End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

EMERGING AUTOMOTIVE TECHNOLOGY (AU-817/BAU-DS-721)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a)	How is the fuel cell different from the battery?	[CO-2][L-1]	
b)	What is the function of the variable valve timing?	[CO-2][L-1]	
c)	What are the limitations of hybrid vehicles?	[CO-1][L-1]	
d)	What are Regenerative braking systems?	[CO-2][L-1]	
e)	State globalization and regionalization in context to automotive Industry.	[CO-1][L-2]	
f)	Name the different types of electrolytes used in Fuel Cell	[CO-1][L-1]	
g)	How is ultra-capacitor beneficial for the electric automobile?	[CO-2][L-2]	
h)	How are hybrid vehicles differing from conventional cars?	[CO-2][L-2]	
i)	Enlist 5 types of sensors used in Automobiles	[CO-3][L-1]	
j)	Define the function of the constantly variable transmission system.	[CO-2][L-1]	**2×10**

PART-A

Q.2 Illustrate the need to switch to alternative mobility source development to use for future cars. [CO-1][L-3] **20**

Q.3 a) Select an alternative energy system that produces electrical energy through a chemical reaction and does not impact the environment, describe it in detail. [CO-2][L-4] **10**

b) Select fuel cell technologies that have been deployed in space to generate electrical energy and water on-board spacecraft, describe it in detail. [CO-2][L-6] **10**

Q.4 a) Analyze the function of variable valve technology and state how to improve the performance of the engine. [CO-3][L-4] **10**

b) Examine the function of the gasoline fuel injection system and how it enhances the engine's performance. [CO-3][L-4] **10**

PART-B

Q.5 Select the best architecture of electric hybrid electric vehicle for low power requirement and explain with neat sketch [CO-4][L-6] **20**

Q.6 Propose the energy storage system for large-scale energy storage in tiny portable devices. [CO-5][L-5] **20**

Q.7 a) Design a vehicle in which replaces an inaccurate mechanical system with a highly advanced and accurate method. Explain any one with a neat sketch [CO-6][L-5] **10**

b) Examine the function of the constant variable transmission system and how it will be helpful for present vehicles. [CO-6][L-4] **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

AIRCRAFT MATERIALS (BAE-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) Predict the behavior of perfectly plastic and elastic plastic material in a tensile test. [CO-1][L-2]

b) List the major requirements of alloying. [CO-1][L-1]

c) Why are pure materials so soft? Illustrate the behavior with a neat diagram. [CO-2][L-1]

d) Enlist the techniques used to improve corrosion and fatigue properties of steel. [CO-3][L-1]

e) Differentiate alloy steel and carbon steel. [CO-3][L-2]

f) List the application of Aluminium alloy in aircraft industry. [CO-4][L-1]

g) Recall the importance of cladding in aircraft material processing. [CO-4][L-2]

h) Classify different types of heat resistant alloys. [CO-5][L-2]

i) List the salient features of Ti-6Al-4V alloy. [CO-5][L-1]

j) Summarize the different functions of matrix in a composite. [CO-6][L-1] **2×10**

PART-A

Q.2 Illustrate with neat diagram different kinds of stresses and loads acting on different components of a modern passenger aircraft and also suggest different materials that can be used for conceptual stage of design process. [CO-1][L-4] **20**

Q.3 Deduce the effect of heat treatment of iron and carbon with the help of a neat diagram and also explain the various types of invariant reactions involved in heat treatment. [CO-2][L-4] **20**

Q.4 a) Classify different types of steel and its numbering system with respect to SAE. [CO-3][L-4] **10**

b) Examine the various corrosion control techniques which are being used in alloy steels with the help of neat diagram. [CO-3][L-3] **10**

PART-B

Q.5 a) Illustrate the classification of Aluminium alloys based on the standards of Aluminium association. [CO-4][L-3] **10**

b) Analyze the tempering nomenclature of Aluminium alloy also illustrate the manufacturing features of Al2024-T3 alloy and Alclad 7075-T4 alloy. [CO-4][L-3] **10**

Q.6 a) Prepare a short note on 'refractory materials and applications in aerospace industry'. [CO-5][L-3] **10**

b) Prepare a short note on Nickel based heat resistant alloys and explain its applications. [CO-5][L-3] **10**

Q.7 a) Illustrate the classification of composite and provide overview of applications of composites in airframe. [CO-6][L-4] **10**

b) Prepare a short note on sandwich materials. [CO-6][L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

MAINTENANCE PRACTICES (MODULE-7) (BAE-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 in brief:

a) Differentiate between 'class-A and class-B fire.' [CO-1][L-2]
b) Define 'risk diamond'. [CO-1][L-1]
c) List the standards to be followed according to DGCA for accredited calibration laboratory. [CO-2][L-1]
d) Interpret the importance of dimension allowance and tolerance. [CO-3][L-1]
e) Recall the importance of Material safety data sheet. [CO-3][L-2]
f) Differentiate BITE and LRU. [CO-4][L-1]
g) Define the Bowing limit for a civil transport aircraft. [CO-4][L-1]
h) List the different standards to be followed in aircraft maintenance. [CO-5][L-2]
i) Recognize the importance of station number in aircraft drawings. [CO-5][L-1]
j) Enlist the type of fits according to BS-4500. [CO-4][L-1] **2×10**

PART-A

Q.2 a) Examine the safety instructions to be followed while a maintenance engineer is working around compressed gas of an aircraft system. [CO-1][L-4] **10**

b) Examine the safety instructions to be followed while a maintenance engineer is working around electrical system of an aircraft. Also explain the safety instruction to be followed while working around an oxygen system. [CO-1][L-4] **10**

Q.3 As a maintenance engineer evaluate the procedure to be followed by a maintenance organization when an equipment comes under the category of OOTA. [CO-2][L-4] **20**

Q.4 With the help of a neat sketch explain the working of a lathe machine which are to be used in a hangar. [CO-3][L-3] **20**

PART-B

Q.5 a) Analyze the various elements of a sheet layout and plot an example of station number for an aircraft of your choice. [CO-4][L-3] **10**

b) Explain different types of engineering drawings with suitable examples. [CO-3][L-3] **10**

Q.6 a) Illustrate different classes of fits with neat sketches. [CO-5][L-4] **10**

b) Prepare a short note on maintenance schedule for fits and clearance. [CO-5][L-3] **10**

Q.7 a) Illustrate the working of Oscilloscope with a neat diagram. [CO-4][L-4] **10**

b) Prepare a short note on Automatic test equipment and data bus analyzer. [CO-4][L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

BASICS OF CFD (BAE-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 in brief:

a) Differentiate uniform flow and non uniform flow. [CO-1][L-2]

b) Derive the expression for first order forward difference formula. [CO-2][L-3]

c) Derive metrics for transformation equation. [CO-3][L-3]

d) Explain central differencing. [CO-5][L-3]

e) Differentiate hyperbolic, parabolic and elliptic equations. [CO-6][L-2] **4×5**

PART-A

Q.2 Derive euler's equation for fluid motion. [CO-1][L-4] **20**

Q.3 Illustrate the dynamics of fluid by using the theory of Navier stokes. [CO-2][L-4] **20**

Q.4 Explain the finite difference approach by using first order and second order approach. [CO-3][L-4] **20**

PART-B

Q.5 Explain briefly about elliptic grid generation and adaptive grids. [CO-4][L-3] **20**

Q.6 Explain in detail about upwind differencing scheme and how finite volume method can be used in one dimensional convection? [CO-5][L-4] **20**

Q.7 Explain turbulence modeling using RANS equation. [CO-6][L-4] **20**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

ROCKET PROPULSION (BAE-DS-723)

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) List the different applications of liquid and solid rockets. [CO-1][L-1]
b) List the different types of rocket propulsion systems. [CO-1][L-1]
c) Define propellant grain. [CO-2][L-1]
d) Sketch the different types of thrust profiles in solid rockets. [CO-2][L-2]
e) Classify different types of liquid propellants. [CO-3][L-1]
f) Differentiate liners and insulators. [CO-3][L-1]
g) Define cryogenic propellant with example. [CO-4][L-2]
h) List the different components of a liquid rocket. [CO-4][L-1]
i) Define Propellant sliver. [CO-5][L-1]
j) List the applications of electric rockets. [CO-5][L-1] **2×10**

PART-A

Q.2. A Rocket of total mass 100 Ton, having a payload of 1 Ton. The engines produce average velocity C= 2700 m/s and structural mass is 10 % of overall mass of rocket

i) Case 1: Assume a single stage rocket.
ii) Case 2: 2 –Stage Rocket, propellant mass and structural mass are shared equally
iii) Case 3: 3- Stage Rocket, propellant mass and structural Mass are shared equally

Find the ideal velocity increment for the above three cases. [CO-1][L-3] **20**

Q.3 a) Illustrate the classification of solid propellants. [CO-2][L-4] **10**
b) With the help of neat sketch explain the different components of a solid propellant rocket. [CO-2][L-3] **10**

Q.4 a) A Payload of mass 100 kg is launched into orbit from the surface of the earth using a four stage solid propellant rocket. The total mass of the four stages including the propellant put together is 17,000 kg. If the initial acceleration to be provided by the booster rocket is 1.5g, where g is the gravitational field of earth. Determine for a chamber pressure of 10MPa in the booster rocket.
Determine:
i) Throat diameter of the booster rocket.
ii) Initial value of the burning surface of the booster grain.
Burn rate of the propellant used in the booster is given by $r = 1.5\ P^{0.3}$ where r is mm/s, P is in atmospheres. $C^* = 1600$ m/s. Density of propellant =1750 kg/m^3, Thrust coefficient = 1.1 [CO-3] [L-4] **10**
b) Prepare a short note on different types of igniters used in solid rockets. [CO3][L3] **10**

PART-B

Q.5 a) With the help of a neat sketch explain bleed cycle which are used in a liquid propulsion system. [CO-4] [L-3] **10**
b) A high pressure pump fed liquid propellant rocket based on the gas generator cycle has a vacuum thrust of 735 kN and a burn duration of 180 seconds. The

propellants used are N_2O_4 and UDMH. The specific impulse is 2950 N-s/kg. The mixture ratio is 1.87. The pressure in the thrust chamber of the rocket is 6MPa and the propellant supply pressure to chamber is 7MPa. N_2O_4 is stored in the propellant tank at a pressure of 0.4 MPa and UDMH is stored at 0.32 MPa. The densities of N_2O_4 and UDMH are 1400 kg/m^3 and 790 kg/m^3

Determine

i) Power required to drive oxidizer and fuel pump
ii) Determine the power input to the turbine if pump efficiency is 60 %.

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

Q.6 a) Illustrate with neat sketches different techniques used for Thrust vectoring of rockets? [CO-5] [L-4] **10**

b) Analyze the working of different types of Injector designs which are being used in liquid propulsion rocket design. As a designer how do select the Injector system for a cryogenic engine? [CO-4] [L-3] **10**

Q.7 a) Explain the working of Arc jet and Resisto jet with the help of a neat diagram. [CO- 5] [L-3] **10**

b) Distinguish the working of VASIMR and MPD thruster with neat sketches. [CO-5] [L-3] **10**

End Semester Examination, Dec. 2023

OPEN ELECTIVE - COMMON FOR ALL COURSES

INTRODUCTION TO DRONE TECHNOLOGY (BAE-OE-002)

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

No. of pages: 1

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

Q.1 Answer the following questions:

a) List the functions of ESC. [CO-1] [L-1]
b) Differentiate between range and endurance. [CO-1] [L-2]
c) Define hovering. [CO-2] [L-1]
d) List the different types of motion of a Quad-copter. [CO-2] [L-1]
e) List four sensors which are being used in commercial drones. [CO-3] [L-1]
f) Enlist the components of IMU. [CO-3] [L-1]
g) Differentiate between symmetrical and cambered airfoil. [CO-4] [L-2]
h) Define 'stalling'. [CO-4] [L-1]
i) List the requirements to obtain RPTO license. [CO-5] [L-2]
j) Differentiate between 'Red zone' and 'Yellow zone'. [CO-6] [L-2] **2×10**

PART-A

Q.2 Explain the different components of a Quad copter with neat sketch. [CO-1][L-4] **20**

Q.3 Predict the equations of motion of drone in climbing and descending, use necessary sketches to explain the concept. [CO-2] [L-5] **20**

Q.4 Evaluate the working of pressure sensor and can pressure sensors can be used to estimate airspeed and altitude of a drone [CO-3] [L-4] **20**

PART-B

Q.5 a) Explain the working of an electric engine which are being used in drone. [CO-4][L-4] **10**

b) Prepare a short note on gliding drones. [CO-4][L-3] **10**

Q.6 a) Explain with the help of neat sketch communication network system of a fixed wing drone. [CO-5][L-4] **10**

b) Prepare a short note on different frequency band which are being used in different kind of drones. [CO-5][L-3] **10**

Q.7 Explain minimum ten rules established by DGCA as drone rules 2021. [CO-6][L-4] **20**

End Semester Examination, Dec. 2023

B. Tech – Seventh Semester

VEHICLE MAINTENANCE (BAU-DS-701)/ (AU-603)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a) How can the advantages of preventive maintenance over breakdown maintenance be practically applied in a vehicle maintenance strategy? [CO-2] [L-3]

b) Analyze and provide a detailed examination of the key criteria that should be considered when selecting a location for a service station. [CO-6] [L-4]

c) When is it appropriate to use water-based chemical cleaning for a multi cylinder IC Engine? [CO-3] [L-1]

d) Assess the rationale behind conducting the cylinder honing process following each re-boring operation in engine maintenance and discuss its implications on engine performance and longevity. [CO-4] [L-5]

e) Explain the potential reasons for the presence of white or grey smoke through exhaust pipe. [CO-5] [L-2]

f) Why is it necessary to measure O_2 in the exhaust pipe? [CO-2] [L-1]

g) Examine the reported starting issue in a vehicle, specifically focusing on potential causes related to fuel injection and supply. [CO-5] [L-4]

h) Explain the purpose of synchronizer rings in a gearbox and whether a vehicle can operate smoothly without them? [CO-1] [L-2]

i) Apply your knowledge to discuss why CV and UJ cross joints require specialized semi-solid grease lubrication and whether standard engine and gearbox oil can serve as a suitable alternative. [CO-3] [L-3]

j) Given a car tire with noticeable wear concentrated in the center, apply your knowledge to identify potential causes and suggest appropriate actions to distribute wear evenly across the tire. [CO-5] [L-3] **2×10**

PART-A

Q.2 Why customer complaint handling is significant to service station? Describe the step-by-step process involved in handling customer complaints, providing a comprehensive explanation of the procedure. [CO-1] [L-1,2] **20**

Q.3 Compile a list of common tools typically utilized in a service station. Provide a detailed explanation of a high-pressure car washing machine, accompanied by an illustrative diagram to clarify its key components and functioning. [CO-3] [L-2,3] **20**

Q.4 Develop a comprehensive operating manual detailing the systematic procedure and sequential steps for disassembling a multi-cylinder petrol engine. [CO-6] [L-6] **20**

PART-B

Q.5 Create an operator's manual that provides comprehensive instructions for checking, servicing, and testing a fuel injector. [CO-6] [L-6] **20**

Q.6 Examine and analyze the typical services and maintenance procedures performed on a differential. [CO-5] [L-4] **20**

Q.7 Evaluate the process of servicing a caliper and brake pedal, and formulate a plan that outlines the steps for overhauling and replacing these components. [CO-4] [L-5] **20**

End Semester Examination, Dec. 2023

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 in brief:			
	a)	Apply Lenz's law for an electric machine.	[CO-3] [L-3]	
	b)	Define the speed coupling	[CO-1] [L-2]	
	c)	Define Uphill Resistance	[CO-1] [L-1]	
	d)	Explain the necessity of electric vehicle.	[CO-1] [L-2]	
	e)	Compare electric vehicle and hybrid vehicle.	[CO-1] [L-2]	
	f)	Enlist key economic parameter for vehicles	[CO-1][L-1]	
	g)	Enlist the design constraint for induction motor.	[CO-2][L-2]	
	h)	How SOP is related to battery	[CO-2] [L-1]	
	i)	What is the hybridness (H%) for plug-in-hybrid	[CO-2] [L-1]	
	j)	Write the Constant Volt/Hz control equation.	[CO-1][L-1]	**2×10**

PART-A

Q.2	a)	Analyze the parameters of torque coupling for parallel drive train.	[CO-4][L-4]	**12**
	b)	Identify the primary reasons for the development of electric and hybrid electric vehicles	[CO-2][L-2]	**8**
Q.3	a)	Describe the four mode of operation of Multi Quadrant DC-DC Converters II.	[CO-2][L-2]	**10**
	b)	Illustrate the principle of Step-Up Operation for Boost Converter with circuit diagram	[CO-4][L-4]	**10**
Q.4	a)	Measure the control parameters of permanent magnet motor drives.	[CO-4][L-6]	**10**
	b)	Integrate the techniques to enhance hybrid vehicle performance	[CO-3][L-4]	**10**

PART-B

Q.5		Propose a design principal for Hybrid Electric Vehicles-1(HEV-II)	[CO-4][L-5]	**20**
Q.6	a)	Categories the hybrid electronic control unit (ECU) and explain them.	[CO-6] [L-4]	**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		Design of Series-Parallel HEV Drivetrain with details of traction torqur control approach and drive train control techniques.	[CO-6][L-5]	**20**

End Semester Examination, Dec. 2023

OPEN ELECTIVE - COMMON FOR ALL BRANCHES

ELECTRIC MOBILITY (BAU-OE-001)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a) Calculate air resistance at 30 Kmph if the air resistance at 10kmph is W. [CO-3] [L-3]

b) A car has a weight of 9000 N Calculate rolling resistance if constant of rolling resistance is 0.25 [CO-2] [L-2]

Assume a vehicle has r_{wheel} of 0.3 m. Convert speeds (Q.3 and Q.4) of [CO-2] [L-6]

c) 2 m/sec into kmph and rpm.

d) 80 kmph into m/sec and rpm. [CO-2] [L-6]

e) Draw two EV configuration based on Drivetrain Configuration. [CO-2] [L-2]

f) Where are ADC and DAC used? [CO-2] [L-2]

g) Differentiate between energy density and power density of battery. [CO-1] [L-1]

h) Write the chemical reaction that takes place in Li ion battery. [CO-1] [L-1]

i) Explain the significance of SOH. [CO-2] [L-2]

j) Name four companies who are setting battery charging stations in India. [CO-1] [L-1] **2×10**

PART-A

Q.2 Compare BEV, HEV, FCEV and IC Engine with the help of comparative table. [CO-2] [L-2] **20**

Q.3 For a 2-wheeler, e-rickshaw and sedan with specifications as given below, compute total traction force, traction power and torque required at 50 kmph. Consider the pickup time to attain 50 kmph to be 20 seconds. Assume slope to be zero. [CO-4] [BTL-4] **20**

Vehicle	ρ (kg/m³)	C_D	A (m²)	μ	weight (kg)	Tyre radius (m)
2-wheeler	1.2	0.9	0.5	0.013	180	0.28
e-rickshaw	1.2	0.44	1.6	0.013	680	0.2
Sedan	1.2	0.35	2.5	0.013	1200	0.31

Q.4 Evaluate 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] **20**

PART-B

Q.5 a) Compare SCR, IGBT and MOSFET along with their application. [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) What are 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. 2023

B. Tech. – First / 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**. Marks are indicated against each question.*

Q.1 Answer briefly.

a) Mention any four differences between prokaryotic cell and eukaryotic cell. [CO-1][L-1]
b) How does an organism interact with its environment? [CO-1][L-2]
c) What is metabolism? [CO-2][L-1]
d) Mention key features of an archaebacteria. [CO-2][L-1]
e) What is a landfill? [CO-2][L-1]
f) Why are blood groups identified before blood transfusion? [CO-3][L-2]
g) Identify the function of kidney. [CO-3][L-2]
h) What is Arteriosclerosis? [CO-4][L-1]
i) Enlist the functions of epidermal tissue. [CO-4][L-1]
j) Identify the Types of Biological Datasets. [CO-4][L-1] **2×10**

