istant of rolling [CO-
c)	List five electric two wheeler manufacturers in Indian Market	[CO-1]
d)	India's first Electric car company "Reva" founder was [L-1]	[CO-1]
e)	Draw two EV configurations based on Drive train Configuration.	[CO-2]
f)	Where are ADC and DAC used? 2][L-2]	[CO-
g) h)	Differentiate between energy density and power density of batt Write the chemical reaction that takes place in Li ion battery. [L-1]	ery. [CO-1] [L-1] [CO-1]
i)	Explain the significance of SOH.	[CO-2]
j)	Name four companies who are installing battery charging statio	ons in India. CO-1] [L-1]
	2×10	

<u>PART-A</u>

Q.2Discuss major challenges faced by electric mobility in India.[CO-2][L-2]20

- Q.3 Ankita wants to design electric scooty having gross vehicle weight of 198 kg. The other values considered for design are Kr = 0.02, gradient angle = 30° , radius of wheel = 6 inches, transmission gear ratio = 4. The bike achieves max speed of 40 km/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]
 5×4

<u>PART-B</u>

- 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? [CO-5] [L-5] 10
- Q.6 a) Li-ion batteries are not suitable for countries like India. Evaluate the statement with facts. [CO-6]
 [L-6] 15
 - b) Enlist advantages and disadvantages of lead acid batteries. [CO-2] [L-2] **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. [CO-2] [L-2] 10

End Semester Examination, Dec. 2022 B. Tech. – Seventh Semester

EMERGING AUTOMOTIVE TECHNOLOGIES (BAU-DS-721)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-2][L-1]

[CO- 2] [L-2]

[CO-2][L-2]

[CO-2][L-2]

[CO-1][L-2]

[CO- 2] [L-2]

[CO-3][L-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.

- Answer the following questions: Q.1
 - a) Name the different types of electrolytes used in Fuel Cell.
 - b) Define the function of the constantly variable transmission system. [CO-1][L-1] [CO-2][L-1]
 - c) What is the function of the variable valve timing?
 - d) Explain Regenerative braking systems.
 - e) How is ultra-capacitor beneficial for the electric automobile?
 - f) Define the term brand management.
 - q) What is meant by the hydrogen storage system?
 - h) What is the use of actuators in the Automotive Industry?
 - i) Define hybrid electric vehicles.
 - j) Explain globalization and regionalization in context to automotive Industry.

[CO-2][L-1] 2x10

PART-A

- Illustrate the need to switch to alternative mobility source development to use for future Q.2 cars. [CO- 3] [L-3] 20
- a) Select an alternative energy system that produces electrical energy through a Q.3 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

- Analyze the best architecture for an electric hybrid with comparison among Q.5 series-parallel architecture and series architecture. [CO-4] [L-5] **20**
- Categories the lead-acid batteries based on construction, absorption voltage and Q.6 float voltage range. [CO-5] [L-4] **20**
- a) Integrate the function of the microcontroller to improve the performance of Q.7 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

[CO-2][L-1]

[CO-1][L-3]

[CO-1][L-2]

[CO-2][L-1] [CO-1][L-1]

[CO-1][L-1]

[CO-2][L-1]

[CO-2][L-1]

[CO-2][L-1] 2x10

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? [CO-1][L-1]
 - b) Enlist the permanent magnet materials.
 - c) Interpret hybridness to hybrid vehicles.
 - d) Write the formula for battery energy and desire run time.
 - e) Enlist the drive cycle are used by other countries.
 - f) Define 'rolling Resistance'.
 - g) State Aero dynamics drags.
 - h) What is meant by hybrid vehicles?
 - i) Enlist source of energy for HEV.
 - j) Highligh the torque coupling.

<u>PART-A</u>

- 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**

<u>PART-B</u>

- 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? [CO-6][L-6] **10**
 - b) Design a brake system for electric and hybrid electric vehicles. [CO-6][L-5] **10**
- Q.7 Design a HEV with a Primer giving details of power requirements, vehicle mass and componenet sizing. [CO-6][L-5] **20**

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. Marks are indicated against each question.

- Q.1 Answer the following:
 - a) Define 'rolling resistance'. [CO-1][L-1] b) Highlights the torque coupling. [CO-1][L-1] c) Explain Aero dynamics drags [CO-2][L-2] d) Enlist sources of energy for HEV. [CO-1][L-1] [CO-1][L-1] e) What is meant by hybrid vehicles? f) Enlist the drive cycle used by other countries. [CO-2][L-2] 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-1] [CO-2][L-2]
 - i) Enlist the permanent magnet materials.
 - j) Interpret hybridness to hybrid vehicles.