PART-A

Q.2 a) Explain how the cells organize to form a body? [CO-2] [L-2] **10**
b) Demonstrate the structural organization of a bacterial cell. [CO-2] [L-3] **10**

Q.3 a) Describe the characteristic features and importance of fungi. [CO-2] [L-2] **10**
b) Compare in-situ and ex-situ bioremediation. [CO-2] [L-5] **10**

Q.4 a) Analyze the biological importance of lipids. [CO-3] [L-4] **10**
b) Explain the function of enzymes in a biological system. [CO-3] [L-2] **10**

PART-B

Q.5 a) Discuss the types, characteristics and functions of muscle tissue. [CO-3] [L-6] **10**
b) Briefly explain the role of hormones in humans. [CO-3] [L-2] **10**

Q.6 a) Demonstrate the mechanism of blood clotting. [CO-4] [L-3] **10**
b) Analyze the causes and symptoms of Congestive heart failure, and suggest ways to prevent it. [CO-4] [L-4] **10**

Q.7 a) What are genes, how do they pass the information from one generation to another? [CO-4] [L-2] **10**
b) What are mutations and how are they caused? [CO-4] [L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. (Biotechnology) – First / Second Semester

BIOLOGY FOR ENGINEERS (BBT-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 in brief:

a) What do you understand by natural selection and genetic drift? [CO-1][L-1]
b) Outline the steps of origin of life via flowchart. [CO-1][L-1]
c) Elaborate DNA replication. [CO-4][L-1]
d) What are the theories associated with a biogenesis? [CO-1][L-2]
e) Compare pulmonary and systemic circulation. [CO-3][L-2]
f) Define bioengineering. [CO-2][L-1]
g) What are neurons? [CO-3][L-1]
h) Describe Air pathway in external respiration. [CO-3][L-2]
i) What are vaccines? [CO-2][L-1]
j) Give four examples of carbohydrates. [CO-2][L-2] **2×10**

PART-A

Q.2 Write short notes on the following:

a) Oparin and Haldane Theory. [CO-1][L-2] **6**
b) Miller's Experiment. [CO-1][L-2] **6**
c) Louis Pasteur Theory. [CO-1][L-2] **8**

Q.3 a) Elaborate proteins on the basis of their functional classification. [CO-2][L-2] **10**
b) What is evolution and various stages of human evolution? [CO-1][L-3] **10**

Q.4 a) What are enzymes? Explain their properties and functions in detail. [CO-2][L-2] **10**
b) How does temperature and pH effect the enzyme activity? Explain with the help of a diagram. [CO-2][L-2] **10**

PART-B

Q.5 a) Illustrate the Central Dogma of life and its detailed functioning with a well labeled flowchart. [CO-4][L-2] **10**
b) Elaborate DNA sequencing in detail with its applications. [CO-4][L-3] **10**

Q.6 Explain why heart is known as a pumping organ? [CO-3][L-3] **20**

Q.7 Write short notes on the following:

a) Ploidy.
b) Genetic disorders. [CO-6][L-2] **10×2**

End Semester Examination, Dec. 2023

B. Tech. (Biotechnology) – 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**. Marks are indicated against each question.*

Q.1
a) Compare active and passive transport across the cell membrane. [CO1][L2]
b) What are microtubules and microfilaments? [CO3][L1]
c) Define 'apoptosis'. [CO4][L1]
d) Illustrate the Integrin receptor structure and function. [CO1][L2]
e) Explain the functions of mitochondria. [CO1][L2]
f) Write a short note on the lysosomes. [CO2][L1]
g) List the cytoskeleton components. [CO1][L1]
h) Compare cilia and flagella of the cell. [CO1][L2]
i) Explain the neurotransmitters. [CO4][L2]
j) Define 'extracellular matrix'. [CO3][L1] **2×10**

PART-A

Q.2 Explain the structure and functions of the cell organelles involve in protein synthesis, sorting and trafficking. [CO2][L5] **20**

Q.3 Describe the various mechanisms of transport across the cell membrane. [CO2][L2] **20**

Q.4
a) Distinguish between prokaryotic and eukaryotic cell. [CO1][L2] **10**
b) Compare animal and plant cell. [CO1][L2] **10**

PART-B

Q.5 Explain various adhere junctions for cell- cell and cell to matrix interactions. [CO3][L2] **20**

Q.6 Describe the cytoskeleton organization in detail. [CO3][L2] **20**

Q.7
a) Illustrate the structure and function of neurons. [CO4][L2] **10**
b) Discuss the structure and function of the muscle cells. [CO4][L2] **10**

End Semester Examination, Dec. 2023

B. Tech. - Third Semester

MICROBIOLOGY (BBT-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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Illustrate Louis Pasteur contributions in Microbiology. [CO-1][L-4]

b) Explain Whitteakars five kingdom classification. [CO-2][L-2]

c) Define the term aseptic techniques. [CO-1][L-2]

d) Contrast between selective media and differential media. [CO-2][L-5]

e) Enlist different types of mode of nutrition of bacteria. [CO-3][L-1]

f) Why would cells that are vigorously growing when inoculated into fresh culture medium have a shorter lag phase than those that have been stored in a refrigerator? [CO-4][L-3]

g) Comments on anaerobic cellular respiration. [CO-5][L-5]

h) Analyze net gain of ATP from one molecule of glucose after lactic acid fermentation. [CO-5][L-4]

i) Discuss the process of transduction in bacteria. [CO-6][L-2]

j) Determine the princi-ple difference in moist and dry heat sterilization. [CO-4][L-4] **2×10**

PART-A

Q.2 a) Discuss the contribution of Edward Jenner and Robert Koch. [CO-1][L-3] **10**

b) Illustrate the criteria for classification based on molecular approach. [CO-1][L-4] **10**

Q.3 a) Contrast in detail about the cell wall structure of gram-positive bacteria and gram-negative bacteria with suitable diagram. [CO-2][L-2] **10**

b) Evaluate the distinguishing characteristics of Chlamydiae and Mycoplasma. [CO-2][L-5] **10**

Q.4 Define the synchronous and continuous growth. Contrast batch and continuous system for microbial growth. [CO-2][L-5] **20**

PART-B

Q.5 a) What chemical intermediates link pyruvate to the TCA cycle? Explain TCA cycle and calculate the ATP formed after TCA cycle [CO-4][L-3] **10**

b) Determine Calvin cycle of photosynthesis. [CO-5][L-5] **10**

Q.6 a) Differentiate between transformation and transduction. [CO-6][L-4] **10**

b) Discuss the properties of Simple transposition and replicative transposition. [CO-6][L-3] **10**

Q.7 a) Describe the principle and procedure for Autoclave. Also mention the indicator used for checking the functioning of an auroclave. [CO-5][L-3] **10**

b) Explain depth filters and membrane filters, and how are they used to sterilize liquids? [CO-5][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. (Biotechnology) - Third Semester

MICROBIOLOGY (BBT-DS-302 A)

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

No. of pages: 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) State Louis Pasture Contribution. [CO-1][L-1]
b) Contrast the five-kingdom classification system with the three-domain system. [CO-2][L-3]
c) Names the various modes of nutrition in fungi. [CO-1][L-2]
d) Explain genetic transformation? [CO-4][L-1]
e) Distinguish between Autotroph and Chemotroph. [CO-1][L-5]
f) Outline the characteristics of Chemostat. [CO-3][L-4]
g) What is Glycolysis and mention its end products? [CO-4][L-2]
h) Contrast bacteriocidal and bacteriostatic? [CO-3][L-5]
i) Explain genetic transduction. [CO-4][L-3]
j) Mention the principle and draw labelled diagram of hot air oven. [CO-6][L-2] **2×10**

PART-A

Q.2 Explain the diversity of microbes and describe the molecular approach used for classification of microorganism. [CO-1][L-2] **20**

Q.3 a) Explain the cell wall structure and characteristics of gram-negative bacteria with suitable labelled diagram. [CO-2][L-2] **10**
b) Illustrate different methods for growth measurement. [CO-2][L-3] **10**

Q.4 Analyse different phases of bacterial growth curve. Discuss various methods of microbial growth measurement. [CO-3][L-4] **20**

PART-B

Q.5 a) Describe Pentose phosphate pathway and its significance. [CO-4] [L-2] **10**
b) What is chemosynthesis? Explain light reaction of photosynthesis. [CO-4] [L-3] **10**

Q.6 Differentiate between the following:

a) Conjugation and Specialized transduction. [CO-5][L-3] **10**
b) Simple transposition and replicative transposition. [CO-5][L-3] **10**

Q.7 a) Describe how a hot air oven works. What items cannot be sterilized by it and why? [CO-6][L-2] **10**
b) Discuss chemical methods as asceptic Describe the operation of a biological safety cabinet. [CO-6][L-6] **10**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) What are Monosaccharides and how are they classified? [CO-1][L-2]
b) Explain fatty acids with its types. [CO-1][L-1]
c) What are reducing sugars? Give an example. [CO-1][L-1]
d) Draw the well labeled structure of saturated and unsaturated Lipids [CO-1][L-2]
e) Enlist any two major properties of amino acids. [CO-1][L-2]
f) Illustrate and explain Holoenzyme in brief. [CO-3][L-2]
g) How do you define denaturation of enzyme? [CO-3][L-1]
h) Differentiate between the Glycolysis and Glycogenesis. [CO-2][L-2]
i) What do you infer by the function of Hexokinase? [CO-2][L-2]
j) How do transamination, deamination and decarboxylation differ? [CO-4][L-2] **2×10**

PART-A

Q.2 a) What are Homopolysaccharides? Give functions along with one example each. Illustrate the structure of the example given. [CO-1][L-2] **10**

b) Give a brief explanation on Hexose derivatives with examples. [CO-1][L-2] **10**

Q.3 a) What do you infer by Triglycerides (TGs)? Outline the properties of TGs. [CO-1][L-3] **10**

b) Explain hydrolysis of fat along with its structure and equation. [CO-1][L-2] **10**

Q.4 What is a peptide bond? Peptides folds to form different types of protein structure. Explain all the structures in detail. Illustrate the basic diagrams for the same. [CO-1][L-2] **20**

PART-B

Q.5 Explain different types of enzyme inhibition. [CO-3][L-2] **20**

Q.6 What do you understand by Glycolysis? Explain its significance and illustrate the steps in a flowchart. [CO-2][L-3] **20**

Q.7 Describe the metabolism of Ammonia in detail. [CO-4] [L-2] **20**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

BIOANALYTICAL TECHNIQUES (BBT-DS-304)

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

No. of pages: 1

Note: *Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Each question carries equal marks.*

Q.1 Answer the following briefly:

a) Differentiate between native and SDS-polyacrylamide gel electrophoresis. [CO4][L2]
b) List the properties of α, β and γ rays. [CO-6][L-1]
c) Why is it important to calibrate analytical instruments? [CO-1][L-3]
d) How is scanning electron microscopy different from a transmission electron microscopy? [CO-5][L-2] **5×4**

PART-A

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**

PART-B

Q.5 a) What are the principles behind the following electrophoresis techniques: Immuno-electrophoresis and isoelectric focusing? [CO-4][L-1] **10**

b) How is DNA separated, visualized and analyzed by gel electrophoresis? [CO4][L4] **10**

Q.6 a) Provide a sketch of the various components of a UV-Vis spectrophotometer and explain its working. [CO-5][L-3] **10**

b) Describe fluorescence spectroscopy alongwith an example of its usage. [CO5][-3] **10**

Q.7 a) How do scintillation counters work? [CO-6][L-2] **10**

b) List the differences between Geiger muller counting and scintillation counting. [CO-6][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. (Biotechnology) – Third Semester

BIOANALYTICAL TECHNIQUES (BBT-DS-304A)

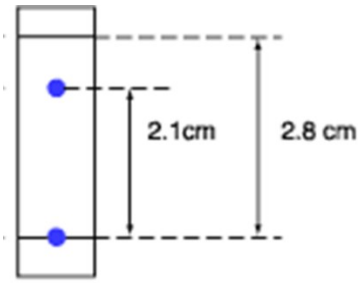
Time: 3 hrs. Max Marks: **100**

No. of pages: 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 briefly.

a) What is span error in an analytical instrument? [CO-1][L-1]
b) Relate the causes of linearity error in measurement. [CO-1][L-1]
c) How can you visualize a live unstained cell using a microscope? [CO-2][L-3]
d) Mention the role of thermionic electron gun in an electron microscope? [CO-2][L-2]
e) What does 'S' refer to in 70S ribosomes. Explain. [CO-2][L-2]
f) How can you detect the colorless biomolecules on a paper chromatogram? [CO-3][L-3]
g) Identify the 'retention factor' of an analyte inthe given chromatogram. [CO-4][L-1]



h) Why is SDS-PAGE not suitable for separation of nucleic acids? [CO-4][L-3]
i) Define Bragg's law. [CO-3][L-1]
j) Enlist the properties of β- particles. [CO-3][L-1] **2×10**

PART-A

Q.2 a) Distinguish between random and systematic errors giving their examples. [CO-1][L-4] **10**
b) Determine the precision in a data set through Gaussian distribution curve. [CO-1][L-2] **10**

Q.3 a) Illustrate the functioning of transmission electron microscope through ray diagram. [CO-2][L-2] **10**
b) Formulate a method to separate biomolecules of similar size but different densities. [CO-4][L-6] **10**

Q.4 a) Analyze the factors influencing resolution of biomolecules in column chromatography. [CO-4][L-4] **10**
b) Select the best chromatographic method for separation of immunoglobulins and explain the technique in detail. [CO-4][L-5] **10**

PART-B

Q.5 a) How can you separate and identify the DNA on the basis of their size? Explain the technique. [CO-2][L-3] **10**
b) Compare the techniques of Agarose gel electrophoresis and PAGE. [CO-2] [L-4] **10**

Q.6 a) Appraise Beer-Lambert's Law. How does it help in quantitative analysis of biomolecules? [CO-3][L-5] **10**
b) How does IR radiation interact with sample? Describe the instrumental set-up of an IR spectroscopy instrument. [CO-3][L-2] **10**

Q.7 a) Elaborate the phenomenon of gas ionization in radioactivity counting. [CO-3][L-2] **10**
b) How are radioactive particles emitted and how do they interact with matter?

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

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer briefly:

a) Give an example of primary sequence database.
b) Expand EMBL, PDB, NIH and RCSB.
c) What do you mean by genbank?
d) Differentiate between pairwise and multiple sequence alignment tool.
e) What do you mean by decision tree?
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 Sanger and Nicolson.
j) What do you mean by orthologous sequence? [CO1][L1] **2×10**

PART-A

Q.2 a) Databases are heart of bioinformatics. Justify the statement. [CO-1][L-2] **10**
b) Discuss any genomic database. [CO-1][L-2] **10**

Q.3 Predict the sequence alignment using NeedleMan and Wunch algorithm.
Where the match score is 2 mismatch score is -1 and gap is 2 and the sequences are ATGCT, CTGAT [CO-2][L-4] **20**

Q.4 Evaluate the given sequences using distance matrix and show cladogram.
ATATCGGGCCCC, CCGCTACGGTTT, ATCGACTCTAAT, CCCCCCCCCCTT
ATGCTACATCGA, TCCCGGGGGAAA [CO-3][L-5] **20**

PART-B

Q.5 a) Explain functional classification of protein using suitable example. [CO-4][L-3] **10**
b) Apply homology modeling to show protein structure secondary predictions. [CO-4][L-3] **10**

Q.6 Infer neural network in in gene finding using suitable diagram. [CO-4] [L-4] **20**

Q.7 Design an appropriate experiment to show the applications of synthetic biology using bacterial system. [CO-6][L-2] **20**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

RECOMBINANT DNA TECHNOLOGY (BBT-DS-501A)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a) What are methyltransferases? What is their role in gene regulation? [CO-1][L-2]

b) Point out the difference and similarity in RDT and genetic engineering. [CO-1][L-2]

c) Define operon and three major lessons that we learn while studying operons. [CO-1][L-1]

d) What are reporter genes? How do they help in various RDT applications? [CO-2][L-3]

e) What is the basic principle behind the technique of PCR? [CO-2][L-2]

f) Differentiate between cDNA and genomic DNA. [CO-2][L-3]

g) Mention the types of DNA sequencing methods. What parameters are the considerations for the choice of the method? [CO-3][L-3]

h) Give an example of DNA delivery agents and methods. [CO-3][L-1]

i) Mention various blotting tools. [CO-4][L-1]

j) Explain the two approaches for producing transgenics. [CO-4][L-2] **2×10**

PART-A

Q.2 Explain the role and function of various enzymes as recombinant DNA technology tools. [CO-1][L-2] **20**

Q.3 Draw a well labelled diagram of an expression vector, marking all the important features. Explain the role of each part in details. [CO-2][L-2] **20**

Q.4 Describe the construction and screening of cDNA and genomic library. Illustrate with appropriate examples. [CO-2][L-3] **20**

PART-B

Q.5 What is genome editing? How is it achieved? Explain various tools and applications of genome editing. [CO-3][L-2] **20**

Q.6 PCR, sequencing and blotting techniques can be combined to produce outcomes in recombinant DNA technology. Design an experiment of RDT involving all these tools. [CO-3][L-6] **20**

Q.7 What are therapeutic proteins? Chalk out a strategy to produce recombinant Insulin. Make use of appropriate illustrations. [CO-4][L-3] **20**

End Semester Examination, Dec. 2023

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 briefly:

a) Just by looking at the food how can you judge if the food is fit for consumption?
b) What do you understand by the biological parameters of the food?
c) What is the basic principle behind the MPN test of food?
d) What are enzymes? Are they already present within the food material?
e) How does fermentation aid in the enhancement of food nutritive content?
f) Awareness of food microbial content helps in preservation of food. Justify.
g) Why are microbes a matter of consideration in food biotechnology?
h) Spores are a menace to pasteurization. Justify this statement.
i) What kind of microbes harm the food at low temperatures?
j) Sterilization helps preserve microbes in food. Justify this statement with suitable explanation of true or false. (CO1,6) (L6, L5, L4, L5), **2×10**

PART-A

Q.2 a) Give a detailed account of role of microorganism in food industry. When can we say a microbe is useful or harmful to the food industry? (CO1,2, L2, L3) **10**

b) Discuss various sources of microorganisms incomplete found in food. (CO1,2, L2, L3) **10**

Q.3 Discuss the intrinsic and extrinsic parameters of food stating their relevance to the food biotechnology. (CO4,5, L3) **20**

Q.4 a) Sea food is derived from the sea water which is salty. Also, salt is used for food preservation. Then please justify how the spoilage of sea food occurs. (CO3,6, L4, L6) **10**

b) Elaborate the various microorganisms involved in spoilage of fruits and vegetables. (CO3,6, L4, L6) **10**

PART-B

Q.5 Propose a schematic of preservation measure you would follow when you have a pantry full of milk, cheese, meat, eggs, fruits, vegetables, pulses and dried seasoning. Mention the techniques you shall utilize for preservation and justify their usage elaborating the principle of the techniques being discussed. (CO3,5, L3) **20**

Q.6 Discuss in detail:

a) The role of microbes in food processing and production
b) Single cell proteins. (CO6,1, L2) **10×2**

Q.7 Comment on:

a) Enzymes in food industry.
b) Utilization of food waste for production of valuable stuff. (CO3, 4, L3) **20**

End Semester Examination, Dec. 2023

B. Tech. (Biotechnology) – Fifth Semester

ANIMAL BIOTECHNOLOGY (BBT-DS-503)

Time: 3hrs. 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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) What are the three major properties of a normal cell? [CO1][L1]
b) Name the scientist who won the Nobel prize in medicine and physiology in the year 2023? [CO2][L1]
c) If the inoculum of cells is taken from a flask where the cells are in log phase and transferred to a flask containing fresh media, which phase of the growth curve will shorten? [CO2][L]
d) What is the mathematical relationship between inoculated and harvested cells? [CO2][L1]
e) How do you count the number of cells in culture medium? [CO2][L2]
f) How do you count the viable cells in the culture medium? [CO2][L2]
g) What is negative and positive selection with respect to immunomagnetic cell sorting? [CO2][L1]
h) Name two characteristics on which the fluorescent-activated cell sorting works? [CO3][L1]
i) What is the use of Ficoll? [CO2][L1]
j) What kind of challenges does the microfluidic cell sorting filters face? [CO3][L1] **2×10**

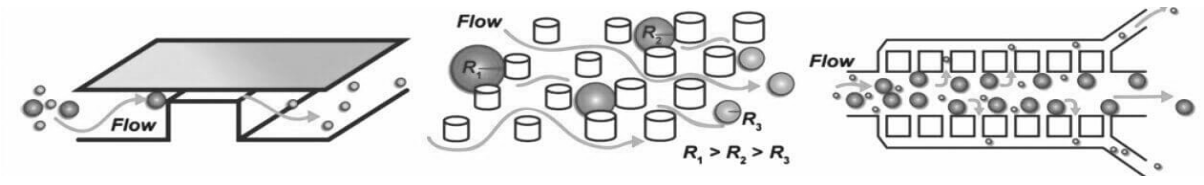
PART-A

Q.2 Raghu counted the number of cells in his flask using a hemocytometer by diluting the cell suspension 1:100? The data pertaining to the number of cells per primary square was as follows:

Sq1 = 632
Sq2 = 656
Sq3 = 627
S34 = 600

Once he calculated the number of cells per ml, he took 100 ul of the inoculum and transferred it to a new flask with fresh medium. Calculate the number of generations that passed if the harvested cells were 100 times the inoculum. Calculate the multiplication rate if the cell were harvested after 96 hours. Calculate the population doubling time? [CO3][L3] **20**

Q.3 Study the figure below and answer the following questions:



a) Name the cell sorting method these figures depict.
b) How has the study of hydrodynamics improved this method of cell sorting?

c) What is Reynolds number?
d) Define Stokes Number.
e) Name the three different methods that the figure depicts.
f) Size determined distribution is applicable when Reynolds number is small and the stokes number of the partical (cell) is small too. Explain. [CO3][L4] **20**

Q.4 The six figures shown below depict scatter plot or line plot for SS/FS and flourescent intensity. The FLH2, PE, V500-A, FITC and PE-Cy7 are flourophores used to study the percentage of cell expressing a particular cell surface protein. Interpret the FACS plots. scatter plots, for the encircled or labeled cell populations.

FIG1

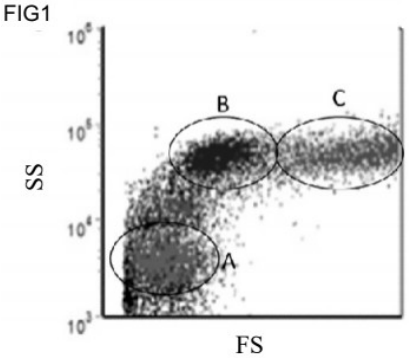


FIG 2

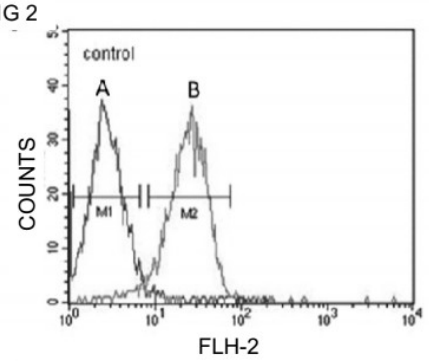


FIG 3

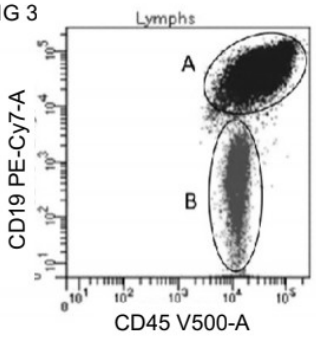


FIG 4

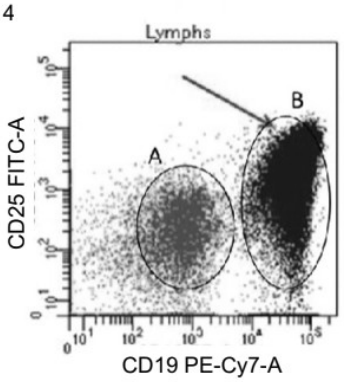
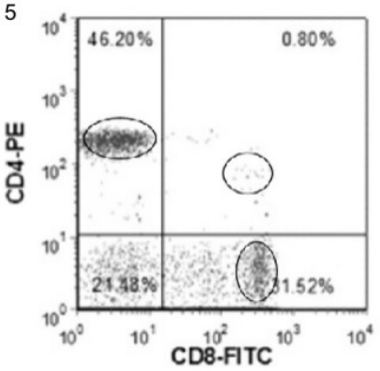


FIG 5



[CO5][L4] **20**

PART-B

Q.5 Discuss the cause and fate of the cells post-fusion using the genotype of the cells used pre-fusion in hybridoma technology. Explain your answer. Explain the purpose and process of hybridoma technology.

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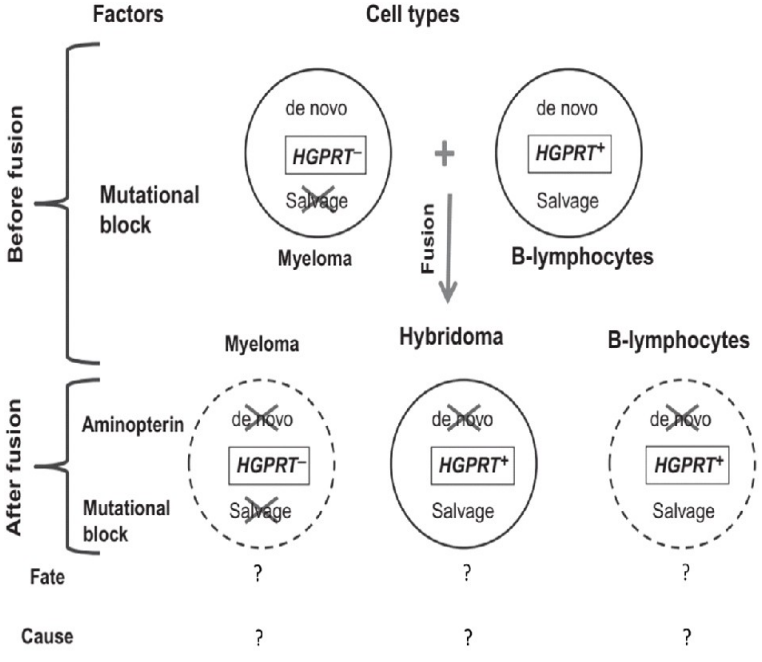
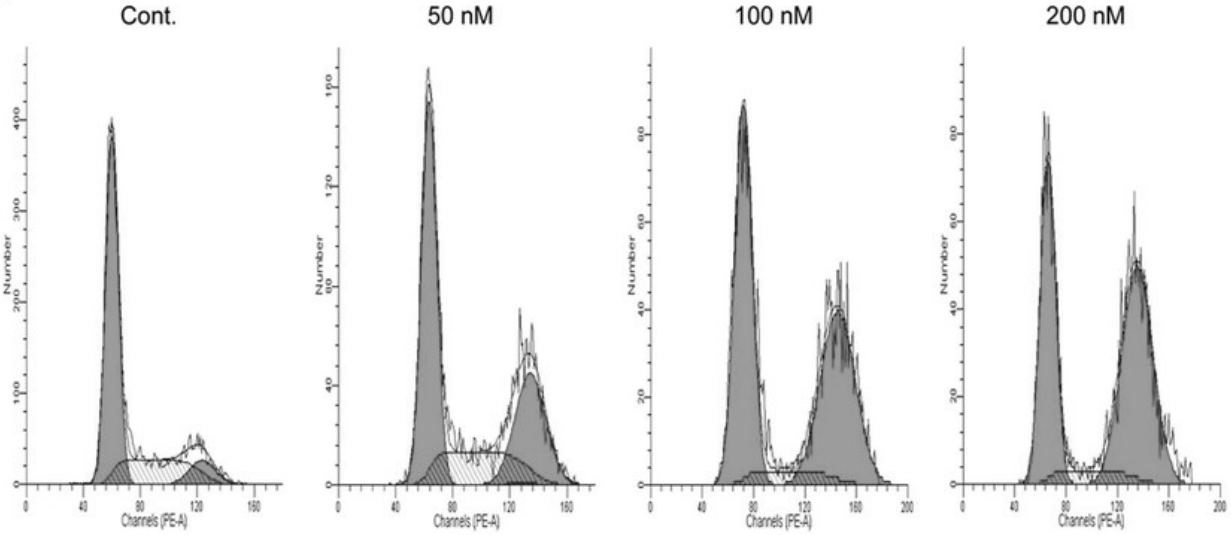


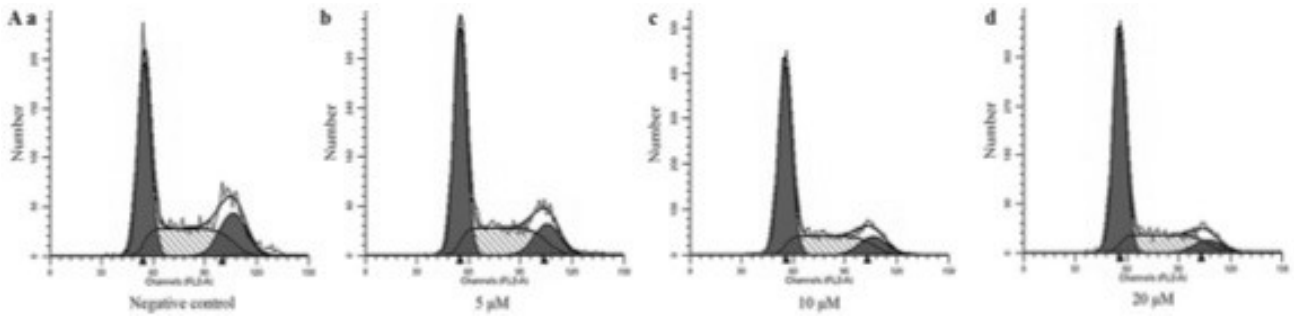
[CO5][L4] **20**

Q.6 Answer the following questions:

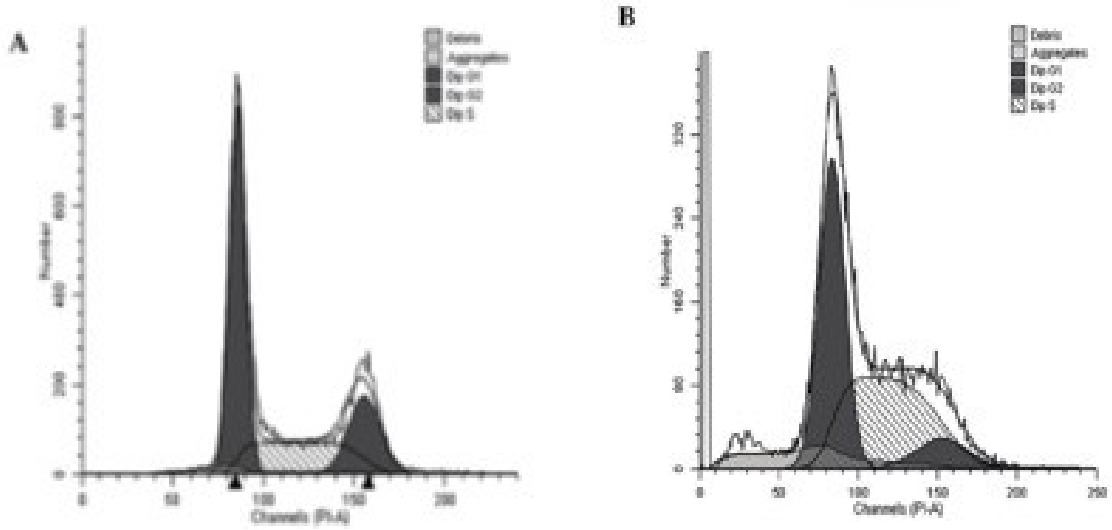
a) Increased concentration of cucurbitin effects the cell cycle. Justify the statement.



b) Increased amount of X inhibitor, disrupts the cell cycle. Justify the statement



c) What stage are the cells arrested at? Justify your statement.

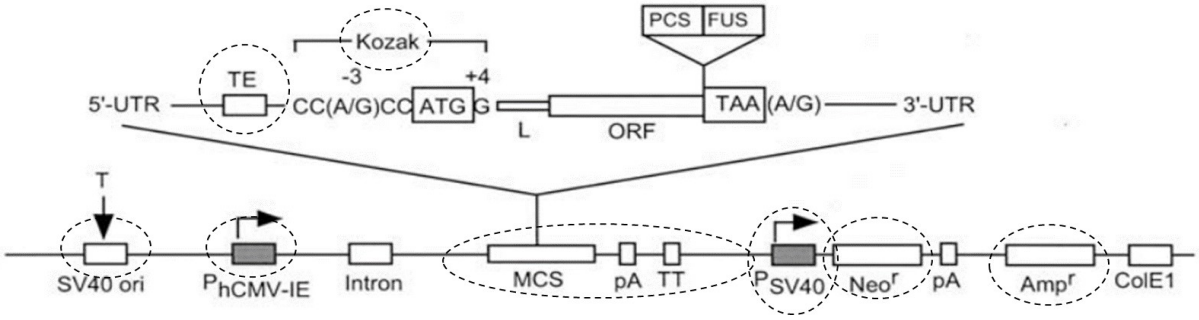


d) Calculate the mean generation time, if the number of cells inoculated is 1.2 X 10^5 and the harvested cells are 3.0X105 and the time elapsed in 24hrs.

[CO4][L5] **20**

Q.7 a) How are the polycistronic constructs different from monocistronic constructs?

b) In the diagram given below mention the functions of encircled DNA regions in the construct.



c) Kenny et al (2007) classified the structures of 3D spheroids formed by a panel of 25 breast cancer cell lines into four groups. What are they? Explain with the help of a diagram.

d) Write a short note on the different delivery systems used in mammalian gene transfer. [CO5][L3] **20**

End Semester Examination, Dec. 2023

B. Tech. (Biotechnology) – Fifth Semester

GENOMICS AND PROTEOMICS (BBT-DS-525)

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

No. of pages: 4

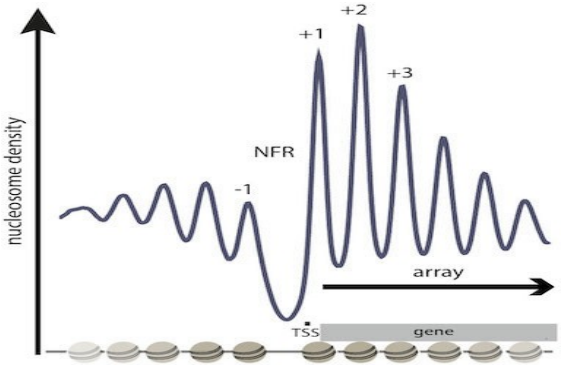
Note: *Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Can transcriptome profile of a cell always correlate with that of proteome? [CO1][L1]
b) What is a nucleosome? What part of the nucleosome is modified? [CO2][L2]
c) Is transcription start site of an actively transcribed gene always open? [CO1][L1]
d) What is the role of insulator? If an insulator is deleted, how would it effect the expression of the gene? [CO2][L1]
e) What is Illumina sequencing technology? [CO2][L2]
f) How is Salting out different from salting in? [CO1][L1]
g) What is SILAC? [CO2][L2]
h) How is ELISA used as an assay technique? [CO2][L2]
i) How are protein concentrations determined using spectroscopy? [CO2][L1]
j) What is Ion exchange chromatography? [CO2][L2] **2×10**

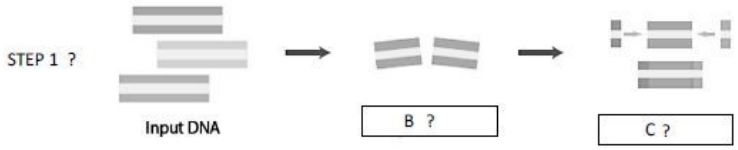
PART-A

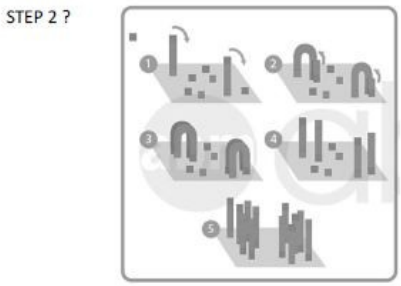
Q.2 The figure below shows nucleosome occupancy measurement in and around thegene. Observe the diagram carefully and answer the following questions:



a) What is a TSS?
b) Define NFR?
c) Using diagrams for nucleosome occupancy show how the genes that are actively transcribed and those that are silenced would differ in their nucleosome occupancy atthe TSS?
d) What are +1 and -1 nucleosomes?
e) What are nucleosomes made of? [CO2][L3] **4×5**

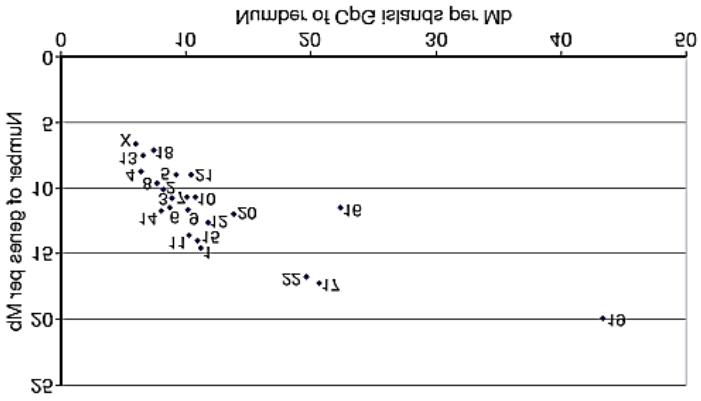
Q.3 The figure below depicts two crucial steps (1 and 2) in 2nd generation Sequencing. Study the figure carefully and answer the following questions:





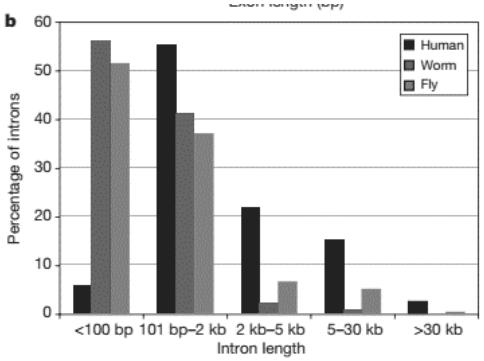
a) What is Step 1 and identify the sub-steps A and B? why is this step crucial?
b) What is Step2? Why is it crucial?
c) What is the type of chemical synthesis 2nd generation sequencing involving and how is it different from that of Sanger Sequencing?
d) What strategy was used in the Human Genome Project? [CO3] [L4] **5×4**

Q.4 a) Study the data given below and answer the questions:



i) Briefly interpret the data.
ii) Which chromosome shows the maximum number of genes per Mb as well as maximum number of CpG islands per Mb?
iii) How do you explain the situation of chromosome X in terms of number of genes per Mb and number of CpG islands per Mb?
iv) Which chromosome has the maximum number of gene but least number of CpG islands per Mb?
v) Which chromosome has the maximum number of CpG islands and least number of genes per Mb? [CO3][L4] **10**