[CO-2][L-1] 2×10

PART-A

- Select the best possible way of combining the power flow to meet the driving Q.2 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**
- a) Analyze the control parameter and configuration of Switched Reluctance Q.4 motor.
 - [CO-5][L-4] 10
 - b) Integrate the techniques to enhance hybrid vehicle performance. [CO- 3] [L-4] **10**

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**

B. Tech. – Seventh Semester

VEHICLE MAINTENANCE (BAU-DS-701/AU-603)

Time: 3 hrs. **100** Max. Marks:

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 t	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**

<u>PART-A</u>

Q.2	 a) What are the various workshop documents and records, which a station needs to maintain. b) Explain important criteria for a service system layout planning. 	a service D-1][L-3,4] 10 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.
 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**

<u>PART-B</u>

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] **20**

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] 10b) What is the requirement of wheel alignment for proper steering geometry?

[CO-6][L-6] **10**

800/4

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 R-11, R-134, R-729 and 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) SO₂

[CO-1,2] [L-3]

[CO-2] [L-3]

[CO-2] [L-2]

- 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. [CO-3] [L-3]

- f) Represent the process of heating and humidification on psychrometric chart.
- g) What do you understand by the term ventillation Air? [CO-5] [L-3]
- 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 one-

third of its original volume then what will be the change in relative humidity moist

- of air?
- j) What is the function of following components in VARS?
 - i) Absorber.
 - ii) Generator.

[CO-2,3] [L-1] **2×10 801/4**

[CO-3] [L-3]

PART-A

Q.2 a) In an aircraft refrigeration system, air enters the compressor at 0.1 MPa, 4 °C and is compressed to 0.3 MPa, with an isentropic efficiency of 72%. The air is then cooled to 55 °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 kg/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).

[CO-1,2] [L-3] **10**

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°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 in

°C

the regenerative heat exchanger with a portion of the air bled after expansion in

cooling turbine. The cabin is to be maintained at a temperature of 25°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 0 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. [CO-2,3] [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 kJ/kg, specific volume=0.0767 m3/kg

At compressor discharge, specific enthalpy=222.6 kJ/kg, specific volume=0.0614

m3/kg.

At condenser exit, specific enthalpy = 84.9 kJ/kg, specific volume = 0.0083 m3/kg

The swept volume for the compressor is 1.5 L and volumetric efficiency is 80%. If

speed, N= 1600 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.

[CO-2,3] [L-3] **8**

[CO-2,3] [L-4] **12**

<u>PART-B</u>

Q.5 a) Derive an expression for the maximum C.O.P of vapor absorption system.

b) The operating temperatures of a single stage vapour absorption refrigeration system

are: generator: 90 °C; condenser and absorber: 40 °C; evaporator: 0 °C. The system has a refrigeration capacity of 100 kW and the heat input to the system is

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

refrigeration capacity and operating temperatures same as before. Examine the

validity of the claim.

- [Co-4] [L-5] **10**
- Q.6 a) Moist air with a DBT of 40oC has a relative humidity of 50% and atmospheric pressure is bar. The saturation pressure of vapour at 40oC is 7.38 kPa and saturation pressure of vapour at 150°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°C, then what will be the relative humidity of the compressed air?

- 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 50kg dry air per second of fresh air at 45°C (DBT) and 30% RH is introduced into the room at 25°C (DBT) and 50%RH. 450 kgda/s of re-circulated air is mixed with outside air and this mixed air then flows over a cooling coil with ADP of 12°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:

T (°C)	12	25	45
Pvs (bar)	0.014016	0.03166	0.09584

[CO-5,6] [L-5] **20**

[[]CO-4] [L-3] **10**

[[]CO-5,6] [L-4] **10**

B. Tech. – Sixth Semester

AUTOMOTIVE COMPONENTS DESIGN (BAU-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)	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.	[CO-5] [L-1]
	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]
	i)	Define the module and pitch circle diameter of gears.	[CO-4] [L-1]
	j)	Enlist types of force acting on connecting rod.	[CO-6] [L-1] 2×10

<u>PART-A</u>

- 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 of42 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 kN/mm2, 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 kN Shaft speed = 720 rpm Shaft diameter = 500 mm Recess diameter = 300 mm Film thickness = 0.15 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**

<u>PART-B</u>

- Q.5 A helical cast steel gear with 30° helix angle has to transmit 35 kW at 1500r.p.m. If the gear has 24 teeth, determine the necessary module, pitch diameter and face width for 20°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°full depth in volute gear may be taken as $0.154 (912/T_E)$, where TE represents the equivalent [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 mm; Stroke = 125 mm; Maximum gas pressure = 5 N/mm²; Indicated mean effective pressure = 0.75 N/mm²; Mechanical efficiency = 80%; Fuel consumption = 0.15 kg per brake power per hour ; Higher calorific value of fuel = 42 × 103 kJ/kg ; Speed = 2000 r.p.m. Any other data required for the design may be assumed.
- Q.7 Determine the dimensions of cross-section of the connecting rod for a diesel engine with the following data: Cylinder bore = 100 mm Length of connecting rod = 350 mm Maximum gas pressure = 4 MPa Factor of safety = 6

[CO-6] [L-5] **20**

End Semester Examination, Dec. 2022 B. Tech. – Fifth Semester 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

<u>PART-A</u>

- 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. [CO-1L6] **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.