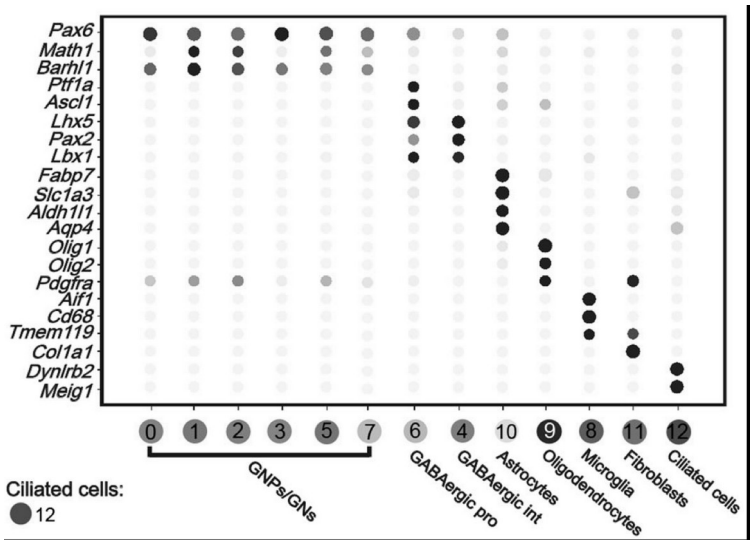
b) Study the data and answer the questions:



i) Briefly interpret the data
ii) Which species show maximum number 2Kb-5Kb intron length?
iii) What type of introns are found in worms?
iv) What are the characteristics of introns in fly worms? [CO3][L4] **10**

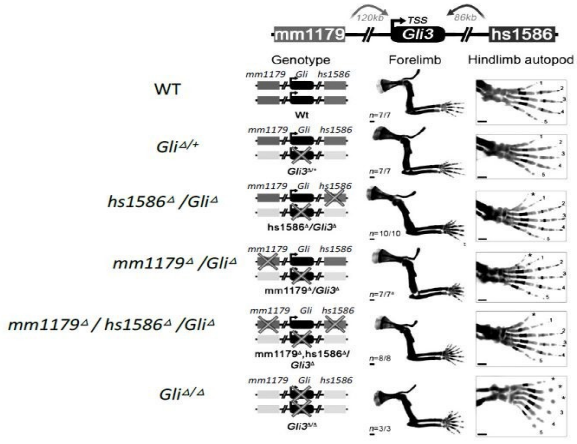
PART-B

Q.5 The data below shows the dot plot for the expression of genes in different cell types including the GNP/GN cells, GAB Aergic progenitors, GAB Aergic interneurons, astrocytes, oligodendrocytes, microglia, fibroblasts and ciliated cell. The size of thedot represents fraction of cell expression and the intensity of colour represents mean expression i.e. higher the intensity greater the mean expression. Study the data carefully and answer the following questions:



a) All the cells have the same genetic composition, yet they look so different from each other and vary in their functionality. Why?
b) What are the major genes expressed in GNP/GN cells? Compare the expression pattern of GNP/GN cells with that of other cell types.
c) What is a trancriptome? [CO4] [L4] **20**

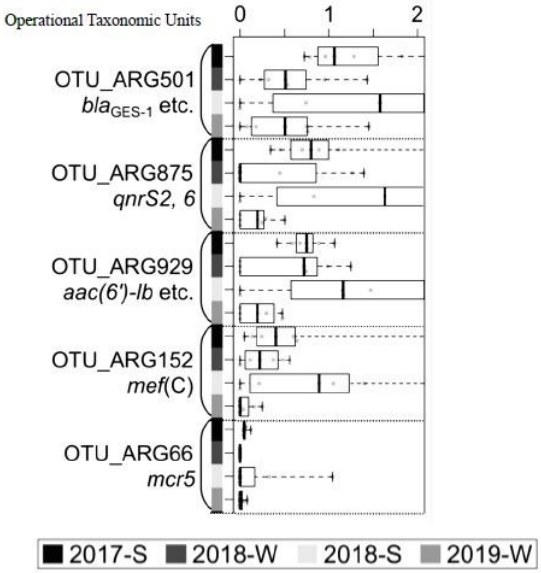
Q.6 Gli gene is crucial for limb and digit (finger) development. This gene also controls the number of digits (fingers) formed. Two enhancers mm1179 and hs1586 are situated upstream and downstream of the Gli gene. Both the enhancers are involved in expression of Gli gene. Deletion of the gene itself or either of the two enhancers can lead to improper development of limb as shown under the Hind limb auto pod column. Symbol (△) represent deletion. In the figure for each scenario, two copies of the genomic region is shown:



a) What is an enhancer? How is it different from promoter?
b) The enhancers are generally located far apart from the gene they regulate, how then do they interact with the promoters of such genes?
c) Compare the scenario where one copy of the gene is deleted, to that of the case where two copies of the gene Gli is knocked out.
d) Consider all the scenarios where one copy of the gene is deleted? Which scenario according to you is the most severe? Why do you think that is?

[CO5][L5] **5×4**

Q.7 In a recent meta genomic analysis of urban wastewater treatment plant effluents in Tokyo (Sekizuka et al. 2022), the following results were obtained on Antimicrobial resistant genes (ARGs) based on different Antimicrobial resistance categories (AMR) These different categories are known as OUT or Operational taxonomic units. The survey started from 2017 Summer (2017-S) and end in 2019 winters(2019-W). Please go through the data (presented in the form of Box-and-Whiskerplot) and answer the following questions:



a) Which OTU shows minimum variation in the appearance of ARGs throughout the time duration?
b) Which OUT shown maximum variation in the appearance of ARGs for the duration of analysis?
c) Which season (mention the year as well) showed maximum emergence of antimicrobial resistance?
d) Compare the data for the summers of 2017 and 2018.
e) Compare the data for the winters of 2018 and 2019. [CO4][L5] **4×5**

End Semester Examination, Dec. 2023

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 Answer the following in brief:

a) What is the difference between a vaccine and an antiviral? [CO-1][L-2]
b) Explain fusion and what follows just after. [CO-2][L-2]
c) How do you imply with viral load? [CO-3][L-2]
d) When does a virus undergoes uncoating? [CO-3][L-2]
e) What is immunization? [CO-4][L-2]
f) Explain antivirals. [CO-6][L-2]
g) What is Vertical Transmission? [CO-4][L-2]
h) Mention the taxonomy of HBV. [CO-5][L-2]
i) Name the two most common vaccine delivery methods. [CO-5][L-2]
j) What is meant by biocontainment? [CO-6][L-2] **2×10**

PART-A

Q.2 What are RNA Viruses? How do they differ from DNA Viruses? Explain in context with classification, salient features and structural differences. [CO-1,2][L-2]**20**

Q.3 Explain the importance of animal cell culture in the area of virology. What are the alternatives to this method? [CO-2,3][L-3]**20**

Q.4 Elaborate on the replication mechanism of a specific DNA virus with suitable diagram and examples. [CO-1][L-2]**20**

PART-B

Q.5 a) Discuss the various types of vaccines. [CO-4,5][L-2] **10**
b) What are the various processes in antiviral designing? [CO-4,5][L-2] **10**

Q.6 a) Give an account of different types of viral vectors. [CO-4,6][L-2] **10**
b) Elaborate on the various biosafety levels adopted for virological laboratories. [CO-4,6][L-2]**10**

Q.7 Discuss about the structure, diagnosis and treatment for HIV Virus. Illustrate the structure with the help of diagram. [CO-5,6][L-2]**20**

End Semester Examination, Dec. 2023

B. Tech (Biotechnology) – Fifth Semester

FOOD PROCESS TECHNOLOGY (BBT-DS-527)

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

No. of pages: 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 briefly:

a) Discuss and justify briefly the possibility of one method of food preservation to suit all types of food products.
b) Substantiate the role of preservation of grains against infestation of pests.
c) What is the basic principle behind curdling of milk during milk spoilage?
d) What are Z and D values?
e) Does fermentation contribute in changing the physical and chemical composition of food material?
f) Awareness of food composition content helps in preservation of food. Justify.
g) Why are microbes a matter of consideration in food process technology?
h) How are jams distinct from pickles?
i) What kind of microbes harm the food at high pH?
j) Preservation directly correlates with good manufacturing practices. Justify this statement with a suitable explanation of true or false. [CO1-4][L1-4] **2×10**

PART-A

Q.2 a) Give a detailed account of and justify the need of different methods of preservation. [CO-1,2][L2,3] **10**

b) Discuss the scope of food processing. Support your answer using general principles of food preservation wherever necessary. [CO-1,2][L2,3] **10**

Q.3 Briefly discuss the drying and milling of grains. Substantiate your answer with an explanation of nature of grains that are being milled. Why is milling only used for dry grains and not fresh fruits? [CO-4][L3] **20**

Q.4 a) Fresh fruits and vegetables already have a protective natural coating, then why do we employ an elaborate method to process them? [CO-3] [L4,5] **5**

b) State and discuss the various methods for preservation methods utilized in preservation of fresh fruits and vegetables. [CO-3] [L4,5] **15**

PART-B

Q.5 Milk being a single food product with a particular composition act as a starter material for several milk products such as curd, yogurt, paneer, cheese, butter. Justify this using suitable explanations. Mention the production technique for any two milk products of your choice. [CO-2] [L-3] **20**

Q.6 Discuss the following:

a) The role of microbes in preservation of poultry products.
b) Storage and transport of raw fish across long distances. [CO-1][L-2] **10×2**

Q.7 Comment on:

a) The good manufacturing practices (GMP) guidelines being designed for handling processed food materials.
b) The strategies adopted in increasing the shelf life of processed foods.

[CO-3,4][L-3] **10×2**

End Semester Examination, Dec. 2023

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 in brief:

a) Define 'induced pluripotency'. [CO-1][L-1]
b) What are embryoid bodies? [CO-1][L-2]
c) Can the terms PSC and iPSC be interchangeably used? [CO-2][L-2]
d) What is embryo-splitting? [CO-4][L-1]
e) Name any two enzymes which depress heterochromatin. [CO-4][L-2]
f) What is a quiescent stem cell? [CO-2][L-1]
g) List the factors influencing defects in cloned animals. [CO-5][L-1]
h) What is Waddington's hypothesis? [CO-3][L-1]
i) What are the various tools of gene editing? [CO-5][L-2]
j) Are IP laws the same across the world in stem cell research? Comment. [CO-6][L-2] **2×10**

PART-A

Q.2 What is a stem cell niche? Discuss the constituents and significance of the stem cell niche. [CO-1][L-1] **20**

Q.3 a) Classify stem cells based on their origin and explain the characteristic features of stem cells. [CO-2][L-3] **10**
b) Explain any two methods of stem cell identification. [CO-2][L-2] **10**

Q.4 Cellular communication is essential for cell fate changes and maintenance of stemness in a cell. Justify using suitable examples. [CO-3][L-3] **20**

PART-B

Q.5 Elaborate the applications and challenges of iPSCs. [CO-4][L-5] **20**

Q.6 What is stem cell therapy? Explain how diabetes mellites can be reversed using stem cell technology. [CO-5][L-2] **20**

Q.7 Mutation in gene X leads to severe debilitating disorder. If you given are the opportunity to apply your learnings from the course and treat the individual, how would you do that? Discuss the procedure in detail. [CO-6][L-6] **20**

End Semester Examination, Dec. 2023

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 briefly:

a) Summarize different plants based sources of drug. [CO-1][L-1]

b) What is the role of molecular biology of receptors molecule in drug discovery. [CO-1][L-1]

c) What are the features present in prodrug? [CO-2][L-1]

d) Illustrate the factors that affects drug distribution. [CO-2][L-3]

e) Explain the approaches used for drug-target identification. [CO-6][L-2]

f) Highlight the applications of high throughput screening. [CO-5][L-2]

g) How drug repurposing help researchers in saving cost and time? [CO-5][L-4]

h) Distinguish between CoMFA and CoMSIA. [CO-4][L-2]

i) Outline the drug discovery process using flow diagram. [CO-3][L-2]

j) Elaborate protein secondary structure component. [CO-5][L-1] **2×10**

PART-A

Q.2 Highlight different steps applied 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 using case study. [CO-3][L-5] **20**

PART-B

Q.5 Analyze different steps involved in docking and virtual screening. [CO-4][L-4] **20**

Q.6 Evaluate Combinatorial chemistry based approaches for lead identification during drug discovery process. [CO-5][L-5] **20**

Q.7 Discuss the sequence and events which take place in QSAR. [CO-6][L-6] **20**

End Semester Examination, Dec. 2023

B. Tech. (Biotechnology) - 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.*

Q.1 Answer the following in brief:

a) Scaffold is a biomaterial. True or False. Comment. (CO.1) L2

b) What is the basic criteria for selecting the type of molecular therapy? (CO.2) L2

c) What are the barriers in gene delivery? Explain any two. (CO.1) L2

d) Helper viruses are used for adenoviral vectors. Yes or no, Give explanation for your answer. (CO.3) L2

e) What is the biological name of growth hormone? (CO.2) L2

f) What are CAR-T cells? Mention their usage. (CO.3) L2

g) How insulin was produced as therapeutic molecule before recombinant therapy? (CO.3) L2

h) What is an antiviral oligonucleotide? (CO.3) L2

i) Name any two immunomodulators. (CO.3) L2

j) What is the clinical application of streptokinase? (CO.3) L2. **2×10**

PART-A

Q.2 a) Give an account of various steps and important considerations in gene delivery for gene therapy. (CO.2, CO.3) L3, L2 **10**

b) What are good and bad genes? How do we deliver them in cells? (CO.2, CO.3) L3, L2 **10**

Q.3 Stem cell and therapy play an important role in regenerative medicine. Comment on the application with appropriate examples. (CO.2, CO.1) L4 **20**

Q.4 Highlight the importance of recombinant therapy. Comment on its utility with respect to stem cell therapy. (CO.3, CO.1) L3 **20**

PART-B

Q.5 a) Give an account of various steps and important considerations in assigning immunotherapy (CO.4, CO.5) L2 **10**

b) Vaccine design and delivery are important steps of molecular therapy. Explain. (CO.4, CO.5) L2. **10**

Q.6 Gene silencing is a natural mechanism that has found applicability. Explain and give examples to support your justification. (CO.5, CO.6) L4 **20**

Q.7 Immune effector cells have regulators. Mention them and discuss their role in immune regulation. (CO.4, CO.6) L3 **20**

End Semester Examination, Dec. 2023

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 brief:

a) Define incineration and its role in wastewater treatment. [CO-1][L-1]
b) Why Fenton technology is one of the most effective oxidation methods for the removal of organic contaminants? [CO-6][L-2]
c) Engineered microbes are effective tools for the remediation of polyaromatic aromatic hydrocarbons and heavy metals. Justify the statement. [CO-5][L-2]
d) Differentiate between Phytoremediation and Phyco-volatization. [CO-3][L-3]
e) What is nitrobenzene, and why is it considered a pollutant? [CO-3][L-1]
f) What do you mean by dissimilarly metal reduction? [CO-2][L-1]
g) Which alkanes are waxy solids? [CO-3][L-1]
h) Give examples of fungi used for Myco-remediation. [CO-4][L-1]
i) How the oligodynamic action of heavy metal works. [CO-1][L-3]
j) Which genes are responsible for microbial degradation of PCBs? [CO-5][L-2] **2×10**

PART-A

Q.2 a) 'Omics approaches in bioremediation of environmental contaminants: An integrated approach for environmental safety and sustainability'. Critically analyze and discuss the statement. [CO-3][L-4] **7**

b) Compare the conventional physicochemical and biological strategies for effective removal of contaminants in water and soil. [CO-1][L-3] **13**

Q.3 a) Classify the different types and factors responsible for bioremediation. [CO-1][L-5] **10**

b) What is phytoremediation, and how does it differ from traditional bioremediation? [CO-3][L-1] **10**

Q.4 a) Describe the biological process of n-alkane degradation. [CO-4][L-2] **15**

b) What are the three possible pathways for n-alkane degradation? [CO-5][L-2] **5**

PART-B

Q.5 a) Discuss the major mechanisms of biodegradation of halogenated aromatic hydrocarbons. [CO-2][L-2] **10**

b) What are the factors affecting biodegradation of halogenated aromatic hydrocarbons? [CO-2][L-2] **10**

Q.6 a) How do Meisenheimer complexes contribute to the selectivity of nucleophilic aromatic substitution reactions? [CO-1][L-5] **10**

b) Differentiate between intradiol and extradiol cleavage and their role in bioremediation of polychlorinated biphenyls. [CO-3][L-3] **10**

Q.7 a) Can biodegradation of nitrobenzene be enhanced or accelerated through bioremediation techniques? [CO-3][L-1] **10**

b) What are the potential intermediate products formed during the biodegradation of nitrobenzene, and are they also toxic? [CO-6][L-1] **10**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

ENGINEERING MECHANICS FOR CIVIL ENGINEERS (BCE-DS-302A)

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) Define "position vector". Illustrate for a 3D right handed coordinate system. [CO1][L2]

b) Illustrate a parallel force system in context of civil engineering. [CO1][L2]

c) State Lami's theorem. [CO2][L2]

d) Draw free body diagram of a block resting on an inclined plane. [CO3][L2]

e) What are the different types of loads as used in the analysis of structures? [CO2][L2]

f) Write the assumptions used in the analysis of a truss. [CO3][L1]

g) In a framed structure, why do we require zero force members? [CO2][L2]

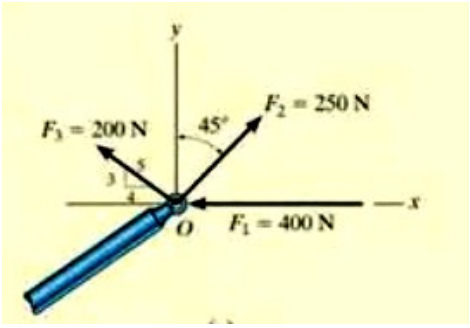
h) Two like parallel forces are acting at a distance of 24 mm apart and their resultant is 20 N. It the line of action of the resultant is 6 mm from any given force, determine the magnitude of two forces. [CO4][L3]

i) A body moves, from rest with a constant acceleration of 10m per sec. what is the distance covered in 5 sec. [CO5][L2]

j) Define time period and frequency of vibrations. [CO-6][L-1] **2×10**

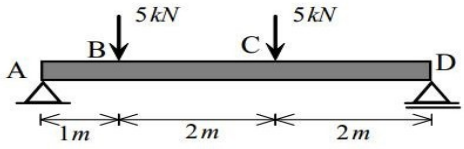
PART-A

Q.2 The end of the boom O is subjected to three concurrent and coplanar forces. Determine the magnitude and direction of the resultant force.



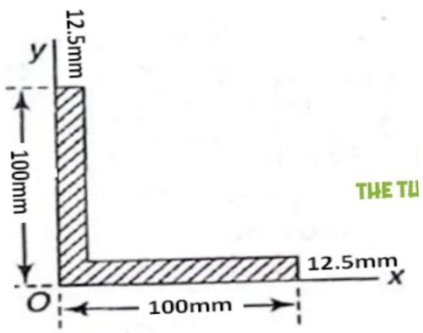
[CO-1][L-3] **20**

Q.3 Draw shear force diagram and bending moment diagram of the following beam.



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

Q.4 Find the moment of inertia of the figure 3 below about both X-Axis and Y-Axis.



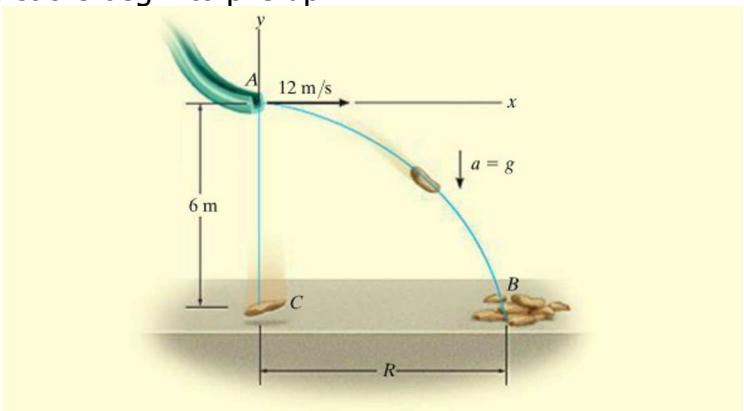
P.T.O.

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

PART-B

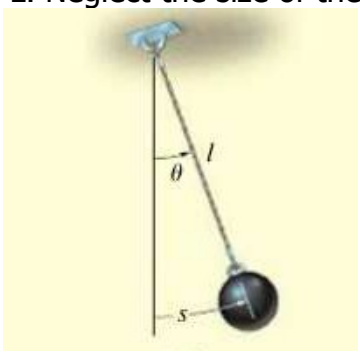
Q.5 A 100-kg block rests on an inclined plane of 30o. Find the magnitude of the force P required to give the block an acceleration of 2.5 m/s^2 upwards. The coefficient of kinetic friction between the block and plane is = 0.25. [CO-4][L-3] **20**

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 then evaluate the time needed for the sack to strike the floor and range R where sacks begin to pile up.



[CO-5][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.



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

End Semester Examination, Dec. 2023

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** from **PART-B**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Define a disaster as per disaster management act 2002. [CO:1, L-1]

b) List any five countries who participated in the world conference on disaster reduction held in Kobe from 18th-22nd January 2005. [CO:4,L:3]

c) Give measures to counter volcanic eruption. [CO:2,L:2]

d) Citing relevant examples justify the benefits of public awareness programs in context of disaster management. [CO.4, L:3]

e) List any three activities disaster preparedness entails, [CO:5,L:2]

f) State true or false for the given statement "Disasters not only reveal underlying social, economic, political and environmental problems, but unfortunately contribute to worsening them." Give justification. [CO:1, L:2]

g) Give examples of any two non-structural measures for disaster risk reduction includes. [CO:5, L-2]

h) Give the essential services to be developed in wake of preparedness of a flood. [CO:4, L:2]

i) Who heads The National Disaster Management Authority? [CO:6, L-2]

j) Why are marginalized people more vulnerable to disaster? [CO:5,L:3] **2×10**

PART-A

Q.2 Differentiate between a disaster and hazard. Give any two examples of hazard. [CO:1, L:2] **20**

Q.3 Differentiate between natural and man-made disasters citing relevant examples. The Bhopal gas tragedy will be grouped in which of these categories. Describe the reason of same and give an over-view of the extent of damage inflicted onto the system during this catastrophe. [CO:2, L:2] **20**

Q.4 Discuss the effects of disasters citing relevant examples. [CO:3, L:3] **20**

PART-B

Q.5 With the help of an illustrative figure explain the disaster management cycle and its different stages citing example of a relevant natural or man-made disaster and the challenges posed by them. [CO:5, L:4] **20**

Q.6 Explain the responsibilities of National Disaster Management Authority. [CO: 6, L:3] **20**

Q.7 Write short notes on ***(any two):***

(20)

a) Physical vulnerability.
b) Social vulnerability.
c) Economic vulnerability. [CO:5,L:2] **10×2**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

ENGINEERING GEOLOGY (BCE-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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) How are natural slopes different artificial slopes? [CO:6, L:2]
b) Define 'streak'. [CO:1, L1]
c) Give two examples of basic rocks. [CO.4,L:2]
d) Differentiate between physical geomorphology and minerology. [CO:2, L:1]
e) List down any two indirect sources that help us to understand the interior of earth. [CO:3, L:1]
f) Give the average radius of earth. [CO:1, L:1]
g) Compile a list of three notable examples representing weathering. [CO:4, L:2]
h) Differentiate between a dip and a strike. [CO:3, L:2]
i) Draw a neat sketch of an anticline and a syncline fold. [CO4, L2]
j) Write names of any two major tectonic plates. [CO:5, L:1] **2×10**

PART-A

Q.2 a) Summarize the importance of engineering geology for civil engineers. [CO6, L:3] **10**
b) Explain the interior of earth with the help of a neat sketch. [CO1, L:3] **10**

Q.3 a) With the help of a neat sketch describe the rock cycle. [CO:2, L:2] **10**
b) Give an overview of sedimentary petrology and its economic significance citing relevant examples. [CO3, BTL3] **10**

Q.4 Explain the process of weathering and different types of weathering citing few notable examples. [CO:4, L:3] **20**

PART-B

Q.5 a) Describe the classification system of joints. [CO:5, L:3] **10**
b) Explain the divergent and convergent plate boundaries with the help of a neat sketch and their significance. [CO:5, L:3] **10**

Q.6 Discuss in detail earthquakes, their classification system, effects and civil engineering considerations in seismic areas. [CO:5, L:3] **20**

Q.7 Discuss the precautionary measures to be exercised for construction of buildings in seismically active areas. [CO:6, L:3] **20**

End Semester Examination, Dec. 2023

B. Tech. — Third Semester

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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Give electron configurations for the Al^{3+} and O^{2-} ions. [CO-1][L-1]
b) Explain primitive cell. [CO-3][L-2]
c) What is the coordination number for the FCC crystal structure? [CO-3][L-1]
d) What are point defects in crystals? [CO-2][L-2]
e) What are the types of dislocation in line defects? [CO-2][L-2]
f) Name the two atomic mechanisms of diffusion. [CO-2][L-1]
g) What is the difference between the states of phase equilibrium and metastability? [CO-2][L-2]
h) Define engineering stress and engineering strain. [CO-4][L-2]
i) Which material is used in piezoelectric? [CO-5][L-2]
j) What is meant by thermal stresses? [CO-5][L-2] **2×10**

PART-A

Q.2 a) Describe covalent, ionic, metallic and secondary types of bonding. [CO-1][L-2] **12**

b) Explain why covalently bonded materials are generally less dense than metallically bonded ones. [CO-1][L-2] **8**

Q.3 a) Draw sketches illustrating for Miller indices (020), (100) and (111). [CO-3][L-3] **6**
b) Calculate the atomic packing factor for Body Centred Cubic (BCC) crystal. [CO-3][L-3] **8**
c) Derive an expression for inter planer spacing between two parallel planes in a simple cubic crystal. [CO-3][L-3] **6**

Q.4 a) Describe the vacancy and self-interstitial crystalline defects. [CO-2][L-2] **6**
b) Explain the Schottky defects in details. [CO-2][L-2] **6**
c) Describe the atomic structure within the vicinity of grain boundary. [CO-2][L-2] **8**

PART-B

Q.5 a) What kind of information can be interpreted from phase diagram? Explain in detail. [CO-2][L-3] **8**
b) Differentiate between steady-state and nonsteady-state diffusion. [CO-2][L-2] **6**
c) Write short note on Gibbs phase rule. [CO-2][L-2] **6**

Q.6 a) State Hooke's law and note the conditions under which it is valid. [CO-4][L-2] **8**
b) Differentiate between Brinell and Vickers hardness testing techniques. [CO-4][L-2] **8**
c) Write a short note on 'yielding and yield strength'. [CO-4][L-2] **4**

Q.7 a) Explain the behaviour of dielectrics in an external field. [CO-5][L-2] **6**
b) Explain the paramagnetism, ferromagnetism, antiferromagnetism and ferrimagnetism with suitable examples. [CO-5][L-2] **10**
c) In a LED the active material used is GaAs with a band gap of 1.5 eV. Find out the wavelength of light emitted. [CO-5][L-4] **4**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Write a short note on "Classifications of Scale". [CO-1][L-2]

b) What is surveying? What are the various types of surveying? [CO-2][L-2]

c) Convert the following quadrantal bearings into whole circle bearings and find their back bearings: N 57^0 E, S 38^0 E, N 42^0 W and S 58^0 W. [CO-3][L-2]

d) With the help of a neat sketch, correlate the concept of "Closing Error" in Traverse Surveying. [CO-2][L-2]

e) Differentiate between "Simple Curve" and "Compound Curve". [CO-3][L-2]

f) What do you understand by the term "Contour Interval"? [CO-3][L-2]

g) What is Photogrammetry ? Discuss its limitations. [CO-4][L-1]

h) List the procedure for determination of Focal Length of a camera in Terrestrial Photogrammetry. [CO-4][L-2]

i) What do you understand by the term "Geographical Information System"? [CO-6][L-2]

j) Write a short note on the importance of remote sensing and its uses.

[CO-5][L-1] **2×10**

PART-A

Q.2 a) Define contours. Discuss its characteristics and uses. [CO-1][L-2] **10**

b) In a city property survey following observations were made. Calculate latitude, departure and closing error. Prior to computation of area enclosed within the traverse, adjust the coordinates using Bowditch Rule. [CO-1][L-4] **10**

Line	Length (m)	Bearing
AB	92.31	45^0 10′
BC	218.76	72^0 05′
CD	153.18	161^0 52′
DE	163.10	228^0 43′
EA	232.26	300^0 42′

Q.3 a) What do you mean by a satellite station and reduction to centre? Derive expression for the reducing the angles measured at the satellite to centre. [CO-2][L-3] **10**

b) What is baseline? Explain different methods of baseline measurements. [CO-2][L-2] **10**

Q.4 a) How are curves classified? Explain the following terms in connection with curves.

i) Vertex.

ii) Arc length.

iii) Long chord of the curve.

iv) Summit. [CO-3][L-2] **10**

b) Two parallel railway lines are to be connected by a reverse curve, each section having the same radius. If the lines are 12 m apart and the maximum distance

P. T. O.

tangent points measured parallel to the straights is 48m find the maximum allowable radius. [CO-3][L-3] **10**

PART-B

Q.5 a) Write a short note on "Global Positioning System". [CO-4][L-3] **10**

b) Write steps for field survey using total station. [CO-4][L-3] **10**

Q.6 a) Discuss other methods of determining scale of vertical photographs. [CO-5] [L-2] **10**

b) To determine the average scale of an aerial photograph, three points A, B, and C were selected. Their elevations were determined from a contoured map as 1400 m, 900 m, and 1100 m. If the flying height of the aircraft above mean sea level is 350 m, and the focal length of the camera lens is 160 mm, calculate the average scale of the aerial photograph. [CO-5][L-3] **10**

Q.7 a) Discuss briefly the ideal remote sensing system. [CO-6][L-2] **10**

b) Discuss the application of remote sensing in:

- Terrain analysis
- Construction material inventories
- Site investigations
- Erosion assessment [CO-6][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

GEOTECHNICAL ENGINEERING (BCE-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 brief:

a) Sketch typical complete grain-size distribution curves for. [CO1][L2]
b) If void ratio of soil is 0.5, what will be its porosity? [CO1][L2]
c) Explain the various field applications of geotechnical engineering in detail. [CO2][L2]
d) How presence of adsorbed water reduces permeability of the soil? [CO2][L2]
e) On what factors value of shear resistance depends? [CO6][L2]
f) What is the relation between void ratio and compression index? [CO1][L2]
g) Why is stress distribution important? [CO3][L1]
h) State the various assumptions of Terzaghi's theory of consolidation their validity. [CO5][L1]
i) Define the Over Consolidation Ratio. [CO6][L2]
j) Write revised Mohr- Coulomb equation. [CO6][L2] **2×10**

PART -A

PART-A

Q.2 a) Explain IS classification of soil in detail. [CO1][L-2] **10**

b) The results of laboratory tests of different soils are given below:

	Clay A	**Clay B**
Liquid Limit (%)	44	55
Plastic limit (%)	20	35
Natural water content, (%)	30	50

Which of the soils is more plastic? Which of them is of softer inconsistency? Explain.

[CO1][L-3] **10**

Q.3 a) What is Darcy's law? How do you know that the flow through a soil obeys Darcy's law? [CO2][L-2] **10**

b) Calculate the horizontal and vertical permeability of a soil deposits consisting of three layers 2 m, 3 m, 1.5 m and 4 m thick with permeabilties 0.2, 2 x 10^{-4}, 0.05, and 5 x 10^{-7} cm/sec resp. [CO2][L-3] **10**

Q.4 a) What are the factors that affect the compaction? Discuss in brief. [CO3][L-3] **10**

b) Calculate the OMC and MDD values for the soil sample having following data:

(CO BCE-DS-502.3) (L-3) (10)

Bulk Density in gm/cc	1.15	1.38	1.52	2.06	1.78	1.66	1.40
Moisture in %	20	27	35	42	40	33	24

[CO3][L-4] **10**

PART-B

P.T.O.

Q.5 a) State the assumptions made in computing stresses below the ground surface due to a point load acting on it. [CO3][L-4] **5**

b) Vertical point load on surface=600 kN. Find incremental vertical pressure at depths 2m and 4m directly under the load and at a distance 5 m radially away from the load axis on these depths. [CO4][L-4] **15**

Q.6 a) Name different stages of consolidation and write about secondary consolidation in brief. [CO5, L-3] **10**

b) Determine the amount of settlement, given the following data: Thickness of compressible medium = 3 m, Coefficient of volume decrease = 0.002 cm^2 /N, Pressure increment at the centre of the compressible medium = 75 kN/m^2. [CO5, L4] **10**

10

Q.7 a) Explain the principle of the direct shear test. What are the advantages of this test? What are its limitations? [CO6, L3] **10**

b) Define the Critical void ratio. Compare the behavior of dense sands with that of loose sands under shearing conditions. (CO3, L3) **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

STRUCTURAL ENGINEERING (BCE-DS-503A)

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

No. of pages: 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 the roles of structural designer and an architect. [CO-1][L-2]
b) Briefly explain the process of idealising load flow path for structures. [CO-1][L-2]
c) With respect to IS Codal Provisions, explain the terms "Dead load" and "Live Loads". [CO-2][L-3]
d) Differentiate between determinate and indeterminate structures. [CO-2][L-2]
e) Define the various reaction components for any two boundary conditions. [CO-3][L-2]
f) List any 4 advantages of steel as a structural element. [CO-4][L-1]
g) What do you understand about the term "Post-Tensioning". [CO-6][L-1]
h) List the various losses in prestress. [CO-6][L-1]
i) Differentiate between over-reinforced and under-reinforced sections. [CO-5][L-2]
j) What does the designation ISRO100 and ISSH-SH means. [CO-5][L-3] **2×10**

PART-A

Q.2 Diagrammatically enunciate the various structural components. [CO-1][L-2] **20**

Q.3
a) Elaborate the various loads considered in the design and analysis of structures with relevance to IS codes. [CO-2][L-2] **10**
b) Explain the various load combinations to be considered in structural design. [CO-2][L-2] **10**

Q.4 Discuss the various "Design philosophies" used in the design and analysis of structures. [CO-3][L-3] **20**

PART-B

Q.5
a) Explain the different types of structural steel. [CO-4][L-2] **10**
b) With a proper sketch, explain the stress strain curve of mild-steel. [CO-4][L-2] **10**

Q.6 Using WSM, calculate area of steel required, for as beam section of width 400 mm and overall depth 750mm. Bending moment are as follows:
a) Case 1: 160 kN-m
b) Case2: 300 Kn-m. (Use M25 and Fe 415 grade of concrete and steel respectively) [CO-1][L-6] **20**

Q.7 With the help of neat sketch, explain the concept of "Pre-tensioning and Post tensioning." [CO-1][L-2] **20**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

STRUCTURAL ANALYSIS-I (BCE-DS-505A)

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) Define shear force and bending moment. [CO1][L-1]
b) What are the type of beams idealized in structural analysis. [CO2][L-1]
c) Draw elastic curves of a fixed beam and a propped cantilever. [CO4][L-2]
d) State Clapeyron's theorem for continuous beams. [CO1][L-1]
e) What is an Influence Line Diagram? [CO3][L-1]
f) Draw ILD for reactions of a simply supported beam having a concentrated unit load crossing from left to right. [CO3][L-2]
g) Find the maximum negative shear force at a section 6m for a 20m beam loaded with a udl of 15kN/m over the whole span. Use ILD. [CO3][L-2]
h) What are the advantages and disadvantages of a fixed Beam? [CO1][L-2]
i) Define stiffness for moment distribution method. [CO4][L-1]
j) Derive the maximum tension in a light cable of span L and dip H subjected to a udl of w/m run on the horizontal span. [CO2][L-3] **2×10**

PART-A

Q.2 a) Determine the magnitude of P and F necessary to keep the concurrent force system in the figure 1 below in equilibrium. [CO1][L-3] **10**

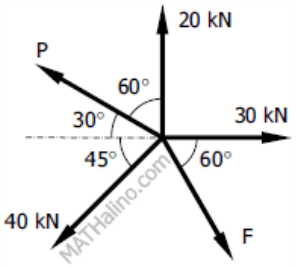


Figure 1

b) Draw SFD and BMD for the following figure 2. [CO1][L-4] **10**

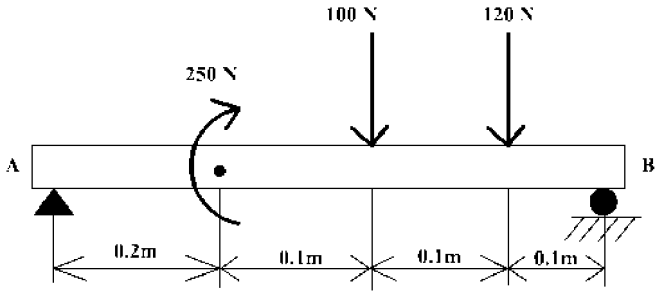


Figure 2

P. T. O.

Q.3 a) Draw ILD for S.F and B.M at a section C distanced z from A of a simply supported beam AB when a unit load crosses the beam. [CO3][L-4] **10**

b) Find the forces in the members BC and BD of the following truss figure 3. [CO2][L-3] **10**

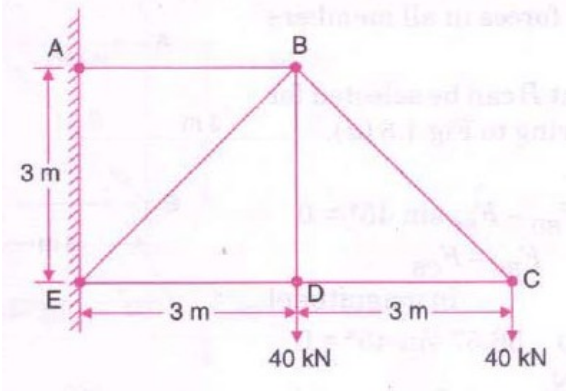


Figure 3

Q.4 a) Find Horizontal thrust of a 30 m span and 8m high three hinged symmetrical parabolic arch loaded with a udl of 20kN/m in the left half span. [CO2][L-3] **10**

b) Using double integration method, determine the end slope and deflection in the beam shown in Figure 4. [CO4][L-3] **10**

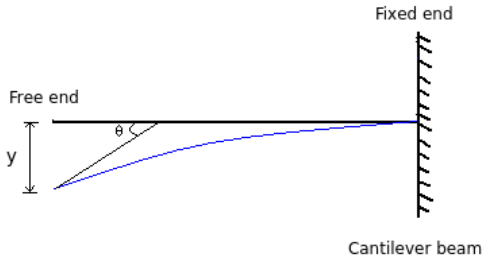


Figure 4

PART-B

Q.5 a) State Castigliano's Ist and 2nd theorem. [CO1][L-1] **5**

b) Find the fixing moments for a fixed beam carrying a central concentrated load 'W' over the span 'L'. [CO1][L-3] **15**

Q.6 A two-span continuous beam ABC (span AB is 3 m and span BC is 5 m) has the extreme ends A and C fixed. The span AB is subjected to a uniformly distributed load of 20 kN/mover the entire span. The span BC is subjected to a point load of 30 kN at 3 m from the right end (Figure 5).Draw the shear force and bending moment diagrams. Assume a constant flexural rigidity throughout the beam. [CO2][L-4] **20**