[CO-3L4] **20**

<u>PART-B</u>

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. [CO-5L6] **20**

B. Tech. – Seventh Semester

ROCKET PROPULSION (BAE-DS-723)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

[CO-1][L-1]

[CO-2][L-2]

[CO-3][[L-2]

[CO-3][L-1]

[CO-4][L-2]

[CO-4][L-2]

[CO-5][L-2]

[CO-6][L-2] **2x10**

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 auestion.

- Answer the following in briefly: Q.1
 - a) Define specific impulse and its significance.
 - b) Why Liquid rockets are preferred during take-off of a Launch vehicle. [CO-1][L-2] [CO-2][L-2]
 - c) State Saint Robert's Law.
 - d) Sketch a Schematic diagram of solid rocket, mentioning its parts.

e) What is the requirement of different grain shapes in solid rockets?

- f) Enlist few applications of solid rockets.
- q) Classify liquid propellants based on specific impulse.
- h) Sketch schematic diagram of a Mono Propellant rocket.
- i) Define Thrust Vectoring.
- j) Enlist few advantages of Electric Propulsion.

<u>PART-A</u>

- 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 m/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 Burning 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**
- The initial burning surface area of a cylindrical propellant grain of outer diameter Q.4 300 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 mm/s, n = 0.3, Determine:
 - a) Initial equilibrium pressure in the rocket chamber.
 - b) Maximum Chamber Pressure.
 - c) Web Thickness.
 - d) Propellant Sliver.
 - 4] **20**

<u>PART-B</u>

- Q.5 a) With the help of a neat diagram explain staged combustion cycle. [CO-4] [L-3] **10** b) Explain with neat sketches different techniques used for achieving Thrust
 - Vector Control. [CO-4] [L-4] **10**

[CO-3] [L-

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'.	[CO- 5] [L-3] 10 [CO-5] [L-3] 10
Q.7	a) With the help of a schematic diagram explain the working of Resistoiet.	Arcjet and
	b) Write a short note on VASIMR.	[CO-6] [L-3] 10 [CO-6] [L-4] 10

B. Tech. – Seventh Semester BASICS OF COMPUTATIONAL FLUID DYNAMICS (BAE-DS-721/AE-827)

Time: 3 hrs.

Max Marks: **100** *No. of pages: 1*

[CO-2] [L-3]

[CO-3] [L-1]

[CO-5] [L-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:
 - a) Differentiate between Compressible and Incompressible Flow? [CO-1] [L-3]
 - b) Estimate Convective and Temporal Acceleration of Fluid Particle
 - c) What are Hyperbolic and Parabolic Equations?
 - d) Illustrate Crank Nicolson form of Implicit Scheme
 - e) Differentiate between K-Epsilon and K-Omega Models [CO-6] [L-2] **4x5**

<u>PART-A</u>

- 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**

<u>PART-B</u>

- Q.5 Consider a steel rod that is subjected to a temperature of 100°c on the left end and 25°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, t=0 Seconds and t= 9 seconds. Use $\Delta x = 0.01$ m, $\Delta t = 3$ seconds. Given k= 54 W/m-k, ρ = 7800 kg/m³, C = 490 J/kg-K. The initial temperature of rod is 20°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.

[CO-6] [L-4] **10x2**

End Semester Examination, Dec. 2022 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. [CO-1, 3, 4] [L-1, 5] **4×5**

<u>PART-A</u>

- Q.2 a) Derive an expression for maximum take-off weight of an aircraft. [CO-1] [L-2] 5b) 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 m^2
 - Mass = 4600 kg
 - Cruise Velocity = 400 knot at 10,000 ft
 - Aspect Ratio = 8
 - Lift Curve Slope = 7.2 / radian
 - $C_{L Max} = 2 \text{ and } -1.2$

[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**

<u>PART-B</u>

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 Kg and 3,540 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" [CO-4] [L-2] 5
- 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**

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]
 List the types of Ice formation to be considered. 	[CO-6][L-2]
j) What is Chemical Oxygen?	[CO-5][L-2] 2x10