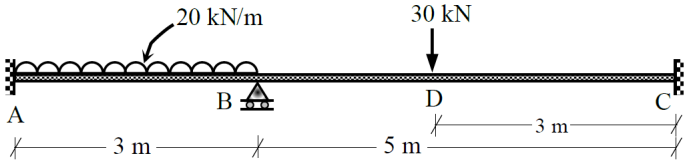


Figure 5

Q.7 A three hinged stiffening girder of a suspension bridge of span 100m is subjected to two point loads of 200 kN and 100kN at distances 25m and 50m from the left end. Find the shear force and bending moment for the girder at a distance 40m from the left end. The supporting cable has a central dip of 10 m. Find also the maximum tension in the cable and draw the Bending Moment Diagram for the girder. [CO3][L-3] **20**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

CONCRETE TECHNOLOGY (BCE-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**. Marks are indicated against each question.*
*Usage of **IS 13920:2019 is allowed.***
*Usage of **Scientific Calculator is allowed.***

Q.1 Answer the following questions:

a) Differentiate between argillaceous and calcareous compounds. [CO-1][L-1]

b) Explain the function of "Silica" in cement. [CO-1][L-1]

c) In a laboratory experiment, if the consistency of the cement measured is 23 percent, determine the percentage of water is added into the sample of cement to determine the compressive strength of cement. [CO-1][L-4]

d) Compare between Fine Sand and coarse Sand. [CO-2][L-2]

e) State "Duff – Abram's Law". [CO-3][L-1]

f) With the help of neat sketch, differentiate between the three different conditions of slump. [CO-3][L-3]

g) Relate the significance of "Target Mean Strength of Concrete" as per IS 10262: 2019. [CO-6][L-4]

h) As per IS 10262: 2019, correlate M 30. [CO-6][L-4]

i) Summarize the commonly used retarders in concrete industry. [CO-5][L-2]

j) Recognize the Indian standard codal provisions for the following:
   i) Fineness of cement by dry sieving.
   ii) Plain and reinforced concrete - code of practice. [CO-6][L-1] **2×10**

PART-A

Q.2 a) Explain in detail the various components of cement. [CO-1][L-2] **10**

b) Elaborate Bogue's Compounds in detail. [CO-1][L-1] **10**

Q.3 a) Summarize the significance of "shape of aggregates". [CO-2][L-2] **10**

b) Evaluate the Fineness Modulus of the given sample of aggregates 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? [CO-2][L-5] **10**

Q.4 What do you understand by "Green Concrete"? Explain in detail the various laboratory experiments which are conducted on the concrete sample to determine its workability? [CO-3][L-1] **20**

PART-B

Q.5 Correlate the functions of various chemical admixtures in mix designing of concrete sample. [CO-4][L-4] **20**

Q.6 Summarize the following:

a) Self – compacting concrete.

b) Light – weight Concrete. [CO-5][L-2] **20**

Q.7 As per IS 10262: 2019, design a Concrete Mix for M 30 for the following data:

- Grade Designation : M 30
- Type of Cement : OPC 33 Grade
- Maximum Nominal Size of Aggregates : 20 mm
- Exposure Condition : Very Severe
- Workability : 85 mm

Assume the suitable data wherever necessary. [CO-6][L-6] **20**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

CONCRETE TECHNOLOGY (BCE-DS-506A)

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

No. of pages: 2

Note: 1. *Attempt **FIVE** questions in 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. *Usage of **IS 13920:2019 is allowed.***
2. *Usage of **Scientific Calculator is allowed.***

Q.1 a) Summarize the different components of Vicat's Apparatus in determination of Consistency and Setting Time of cement. [CO-1][L-2]

b) In a laboratory experiment, if the consistency of the cement measured is 30 percent, determine the percentage of water is added into the sample of cement to determine the compressive strength of cement. [CO-1][L-3]

c) Correlate "Fineness Modulus" with grade of aggregates. [CO-2][L-3]

d) Differentiate between "Consistency" and "Workability" of concrete. [CO-3][L-2]

e) State the working principle of "Schmidt Rebound Hammer Test". [CO-3][L-2]

f) List the various types of Super plasticizers used for modifying the properties of concrete sample. [CO-4][L-1]

g) Summarize the various functions of admixtures. [CO-4][L-2]

h) As per IS 10262: 2019, evaluate the Target Mean Strength of M 35. [CO-6][L-3]

i) Interpret "M 45". [CO-5][L-2]

j) What do you understand by "Hot Weather Concreting"? [CO-5][L-2] **2×10**

PART-A

Q.2 a) Summarize the various laboratory experiments performed for determination of properties of cement particles. [CO-1] [L-3] **12**

b) With the help of neat sketches, compare the two different processes of manufacturing of cement. [CO-1] [L-3] **8**

Q.3 a) Summarize the concept of "Flakiness Index". [CO-2] [L-3] **8**

b) Evaluate the Fineness Modulus of the given sample of aggregates for the following data:

- The total weight of the sample : 25Kg
- Weight retained on 40 mm IS Sieve : 3.0 Kg
- Weight retained on 20 mm IS Sieve : 3.25 Kg
- Weight retained on 10 mm IS Sieve : 4.50 Kg
- What do you infer from the result obtained? [CO-2] [L-4] **12**

Q.4 With suitable diagrams, correlate the following in determination of properties of concrete sample: [CO-3] [L-3] **20**

a) Slump Test.

b) Ultrasonic Pulse Velocity Test.

PART-B

Q.5 Associate the following admixtures employed in concrete making process based on their individual distinguished characteristics: [CO-4] [L-3] **20**

a) Plasticizers

b) Retarders

P. T. O.

c) Rice Husk Ash
d) Metakaolin

Q.6 a) Compare the Fibre – Reinforced Concrete and Light Weight Concrete based on fresh and hardened properties of concrete. [CO-5] [L-3] **10**

b) Corelate the importance of Self – Compacting Concrete as a progressive viability in the field of Concrete Technology. [CO-5] [L-4] **10**

Q.7 As per IS 10262: 2019, design a Concrete Mix for M 30 for the following data:

- Grade Designation : M 30
- Type of Cement : OPC 43 Grade
- Maximum Nominal Size of Aggregates : 20 mm
- Exposure Condition : Extreme
- Workability : 85 mm

Assume the suitable data wherever necessary. [CO-6] [L-6] **20**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

ENVIRONMENTAL ENGINEERING-I (BCE-DS-507)

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) Give the yardstick for computing water demand of a public park. [CO:1, L:1]
b) Compute the water demand of a town with a population of 60000. [CO:1, L3]
c) Compute the fire demand of a city with a population of 1,40,000. [CO.1,L:3]
d) Give the norm for minimum domestic consumption of water for a city or town with full flushing system as per IS:1172-1993. [CO:1, L:1]
e) List down the requirements of water intended for domestic use. [CO:1, L:1]
f) How are cation exchange resins different from anion exchange resins? [CO:3, L:1]
g) Where is the radial system of distribution used? [CO:4, L:2]
h) Write down the purpose of regeneration in the zeolite process. [CO:3, L:2]
i) Classify fitters and their functions. [CO3, L3]
j) Write down any two disadvantages of reverse osmosis system. [CO:3, L:3] **2×10**

PART-A

Q.2 a) Compute the water demand of a township with the following given data:

- Total population = 18000
- Number of factories with bathroom = 150 each having 230 employees
- Number of day boarding schools = 3 @ 400 students/school
- Number of colleges = 2 @ 550 students/college
- Cinema hall = 2 with a seating capacity of 100 each
- Restaurants = 4 with a seating capacity of 60 each
- Hospital = 2 with 300 beds each.
- Master plan green area = 4000 sq.m
- Make suitable adjustments for losses and thefts. [CO1, L:3] **10**

b) Discuss the factors affecting the per capita water demand. [CO1,L:3] **10**

Q.3 a) In a water treatment plant, the pH value of incoming and outgoing water are 7.2 and 8.4 respectively. Assuming a linear variation of pH with time, determine the average pH value of water. [CO:2,L:3] **10**

b) Explain the any two of the following citing permissible standards of the same as per the prevalent codal provisions in context of water:

- Turbidity
- Colour and temperature
- Taste and odour [CO2, L3] **10**

Q.4 a) Two million litres of water is passing through a sedimentation tank which is 6 m wide, 15 m long and having a water depth of 3 m. Compute:

P.T.O.

- The detention time of tank
- Average flow velocity through the tank

If 60 rpm is the concentration of suspended solids present in turbid raw water, how much dry solids will be deposited per day in the tank assuming 70% removal in the basin, and average specific gravity of the deposit as 2. [CO:3, L:4] **10**

b) Summarize the objective of treatment of water. Draw a flow chart illustrating the sequence of various treatment units in a water treatment plant. [CO:3, L:3] **10**

PART-B

Q.5 Discuss in detail ***any two*** including their advantages and disadvantages:

a) Lime-soda process.
b) Ion exchange.
c) Chlorination. [CO:3, L:3] **10×2**

Q.6 a) Water has to be supplied to a town with a population of 1,50,000 at the rate of 160 lpcd from a river 2000 m away. The difference in elevation between the lowest water level in the sump and reservoir is 36 m. If the demand has to be supplied in 8 hours, determine the size of the main and the brake horse power of the pumps required. Assume maximum demand as 1.5 times the average demand. Assume f=0.0075, velocity in the pipe 2.4 m/sec, and efficiency of pump is 80%. [CO:4, L:4] **10**

b) Draw a neat sketch of a sluice valve and explain its uses. [CO:4, L:3] **10**

Q.7 a) Summarize the requirements of a good distribution system. [CO:4, L:3] **10**

b) With the help of a neat sketch explain the concept of dead-end system of distribution and its advantages and disadvantages. [CO:4, L:3] **10**

End Semester Examination, Dec. 2023

B. Tech. – FifthSemester

PAVEMENT MATERIALS (BCE-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 a) Explain the requirements of a good binder. [CO-3][L-2]

b) Describe various types of natural aggregates. [CO-2][L-1]

c) Explain the terms

i) VFBii)VMA [CO-5][L-2]

d) Discuss the scope of soil stabilization in road construction. [CO-1][L-1]

e) Discuss the importance of studying behaviour of soil as a highway material. [CO-1][L-1]

f) Mention the various tests carried out on bitumen along with its properties and uses. [CO-3][L-2]

g) Write down the steps of bituminous mix design. [CO-4][L-2]

h) Discuss the materials used for construction of pavement quality concrete. [CO-6][L-2]

i) Write a note on importance and construction of:

i) Drainage layer for cement concrete pavement.

ii) Joint filler and sealer. [CO-6][L-2]

j) Enumerate the benefits of soil compaction in highway engineering.[CO-1][L-2]

2×10

PART-A

Q.2 a) Explain the applications of:

i) Liquid limit.

ii) Plasticity index.

iii) Free swell index of soils in highway construction works. [CO-1][L-2] **10**

b) Explain CBR and the test procedure in the laboratory. How are the results of the test obtained and interpreted? [CO-1][L-2] **10**

Q.3 a) Explain the desirable properties of aggregates to be used indifferent types of pavement construction. State the tests conducted for each property. [CO-2][L-2] **10**

b) Explain the principle of conducting Los Angeles abrasion test. Mention the recommended LA values for pavement construction. [CO-2][L-2] **10**

Q.4 a) Explain the uses of bitumen emulsion. How are they prepared? [CO-3][L-2] **10**

b) Explain the essential laboratory tests on modified bituminous binders. Mention the objects of these tests. [CO-3][L-2] **10**

PART-B

Q.5 a) Mention the desirable properties of bituminous mix for pavement surface course. [CO-4][L-2] **10**

b) Discuss the fatigue characteristics of bituminous mixes in detail. [CO-4][L-2] **10**

Q.6 Mention the step-by-step procedure of Marshall method of bituminous mix design. [CO-5][L-2] **20**

Q.7 Discuss different materials required for the construction of a Cement Concrete pavement. Mention how a concrete mix is designed for obtaining PQC? [CO-6][L-3] **20**

End Semester Examination, Dec. 2023

B. Tech. – Fourth/Fifth Semester

PLANNING AND DESIGN OF SUSTAINABLE TRANSPORT SYSTEM (BCE-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 brief:

a) Explain various challenges and barriers need to be overcome to promote sustainable transportation. [CO1, L-2]

b) How does transportation contribute to air pollution and what are the primary pollutants associated with it? [CO3, L-2]

c) Explain the three pillars of sustainability, and why are they significant? [CO1, L-2]

d) What role does the availability of public transportation play in shaping land use decisions and reducing car dependency? [CO4, L-2]

e) Define the term "Transit-Oriented Development (TOD)", and also discuss its key principles. [CO4, L-1]

f) Give a method adopted for maintaining a sustainable transport in our city. [CO1, L-1]

g) Discuss the role of recycle and refurbishing in achieving a circular economy in transportation. [CO2, L-2]

h) How can alternative fuels like hydrogen and biofuels contribute to carbon reduction in transportation? [CO3, L-2]

i) Give some examples of successful EIA cases that have influenced project outcomes positively. [CO2, L-1]

j) Discuss various measures can be taken to reduce noise pollution from vehicles and transportation infrastructure. [CO2, L-2] **2×10**

PART-A

Q.2 a) Discuss the impact of a non-sustainable transportation system. suggest any methods to reduce the impacts. [CO1, L-2] **10**

b) Explain the current state of transportation in India, considering all modes of transportation, and how do these systems collectively contribute to the country's economic development and connectivity? [CO1, L-2] **10**

Q.3 a) "Land use planning – a contribution to sustainable land management". Justify this statement. [CO4, L-4] **10**

b) "TOD contribute to sustainable and environmentally friendly urban development" Elaborate this statement. [CO4, L-3] **10**

Q.4 a) Discuss the main objectives of sustainable transportation planning and how do they differ from traditional transportation planning? [CO1, L-2] **10**

b) How can a shift towards electric vehicles (EVs) help mitigate the carbon footprint of the transportation sector? [CO3, L-4] **10**

P. T. O.

PART-B

Q.5 a) How does sustainability relate to the concept of the circular economy, and what strategies can be implemented to reduce waste, promote resource efficiency, and minimize the environmental impact of products and services? [CO2, L-4] **10**

b) Explain the term "LCA". Illustrate how LCA can be effectively used in the environmental management of industrial production systems. [CO2, L-3] **10**

Q.6 How do governments and policy frameworks facilitate sustainability, and in what ways do legislation and regulations stimulate the adoption of sustainable practices at local, national, and global levels? [CO3, L-4] **20**

Q.7 a) Discuss the benefits of doing an EIA study. Also, mention the purpose of the "screening step of EIA. [CO3, L-2] **10**

b) Explain various methodologies and approaches used in Environmental Impact Assessment (EIA) with suitable examples. [CO3, L-2] **10**

End Semester Examination, Dec. 2023

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 in brief:

a) Write down the name of first country where industry related production commenced. [CO-2,L-1]
b) Give the purpose of screening in EIA. [CO-1,L-2]
c) Compile a list of any two materials used in rehabilitation of structures. [CO-3,L-1]
d) What do you understand by green field development? [CO-4,L-2]
e) List any four sub-divisions of civil engineering. [CO-5,L-1]
f) How is weathering related with aesthetics? [CO-4,L-3]
g) Give atleast two reasons which call for rehabilitation of structures. [CO-4,L-3]
h) Give any two advantages of prefabricated constructions. [CO-5,L-3]
i) What inference can be made from TL 20? [CO-3,L-3]
j) Give any two advantages of water transport. [CO-5,L-3] **2×10**

PART-A

Q.2 a) "Global warming is posing new challenges for civil engineers with the passage of time" make supportive justifications. [CO-1,L-3] **10**

b) What do you mean by human development index? Compare ecological foot print of India vs other countries. [CO-1,L-3] **10**

Q.3 Summarize the outcome of the summit on future of civil engineering held in 2006. [CO-2,L-3] **20**

Q.4 a) Discuss in details the strategies for making cities smart. [CO-3,L-3] **10**

b) How does the infrastructure development in any nation can impact its GDP? [CO-3,L-3] **10**

PART-B

Q.5 a) What factors are instrumental for us as a stakeholder to this environment in promoting reuse of treated wastewater? [CO-4,L-4] **10**

b) Write a short note on

i) Innovations and methodologies for ensuring sustainability. [CO-3,L-2] **10**
ii) Flood control.

Q.6 a) Discuss the effects to built environment on human health and environment. [CO-5,L-3] **10**

b) What is role of urban arts commission? [CO-5,L-2] **10**

Q.7 a) Justify the use of EIA process as a tool of sustainable development. [CO-4,L-4] **10**

b) Discuss in detail various techniques used for green house gas reduction. [CO-5,L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

STRUCTURAL ANALYSIS - II (BCE-DS-702)

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

No. of pages: 2

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

Q.1 Answer the following in brief:

a) Correlate the expression of "Rotation Factor" in Kani's Rotation method. [CO-1][L-3]

b) Express K12 in relation with Stiffness Matrix method. [CO-2][L-2]

c) State the expression of flexibility matrix for a fixed beam subjected to Udl over its entire span. [CO-3][L-2]

d) Evaluate the load vector of a fixed beam ABC; AB = BC = 9m; AB is loaded with 45 kN/m over its entire span and BC has a concentrated load of 30 kN at its mid span. [CO-3][L-3]

e) Summarize the process of determination of deflection matrix by using stiffness matrix method. [CO-2][L-2]

f) Illustrate influence line diagram for a typical beam subjected to moving loads. [CO-4][L-2]

g) State"Muller – Breslau Principle". [CO-5][L-1]

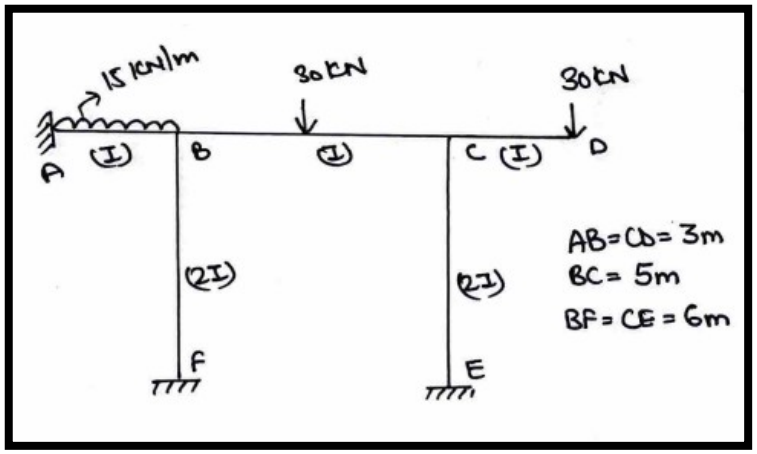
h) Evaluate the maximum reaction in a simply supported beam AB of span 15 m; loaded with two moving loads of 15 kN and 45 kN spaced 30 m apart. [CO-5][L-3]

i) With the help of a neat sketch, explain the concept of "Temperature Effect in Three – Hinged Arch". [CO-6][L-2]

j) State the expression for horizontal thrust in a three – hinged arch, when the moving load is placed between one end support and its mid - span. [CO-6][L-2] **2×10**

PART-A

Q.2 Analyze the frame by using Kani's method of structural analysis. [CO-1] [L-4] **20**

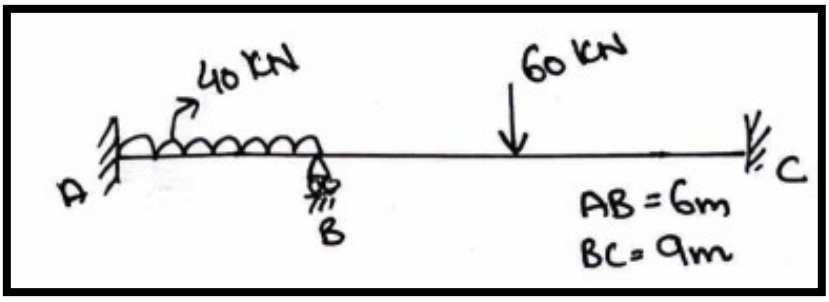


Q.3 a) Compare "compatibility method" and "equilibrium method" of structural analysis. [CO-2][L-3] **12**

b) With the help of neat sketch, write a note on different types of stiffnesses which are possible in a structural member when experiencing external loads. [CO2][L-3] **8**

P. T. O.

Q.4 Determine the deflection matrix by using flexibility matrix method:

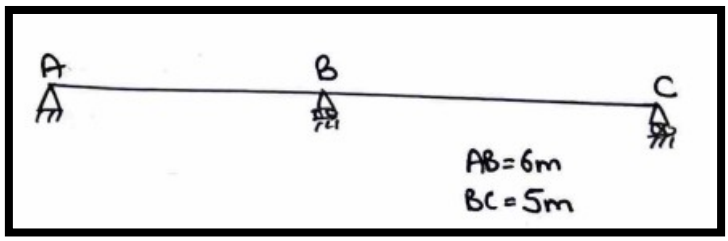


[CO-3][L-4] **20**

PART-B

Q.5 Four wheel loads of magnitude 5 kN, 6 kN, 7 kN and 8 kN are placed at 2m, 3m and 2m apart and are moving on a simply supported beam of span 20 m with 5 kN leading from left to right. Evaluate the absolute maximum bending moment. [CO-4][L-5] **20**

Q.6 Evaluate the ordinates of influence lines for Reaction R_A for the beam as shown at 1 m interval and draw the influence line diagram. Consider "EI" to be constant throughout.



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

Q.7 With the help of neat sketch, explain the structural behavior of a typical "Two – Hinged Arch". Exppress its determinacy, reactions and comparison with a three hinged arch. [CO-6][L-3] **20**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

FOUNDATION ENGINEERING (BCE-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
a) Define safe bearing capacity of soil. [CO2, L1]
b) How would you decide the depth of exploration. [CO1, L2]
c) In what situations would you go for combined footing? [CO1, L3]
d) What is underreamed pile foundation? [CO3, L1]
e) What are the engineering problems associated with black cotton soils. [CO2, L2]
f) List various types of anchorages used in sheet pile walls. [CO4, L2]
g) Why do we provide retaining walls? [CO5, L2]
h) Enumerate the basic types of failure of a finite slope occurance. [CO6, L2]
i) State the causes for failure of slope. [CO6, L2]
j) Write advantages and disadvantages of gravity walls? [CO5, L1] **2×10**

PART-A

Q.2
a) Discuss the effect of water table fluctuations on bearing capacity of soil. [CO1, L5] **10**
b) State under what conditions following foundations are provided i) Trapezoidal combined footing, ii) mat footing iii) Strap footing. [CO1, L3] **10**

Q.3
a) Explain in detail bearing capacity analysis by Plate Load test? [CO2, L3] **10**
b) Compute the safe bearing capacity of a rectangular footing 1.8 m × 3.0 m, located at a depth of 1.5 m below the ground level in a soil of average density 18 kN/m3. C= 8 kN/m^2, φ = 32.5°, Nc = 38.13, Nq = 25.85, and Nγ=35.21. Assume a suitable factor of safety and that the water table is very deep. Also compute the reduction in safe bearing capacity of the footing if the water table rises to the ground level and write your observation. [CO2, L4] **10**

Q.4 What do you mean by pile foundations? Under what situations is it provided? Discuss various types of deep foundations on the basis of material used and function. [CO3,L3] **20**

PART-B

Q.5 Draw pressure distribution diagrams of sheet piles and explain different types in detail. [CO4, L3] **20**

Q.6
a) With the help of neat sketch explain various types of retaining walls along with their components. [CO5, L3] **10**
b) How overturning and sliding failure can be controlled for a gravity wall? Explain. [CO5, L3] **10**

Q.7 Derive the equation for factor of safety of an infinite slope when soil is dry and cohesionless. What will happen to the factor of safety when the same slope is under submergence. [CO6, L4] **20**

End Semester Examination, Dec. 2023

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 in brief:

a) What is Basic design consideration in masonry structure? [CO-1][L-1]

b) Write different types of foundations in masonry structure. [CO-1][L-1]

c) Enlist the different types of shear test specimens [CO-2][L-2]

d) Write earthquake - resistant design and construction masonry IS Codes [CO-2][L-2]

e) Design a simply supported brickwork beam of span 4 m and of section 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_y=250N/mm^2. [CO-4][L-5]

f) What do you mean by reinforced and prestressed masonry? [CO-3][L-4]

g) Briefly explain the methods of prestressing concrete. [CO-3][L-3]

h) What kind of advantages does prestressing offer over reinforced masonry? [CO-5][L-2]

i) Write a short text regarding accidental loading. [CO-5][L-3]

j) Briefly explain the efforts made to reduce the accident death statistics. [CO-6][L-4] **2×10**

PART-A

Q.2 Explain complex arrangements and double cross-wall systems with the help of cross section channel. [CO-1] [L-1] **20**

Q.3 What does one understand about the flexural tensile strength of masonry bricks? Illustrate with a diagram. [CO-2][L-2] **20**

Q.4 Describe masonry assemblage and effect of bed materials on brick prism strength. [CO-3][L-2] **20**

PART-B

Q.5 a) Explain in detail:

i) Uniaxial bending. [CO-4][L-3] **5**

ii) Biaxial bending. [CO-4][L-3] **5**

b) What do you understand Reinforced Masonry? Write Additional assumption and limitations of Reinforced Masonry. [CO-5][L-5] **10**

Q.6 a) Explain the Shear strength of different types of brickwork beams of a similar cross-section. [CO-4][L-3] **10**

b) Consider a cavity wall of length 5m with an inner loadbearing 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/mm^2. Find tie area [CO-4][L-5] **10**

Q.7 a) Describe the technique and methods of prestressing of masonry. [CO-5][L-3] **10**

b) Explain the importance and utility of ties in masonry structure. [CO-6][L-4] **10**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

HIGHWAY CONSTRUCTION AND MANAGEMENT (BCE-DS-722A)

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

No. of pages: 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 role of dowel bars and tie bars in highway construction? [CO-3][L-1]
b) Write down the name of current road projects in India. [CO-1][L-1]
c) Briefly outline the historical development of road construction. [CO-1][L-2]
d) Explain the various requirements of an ideal highway alignment. [CO-1][L-2]
e) Write down the name of different types of materials used in pavement. [CO-2][L-1]
f) Define the term " Aligator cracking and Ruts". [CO-3][L-1]
g) What is the use of fly ash as highway materials? [CO-2][L-1]
h) Define flexible and rigid pavements as per IRC. [CO-3][L-1]
i) Mention the name of various geosynthetics used in pavements. [CO-4][L-1]
j) What are the objectives of highway planning? [CO-5][L-1] **2×10**

PART-A

Q.2 a) Explain the principle of the various tests on road stones. Also, specify the desirable values of the test results. [CO-2][L-2] **10**

b) Illustrate the various factors controlling the alignment of road. [CO-1][L-2] **10**

Q.3 a) Explain specification of materials, construction procedure and quality control measures of bituminous concrete. [CO-3][L-2] **10**

b) Explain the importance of compaction of soil in highway construction and also mention various types of equipments used for compaction. [CO-2][L-2] **10**

Q.4 a) Discuss the construction and quality control measures of rigid pavement. [CO-3][L-2] **10**

b) Classify the various types of joints in highway, also mention their uses. [CO-3][L-2] **10**

PART-B

Q.5 a) Discuss the functions of geosynthetics in pavement. [CO-4][L-2] **10**

b) Explain the application of geotextile materials in Pavement. [CO-2][L-2] **10**

Q.6 a) Discuss the various maintenance requirement in different road components. [CO-4][L-2] **10**

b) Discuss the various types of deteriorations in road infrastructure. [CO-4][L-2] **10**

Q.7 a) Explain the public–private partnerships and private sector finance in highway construction. [CO-5][L-2] **10**

b) Elaborate the scope and functions of highway construction management. [CO-5][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

BRIDGE ENGINEERING (BCE-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**. Marks are indicated against each question.*

Q.1
a) Summarize the basic six forms of bridge structure. [CO-1][L-2]
b) With the help of a neat sketch, illustrate different components of a bridge. [CO-1][L-2]
c) As per the Indian Road Congress (IRC), list the various sections considered for designing and analysis of bridges. [CO-2][L-1]
d) With the help of a neat sketch, illustrate the "tracked vehicle" specifications of IRC class AA loading. [CO-2][L-3]
e) Differentiate between "Pressurized Pipes" and "Non – Pressurized Pipes". [CO-3][L-2]
f) With the help of neat sketches, illustrate the various arch rings employed for Masonry Arch Bridge. [CO-4][L-2]
g) Summarize the features of suspension bridges. [CO-5][L-2]
h) State the various functions of bearing. [CO-6][L-2]
i) Compare "Pier" and "Abutment". [CO-6][L-2]
j) List the various inspections performed under maintenance of bridge structure. [CO-6][L-1] **2×10**

PART-A

Q.2
a) *"The choice of a right site is a crucial decision in the planning and designing of a bridge".* Justify the statement in accordance with the factors considered for selection of a site for construction of a bridge structure. [CO-1][L-3] **12**
b) Plan a mechanism to determine the "economical span" for a typical bridge. [CO-1][L-3] **8**

Q.3
a) Summarize the allowances considered for determination of "impact effect" for IRC class A or class B loading. [CO-1][L-3] **5**
b) Evaluate the total design moments for a reinforced concrete slab culvert with the following data:
   - Clear Span of bridge: 6 m
   - 2 – Lane width roadway
   - m footpaths on either side of roadway
   - Wearing coat: 80 mm
   - Width of bearing: 400 mm
   - IRC Class AA – Tracked vehicle
   - M 25 grade concrete and Fe 415 Steel

   [CO-1] [L-5] **15**

Q.4
a) With the help of neat sketches, summarize the concept and various loading considerations of a typical RC box culvert. [CO-3] [L-3] **12**
b) Plan a mechanism to design a typical pipe culvert. [CO-3] [L-4] **8**

PART-B

Q.5
a) Summarize the design principles of Masonry Arch Bridge. [CO-3][L-3] **8**
b) With the help of neat sketches, write a well – detailed note on "Configuration of Cable –stayed Bridge". [CO-3][L-3] **12**

Q.6 Illustrate the various structural components of a typical suspension bridge. [CO-3][L-3] **20**

Q.7 Elaborate the following:

a) Elastomeric bearings. b) Shapes of pier. [CO-6][L-3] **10×2**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

EARTHQUAKE ENGINEERING (BCE-DS-833)

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) "Transverse wave do not travel through liquids". Justify the statement. [CO-3][L-3]

b) Differentiate between deterministic loads and stochastic loads. [CO-1][L-2]

c) Elucidate the term PGA and infer what a "horizontal PGA value of 0.6g" suggest. [CO-3][L-1]

d) "Richter scale is a logarithmic scale". Explain. [CO-3][L-2]

e) Explain the primary reason for effectiveness of base isolation in reducing earthquake induced forces in a structure. [CO-6][L-2]

f) Explain the term "dynamic response". [CO-4][L-2]

g) What do you understand by "Free vibration analysis". [CO-2][L-1]

h) Explain in brief the different variables affecting sectional ductility. [CO-5][L-2]

i) Mention the two methods of analysis specified on the review of IS 1893:1984. [CO-5][L-1]

j) Write a short note on structural protective systems. [CO-6][L-1] **2×10**

PART-A

Q.2 a) Differentiate between free and forced vibrations. [CO-1] [L-2] **5**

b) Calculate the mass to be lumped, its stiffness in X and Z-direction and the time period for the for the given SDOF system in (Fig.1). Consider: Height from plinth level to roof level as 3.5m; C_1=300mm x 350 mm; C_2= 300mm dia; Beams = 300mm x 350 mm. The distance between each column is taken as 5.2 m in both directions and thickness of slab= 150mm. Assume necessary data.

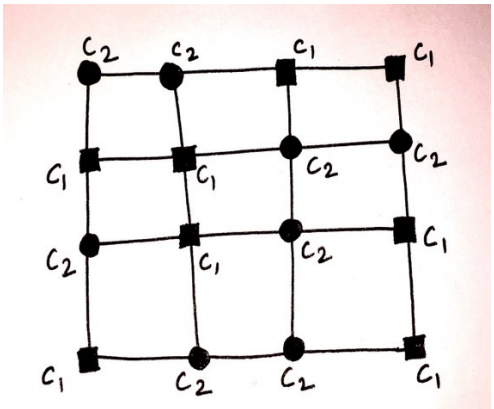


Fig. 1 [CO-1][L-4] **15**

Q.3 Define steady state response and determine the steady state response of the system given below (Fig. 2). [CO-2][L-5] **20**

P. T. O.

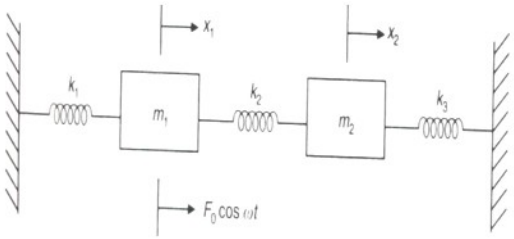


Fig.2

Q.4 a) Explain by highlighting the magnitude and intensity of 10 past earthquakes and give information on some disastrous earthquakes. [CO-3] [L-2] **10**

b) "*With regards to earthquake engineering, is magnitude the same as intensity?*" Explain. How are magnitude and intensity of an EQ measured? [CO-3][L-2] **10**

PART-B

Q.5 a) Write a well detailed note on response spectrum analysis. [CO-4][L-1] **10**

b) Enunciate the various effects of liquefaction. [CO-4][L-2] **10**

Q.6 Explain in detail a generalized method of conducting dynamic analysis .[CO-5][L-2] **20**

Q.7 a) Write a well detailed note on base-isolation techniques. [CO-5][L-2] **10**

b) Highlight the important points in mitigating the effects of earthquakes on structures. [CO-6][L-2] **10**

End Semester Examination, Dec. 2023

OPEN ELECTIVE - COMMON FOR ALL BRANCHES

SOLID WASTE MANAGEMENT (BCE-OE-001A)

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) List the environmental impact of improper waste disposal on land? [CO-5][L-2]

b) Give the four attributes of waste on basis of which it is classified as hazardous. [CO-2][L-2]

c) Give the norm for computing the residential refuse generation rate. [CO-3][L-2]

d) Define biomedical waste. [CO-1][L-1]

e) List two sources contributing to institutional waste. [CO-2][L-1]

f) What is the objective of economically sustainable waste management system? [CO-1][L-2]

g) List any two advantages of waste recycling for the economy. [CO-3][L-2]

h) Give the formula for calculating the moisture content of waste. [CO-4][L-2]

i) List any two vehicles that can be used for primary collection of waste. [CO-5][L-3]

j) No landfill site should be constructed within ... m of any river. [CO-5][L-3] **2×10**

PART-A

Q.2 a) With the help of a flow chart explain the functional elements of solid waste management system. [CO-1] [L-3] **10**

b) Explain the integrated waste management hierarchy with the help of an illustrative figure. [CO-1] [L-3] **10**

Q.3 a) Compute the quantity of residential refuse generation from the following given data for each locality. Also estimate the total waste generation from the area.

S. No	Locality Name	No. of Households	Average no. of persons/household
1	A	762	6
2	B	691	5
3	C	497	4
4	D	684	5
5	E	761	6
6	F	589	5
7	G	364	3
8	H	680	4
9	I	732	4
10	J	684	3

[CO-2][L-4] **12**

b) Discuss the need for analysis of waste. [CO-2][L-3] **8**

Q.4 a) Discuss in detail any two vehicles used for primary collection of waste. [CO-3] [L-3] **10**

b) Compute the number of 9.5 m^3 containers required for storing the waste arising out of a community comprising of the following:

P. T. O.

No. of units = 800
Family size = 4 person/unit
Per capita waste generation rate = 1.1 kg/person/day
Un-compacted specific volume =120 kg/m^3
Compacted volume = 275 kg/m^3
Also compute the waste quantity in terms of biodegradable, non-biodegradable and inert. [CO-5] [L-4] **10**

PART-B

Q.5 Describe the incineration process and its benefits. [CO-4] [L-3] **20**

Q.6 Explain the locational criteria of a landfill site. [CO-5] [L-3] **20**

Q.7 Explain the procedure for preparation of a solid waste management plan with the help of a flowchart. [CO-1] [L-3] **20**

End Semester Examination, Dec. 2023

B. Tech. – First / Second Semester

CHEMISTRY (BCH-100)

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

No. of pages: 2

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

Q.1 Answer the following in brief:

a) Give one example of nucleophilic and electrophilic substitution reaction. [CO-6][L-1]

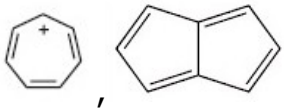
b) Which electronic transitions is possible in CH_3-CO-CH_3 and why? [CO-5][L-1]

c) Calculate phase, and degree of freedom at triple point. [CO-4][L-2]

d) Write two factors which affect corrosion and explain why? [CO-4][L-1]

e) Elaborate optical activity with suitable examples. [CO-3][L-1]

f) Find aromatic and anti-aromatic molecules in following: [CO-1][L-2]



g) How many types of Spectral shifts are observed in electronic spectroscopy? [CO-5][L-2]

h) Calculate the energy of particle in 6^{th} level in one dimensional box. [CO-1][L-2]

i) LiCl is more soluble in pyridine than in H_2O. Why? [CO-2][L-2]

j) Explain critical temperature and critical pressure of substance with example. [CO-4][L-1] **2×10**

PART-A

Q.2 a) Why the crystal field splitting in octahedral complexes is different in comparison to tetrahedral complexes? Make crystal field splitting diagram of $[Co(Cl)_6]^{3-}$ and $[Co(CN)_6]^{3-}$ [CO-1][L-4] **10**

b) Compare the bond order of NO and CO with the help of molecular orbital diagram and write their electronic configuration. [CO-1][L-3] **10**

Q.3 a) Comments on the following with proper reasons.

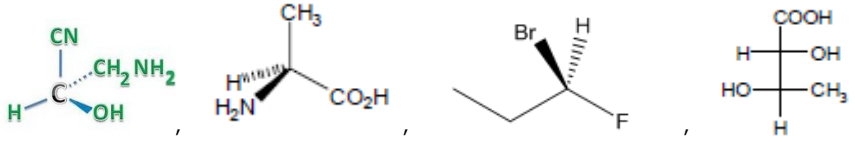
i) Penetration power of an electron in a multi-electron atom.

ii) Electron affinity of nitrogen element is approximately zero. [CO-2][L-3] **10**

b) Calculate effective nuclear charge (Z_{eff}) of last electron of the following:

i) S, ii) O, iii) Mg iv) Cu [CO-2][L-4] **10**

Q.4 a) Find the *R* or *S* configuration of each chiral carbon.