<u>PART-A</u>

- 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] [L-3]
 12
 b) Write a short note on Eucl Dumping System [CO-3] [L
 - b) Write a short note on Fuel Dumping System. [CO-3] [L-3] **8**

<u>PART-B</u>

- 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] [L-3] **10**

b) Explain in detail Anti-Icing and De-icing system used in a modern airliner.
 [CO-6] [L-3] 10

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'.
 - b) Differentiate between Symmetrical and Unsymmetrical Bending.
 - c) Define 'Slenderness Ratio of a Column'.
 - d) Illustrate state of stress in a matrix form.
 - e) State Saint Venant's Principle.
 - f) Define 'Stress Concentration factor K'.
 - g) Differentiate between Elements and Nodes.
 - h) What is Discretization?
 - i) What is the requirement of idealization of structures?
 - j) Differentiate between statically determinate and Indeterminate structures.

[CO-5][L-2] **2x10**

[CO-1][L-1]

[CO-1][L-1]

[CO-2][L-2]

[CO-3][L-2]

[CO-3][[L-1]

[CO-3][L-2]

[CO-4][L-2]

[CO-4][L-2]

[CO-5][L-2]

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:

$$\sigma_{XX} = X^{3}YZ + X^{2}Y^{2}$$
 $T_{Xy} = X^{2}YZ$
 $\sigma_{yy} = 3Y^{2}Z + YZ$
 $T_{YZ} = XY^{2}Z$
 $\sigma_{zz} = X^{2}Y^{2}Z^{2} + XZ$
 $T_{XZ} = XYZ^{2}$

Find whether the equilibrium conditions are satisfied or not at points. (3,-4,2)

[CO-3] [L-3] 10

10

<u>PART-B</u>

- Q.5 a) Write a short note on Finite Element Method and its applications. [CO-4] [L-3] 8
 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**



815/4

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**

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'. b) Plot the variation of pressure across a C-D Nozzle. c) Define 'Shock wave'. d) How flow properties varies across a Normal shock wave? e) Define 'Shock Polar'. f) How Expansion Waves are formed? g) Define 'Critical Mach Number'. h) Define 'Drag Divergence Mach Number'. i) Define the 'significance of Transonic Flow'. j) Differentiate between 'Nozzles' and 'Diffusers'. 	[CO-1][L-1] [CO-2][L-2] [CO-2][L-2] [CO-3][[L-1] [CO-3][L-1] [CO-3][L-2] [CO-4][L-2] [CO-4][L-2] [CO-5][L-2] 2x10
	<u>PART-A</u>	
Q.2	Derive relation between area and velocity. How the flow can be accusuld subsonic to supersonic flow regime? 4] 20	elerated from [CO-1][L-
Q.3	Derive Rankine-Hugonoit Equation and explain its significance.	[CO-2] [L-3] 20
Q.4	Derive Θ - β -M relations for Oblique shock waves with necessary assurption PART-B	mptions. [CO-3][L-4] 20
Q.5	 a) Write a Short note on Whitcomb's Area Rule. 3] 10 b) Derive Velocity potential equation for subsonic compressible airfoil. 	[CO-4][L- flow over an
	3] 10	[CO-4][L-
Q.6	Using small perturbation theory estimate drag for a Supersonic Airfoil. 4] 20	[CO5] [L-
Q.7	 a) Write a short note on 'Supersonic Nozzle design'. 3] 10 b) Using Taylor's Series of Expansion illustrate finite difference forward difference 	[CO-6] [L- technique in [CO-6][L-4] 10

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'.	[CO-3][L-1]
g)	Differentiate between 'Elasticity' and 'Plasticity'.	[CO-4][L-2]
h)	Which are the common parts of an aircraft where composites are used?	[CO-4][L-2]
i)	Explain functions of Gyroscope for an aircraft.	[CO-5][L-2]
j)	Which are the primary flight control surfaces of an Aircraft?	[CO-6][L-2]
		2x10

<u>PART-A</u>

Q.2	a) Explain classification of Aircraft.	[CO-1] [L-3] 10
	b) Write a brief note on Launch Vehicle.	[CO-1] [L-2] 10

- Q.3 a) Illustrate the importance of Hydrostatic equation in Aerodynamics. [CO-2] [L-3] 10
 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

<u>PART-B</u>

- 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 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**

2x10

- Q.3 a) Illustrate the functionality of Map Reduce. Write a program to count the number of distinct elements in a Data-stream. CO-2] [L-3] **10**
 - b) Extend examples to demonstrate the importance of HDFS and its subsequent components in Big Data Analytics.
 [CO-3] [L-3] 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**

<u>PART-B</u>

- 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. CO-5] [L-4] **10**

- 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. [CO-6] [L-2] **10**