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

b) How do you find the stability of various conformers? Draw the relative potential energy diagram of butane with various conformers. [CO-3][L-3] **10**

PART-B

Q.5 a) Analyze following with proper explanation:

i) Van der waal's constants.

ii) true and meta stable equilibrium. [CO-4][L-3] **10**

P. T. O.

b) Calculate the emf of the electrochemical cell.
Mg (s)|Mg^{2+} (0.001M) ||Ag^{+}(aq)(0.01M)|Cu
The standard electrode potentials are

$Ag^{+} + e^{-} \rightarrow Ag(aq)$ $\quad E^{o} = 0.80$ volt

$Mg^{2+} + 2e^{-} \rightarrow Zn(aq)$ $\quad E^{o} = -2.37V$ volt [CO-4][L-4] **10**

Q.6 a) Write short notes on following with proper reason:
i) Advantages of AFM over SEM.
ii) Scanning Electron Microscope (SEM). [CO-5][L-4] **10**

b) Discuss the principle of NMR spectroscopy. What information can be obtained from the NMR peaks? Describe various application of NMR spectroscopy.
[CO-5][L-3] **10**

Q.7 a) Why rate of reaction for the SN_1 goes from primary (slowest) << secondary < tertiary (fastest). Also differentiate between SN_1 and SN_2 reactions? [CO-6][L-4] **10**

b) Describe various steps with equations involved in synthesis and purification of Acetylsalicylic Acid. [CO-6][L-3] **10**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Differentiate between permanent and temporary hardness of water. [CO-3][L-2]

b) Calculate number of phases, components and degree of freedom in mixture of benzene and water. [CO-1][L-4]

c) Define metastable equilibrium in water system. [CO-1][L1]

d) Write down two disadvantages of zeolite method for treatment of water. [CO-3][L-1]

e) How cation exchange resin can be regenerated? [CO-3][L-2]

f) Which conformer of butane is more stable; staggered or eclipsed and why? [CO-2][L-3]

g) State Lambert-Beer's Law. [CO-2][L-2]

h) Draw d-orbitals splitting patterns with filling of electrons in the appropriate d-orbitals in the d^7, octahedral for low and high spin complex. [CO-2][L-3]

i) Give the example of any two IR active molecules. [CO-2][L-2]

j) Comment on physical significance of Ψ and Ψ^2. [CO-2][L-3] **2×10**

PART-A

Q.2 a) 100 ml of water sample required 25 ml of N/50 H_2SO_4 for neutralization to phenolphthalein end point. After this, methyl orange was added to this and further acid required was 5.5 ml. Calculate the type and magnitude of water alkalinity. [CO-3][L-4] **10**

b) Explain ion exchange method with the help of well labeled diagram for demineralization of water. [CO-3][L-2] **10**

Q.3 a) Differentiate between primary and secondary cell. Write down applications of smart batteries. [CO-3][L-2 ,3] **10**

b) Calculate the no. of moles of O_2 consumed if 30 moles of H_2O are produced during the combustion of propane. [CO-3][L-3] **5**

c) Classify different kinds of fuel. [CO-3][L-3] **5**

Q.4 a) Draw the labelled phase diagram of eutectic system and explain the curves and points. [CO-1][L-2, 3] **10**

b) Find out number of phases, components and degree of freedom in following examples.

i) Decomposition of barium carbonate.

ii) NaCl(aq) ↔ water vapour(g)

iii) NH_4Cl (s) ↔ NH_3(g) + HCl (g)

iv) Saturated solution of sugar

v) Benzene in equilibrium with its vapours [CO-1][L-4] **1×5**

c) Justify the statement that " Eutectic is mixture". [CO-1]L-3] **5**

PART-B

Q.5 a) Calculate the lowest three energy levels of a particle of mass 10^{-15} Kg in a box of length L = 10^{-9} m. Planck's constant (6.625 × 10–34 m^2kg/sec). [CO-2][L-4] **10**

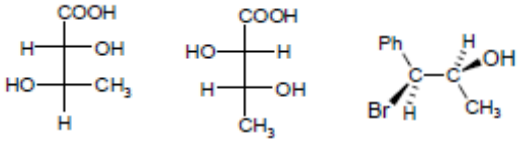
b) Analyze the Crystal Field splitting in octahedral complexes along with splitting diagram of $[Cr(H_2O)_6]^{3+}$ or $[Fe(CN)6]^{4-}$ [CO-2][L-4] **5**

P.T.O.

c) Draw molecular orbital diagram of O_2 ad predict its magnetic behaviour and bond order. [CO-2][L-4] **5**

Q.6 a) Draw all possible conformations of ethane and comment on their stability? Also, draw P.E plot for various conformers of ethane. [CO-1][L-3] **10**

b) Label each stereogenic centers as *R* or *S*



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

Q.7 a) Illustrate the various principles of electronic spectroscopy. Discuss the spectral shifts in electronic spectroscopy in detail. [CO-2][L-2,3] **10**

b) Discuss the principle and applications of Infra Red spectroscopy. [CO-2][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. – First Semester

AI FOR ENGINEERING (BCS-100)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a) Discuss misconceptions about AI. [CO1][L2]
b) Explain depth-first searching technique. [CO2][L3]
c) Illustrate Bayesian network. [CO3][L3]
d) Explain the role of AI in healthcare. [CO4][L2]
e) Illustrate the role of AI in computer vision. [CO1][L3]
f) Explain automatic programming. [CO2][L4]
g) Differentiate between machine learning and humans. [CO3][L2]
h) Discuss the role of AI in education. [CO4][L2]
i) Illustrate the Turing test. [CO1] [L2]
j) Explain an example of a production system. [CO2][L3] **2×10**

PART-A

Q.2 a) How AI can be used in Image recognition? Does any other application have similarity to using AI? Comment. [CO1][L3] **10**

b) Discuss five advantages of Python usage as AI language. [CO1][L3] **10**

Q.3 a) Analyze the decision making process in an AI application. Formulate the problem and draw its state-space diagram. [CO2][L4] **10**

b) Explain the process of knowledge representation in AI. Discuss searching techniques that are used in state-space problems. [CO2][L4] **10**

Q.4 a) Illustrate the use of Inference engines in AI. Explain different kinds of agents. [CO2][L3] **10**

b) Explain state-space problem formulation. [CO2][L3] **10**

PART-B

Q.5 Illustrate the role of machine learning in an AI application. How machine learning is related to AI? Explain types of machine learning. [CO3][L5] **20**

Q.6 Illustrate a natural language processing model. Create a system for handling user queries in a local language. Illustrate the components of the system. [CO4][L6] **20**

Q.7 Create an AI model for Game playing applications. Draw a diagram for different components of the model. [CO4][L5] **20**

End Semester Examination, Dec. 2023

B. Tech. – First / Second Semester

ARTIFICIAL INTELIGENCE FOR ENGINEERS (BCS-100A)

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

No. of pages: 2

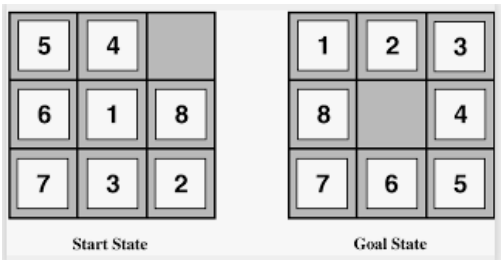
Note: *Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Discuss the Turing test of artificial intelligence. [CO-1][L-2]
b) Explain the importance of heuristics. [CO-2][L-2]
c) Compare human expert and an expert system. [CO-4][L-2]
d) Briefly discuss the concept of an intelligent agent. [CO-3][L-2]
e) List various applications of AI. [CO-4][L-2]
f) List the four categories of production systems. [CO-2][L-2]
g) Explain the term rationality in the context of AI [CO-2][L-2]
h) Define 'natural intelligence'. [CO-1][L-2]
i) List five AI applications in education domain. [CO-4][L-2]
j) Explain the key features of prolog. [CO-1][L-2] **2×10**

PART-A

Q.2 a) Design the solution of the eight-puzzle problem using DFS and BFS. Which one is better and why? [CO-2] [L-6] **10**



b) Define state space. How to formulate a problem using state space? 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] **10**

Q.3 a) Define 'Artificial Intelligence (AI)'. Discuss the historical evolution of AI. Highlight the major milestones. [CO-1][L-2] **10**

b) Explain contribution of various academic disciplines in the development of AI. [CO-1][L-2] **4**

c) Consider the following scenario: Initial string: cbaca, Final String: aabcc. Production Rules: R1: ba->ab, R2: ca->ac, and R3: ba->ab. Use production system to convert the initial string into final string. [CO-2][L-6] **6**

Q.4 a) Discuss AI problem characteristics in detail by taking a suitable example. [CO-2][L-3] **10**

b) Discuss various ethical issues in the design of AI applications. Take suitable examples. [CO-1][L-4] **10**

PART-B

Q.5 a) What is PEAS? Explain in detail the PEAS environment of taxi driver agent. [CO-3][L-3] **10**

b) Explain reflex and goal based agents with the help of suitable diagrams. [CO-3][L-3] **10**

P. T. O.

Q.6 a) Define Natural Language Processing (NLP). Explain applications of NLP in education domain. [CO-4][L-3] **10**

b) Define the term computer vision. Explain various use cases of computer vision in healthcare. [CO-4][L-3] **10**

Q.7 a) Explain the key components of a robot. Explain purpose of each component. Discuss some applications of robots. [CO-4][L-3] **10**

b) Explain the properties of the agent environment. [CO-3][L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. – First / 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 in brief:

a) Differentiate between program and algorithm. [CO-3][L-2]
b) Give an example of variables with data type. [CO-2][L-2]
c) What is the operating system? [CO-2][L-2]
d) Define multi-dimensional array with example. [CO-2][L-1]
e) List out the functions of compiler? [CO-5][L-4]
f) How to pass the parameters (call by references) in functions? [CO-2][L-2]
g) Write all the relational operators with the specifications. [CO-1][L-1]
h) Draw flowchart for finding greatest of three numbers. [CO-3][L-1]
i) Define Pointers. [CO-3][L-2]
j) Define recursion with an example. [CO-3][L-3] **2×10**

PART-A

Q.2 a) Write an algorithm to find the square root of a number. Also draw the flow chart for the same. [CO-1][L-2] **10**

b) Differentiate between:
i) High Level Language and Low-Level Language.
ii) Syntax and logical errors. [CO-1][L-2] **5×2**

Q.3 a) How to perform arithmetic operation between two numbers in C programming language? Write a C program to find sum, difference, product, quotient and modulus of two given numbers. [CO-2][L-5] **10**

b) Write a program to print sum of three matrices. [CO-2][L-5] **10**

Q.4 a) Write a program to store information of 15 products using structures and arrays. product details are Product id, product_name, MFG_date and Qty. [CO-3][L-4] **10**

b) Explain the algorithm for searching an element in a linear array. [CO-3] [L-5] **10**

PART-B

Q.5 a) Write a program to find the factorial of a number using recursive function. What are the applications of recursion? [CO-4][L-4] **10**

b) Discuss the scope of local, global and static variables. [CO-4][L-5] **10**

Q.6 a) Write the code to implement the insertion sort. How it is better than other sorting techniques. [CO-5][L-3] **10**

b) Sort the following numbers using quick sort algorithm 10, 5, 18, 3, 1, 20, 9, 15. [CO-5][L-3] **10**

Q.7 a) If a variable is a pointer to a structure, then which of the following operator is used to access data members of the structure through the pointer variable? How a pointer is declared? How it support to self referential structures? [CO-6][L-3] **10**

b) List out the various file opening and closing modes and explain each. [CO-6][L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. – First / Second Semester

INTRODUCTION TO OPEN SOURCE SOFTWARE AND 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:

a) Define 'open source software'. Give examples. [CO-1][L-1]
b) Differentiate between open standards and closed standards. [CO-2][L-2]
c) Give examples of any two International De Jure standard setters. [CO-3][L-1]
d) How can you become a member of the Bluetooth special interest group de-facto standards? [CO-4][L-3]
e) Explain the drivers of adoption of open standards. [CO-5][L-4] **4×5**

PART-A

Q.2 a) Differentiate between De Jure and De Facto standards. [CO-1][L-3] **10**
b) Discuss all the strengths and advantages of open standards. [CO-1][L-2] **10**

Q.3 a) Explain the history of open source and the evolution of UNIX. [CO-2][L-1] **10**
b) Describe the need of GNU General Public License. What does copyleft mean? [CO-2][L-3] **10**

Q.4 a) Discuss open source development process in detail with diagram. [CO-3][L-2] **10**
b) Write notes on: open source initiative, Brook's law, Apache software foundation, open source community. [CO-3][L-3] **10**

PART-B

Q.5 a) Discuss the evolution process of open standards. Also draw neat diagram of open standard life cycle. [CO-4][L-5] **10**
b) Write a note on the following:
i) Benefits of open standards.
ii) Standard organizations. [CO-4][L-2] **5×2**

Q.6 a) Discuss the process of the national adoption of an international standard. [CO-5][L-5] **10**
b) Write a note on the following:
i) Adoption drivers.
ii) Pros and cons of early adopters. [CO-5][L-2] **5×2**

Q.7 Write short notes on:

a) Open source software.
b) Linux.
c) Free software foundation. [CO-6][L-2] **20**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

DATA STRUCTURES AND ALGORITHMS (BCS-DS-301)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a) What do you understand by the term 'data structures'? [CO-1][L-1]
b) Differentiate binary tree and binary search tree. [CO-4][L-2]
c) Discuss 'Asymptotic Notations' used for the analysis of an algorithm. [CO-1][L-1]
d) Write the time complexity of Bubble sort. [CO-6][L-1]
e) What do you mean by Abstract Data Type? [CO-1][L-2]
f) Compare linked list and array implementation of general list. [CO-2][L-1]
g) Convert the given infix expression: C*(Y/S-W)^D to postfix notation. [CO-3][L-2]
h) Differentiate Prim's and krushkal's algorithm. [CO-5][L-1]
i) What do you mean by Hashing function in data analysis? [CO-6][L-1]
j) State the various techniques to represent graphs. [CO-5][L-2] **2×10**

PART-A

Q.2 a) Discuss binary search techniques. Write a C program to search an element from an array and also discuss its space and time complexity. [CO-1][L-2] **15**
b) Write a C program to delete an element from a specific location (assume location at 3) in an array of 8 integers. [CO-1][L-2] **5**

Q.3 a) Design an algorithm to reverse a singliy- linked list; take the necessary assumptions. [CO2][L3] **10**
b) Write a C program to demonstrate deletion operation in a doubly linked list. [CO2-][L-3] **10**

Q.4 a) Discuss in detail, the core concept of binary search tree and its various operations with their complexity analysis, supported with suitable examples. [CO-3][L-2] **15**
b) Explain treaded binary tree in brief, with its node representation. [CO3][L3] **5**

PART-B

Q.5 a) Create a binary search tree on the following list [19, 4, 12, 77, 28, 55, 84, 1,99]. Also write algorithm to insert and delete a node into a BST. [CO4][L-2] **10**
b) Write a short note on 'AVL tree'. Also explain all its rotations. [CO4][L-2] **10**

Q.6 a) Define following terms with respect to graph with supporting diagram:
i) Pendent node ii) Euler path iii) Planner graph iv) Degree of graph v) path matrix. [CO5][L2] **10**
b) Write Kruskal's algorithm to find minimum spanning tree. Apply same algorithm on following graph to find MST. [CO5][L2] **10**

Q.7 Write short notes on *(any two each part carries 10 marks):*

a) Real world applications of Hashing
b) Performance and Comparison of sorting algorithms.
c) Merge sort and Heap sort. [CO-6][L-2] **10×2**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

OBJECT ORIENTED PROGRAMMING (BCS-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**. Marks are indicated against each question.*

Q.1
a) Discuss how a pointer can be declared. [CO1][L2]
b) List object oriented languages. [CO1][L1]
c) Define reference variable. Give its syntax. [CO2][L2]
d) Differentiate between a bug and an error with examples. [CO6][L2]
e) Describe static members with examples. [CO1][L2]
f) Define 'class' with example. [CO1][L1]
g) List applications of Object oriented programming. [CO1][L1]

h) Name the operators that cannot be overloaded. [CO3][L1]
i) Differentiate between 'Constructor' and 'Destructor' with syntax. [CO2][L2]
j) Compare procedure-oriented and object-oriented languages. [CO1][L4] **2×10**

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 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) Describe the concept of friend functions and explain it with the help of an example. [CO1][L2] **10**
b) Overload the operators << and >> using the concept of overloading of operators using friend function. [CO3][L3] **10**

PART-B

Q.5 Create a class named 'Engineering' with suitable members. Derive two classes namely 'Computer_Engg' and 'Mechanical_Engg' from the base class. Assume suitable members in these sub classes. Implement the concept of inheritance considering public mode of inheritance. [CO4][L3] **20**

Q.6
a) Apply file handling to count the number of lines, spaces and tabs in a file. [CO5][L3] **10**
b) Design a program to open a file and read a line from it. Explain all the functions used for opening a file and reading from it. [CO5][L6] **10**

Q.7 a) Compare class template and function template. Write a program to arrange a list of numbers using templates. [CO6][L4] **10**

b) Differentiate between error and exception. How an exception can be rethrown in C++ with the help of an example? [CO6][L2] **10**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

OBJECT ORIENTED PROGRAMMING (BCS-DS-302A)

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 the output of the following code snippet. [CO-3][L-3]

```
#include<iostream>
usingnamespacestd;

/* local variable is same as a member's name */
classTest
{
        private:
                int x;
        public:
                void setX (int x) { Test::x = x; }
                void print() { cout << "x = "<< x << endl; }
};

int main()
{
   Test obj;
   int x = 40;
   obj.setX(x);
   obj.print();
   return 0;
}
```

b) Declare a class rectangle with 2 integer data members (height and width) and a constructor to initialize these variables. [CO-2][L-3]

c) Define pure virtual function. [CO-5][L-2]

d) Differentiate between method overloading and method overriding. [CO-3][L-3]

e) Mention any two operators that cannot be overloaded in C^{++}. [CO-3][L-2]

f) Describe the characteristics of object-oriented programming language. [CO-1][L-2]

g) Explain use of friend function with the help of suitable example. [CO-3][L-2]

h) Can a constructor be virtual? [CO-4][L-1]

i) What do you mean by exception?

[CO-6][L-3]

j) What is the output of the following code snippet?

[CO-6][L-3]

```
#include <iostream>
using namespace std;

template <int i>
void fun()
{
```

```
  i = 20;
  cout << i;
}

int main()
{
  fun<10>();
  return 0;
}
```

2×10

PART-A

Q.2 a) What are access specifiers? How many access specifiers are used in C++? Explain with examples. [CO-1][L-2] **10**

b) Design and implement the following classes:
Create a class named Machine that represents a manufacturing machine.
The Machine class should have the following attributes:
machine_id (an integer)
machine_name (a string)
production_capacity (an integer, representing the number of units it can produce per hour)
Implement a method start_production(self) that prints a message indicating that the machine has started production. [CO-1][L-6] **10**

Q.3 a) Input and display data of 50 employees using array of objects and constructors in C++. [CO-2][L-5] **10**

b) Explain Constructor overloading with help of an example. [CO-2][L-3] **10**

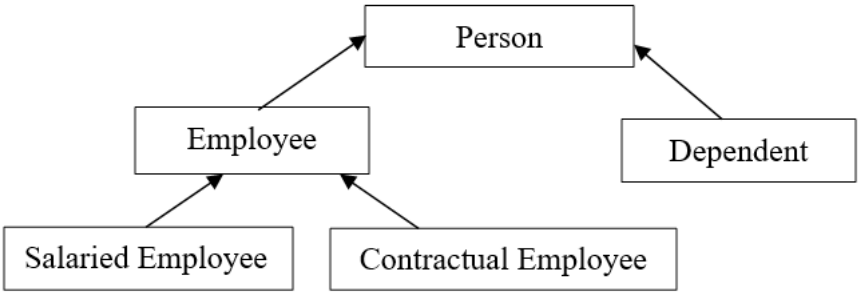
[CO-2][L-3]**10**

Q.4 You are designing a system to model a simple library. In this library system, there are Book and Author classes. Each Book has an Author, and an Author can have multiple books. Implement these classes using composition. Write a C++ program that defines the Book and Author classes using composition.
The **Book** class should have the following attributes and methods:
Attributes: title (a string), publication_year (an integer), author (an instance of the Author class)
Methods:
get_info(): Returns a string containing the book's title, publication year, and the author's name.
The **Author** class should have the following attributes and methods:
Attributes: name (a string), books (a list of Book objects)
Methods:
add_book(book): Takes a Book object as an argument and adds it to the author's list of books.
get_books(): Returns a list of titles of all the books by the author.

Your program should demonstrate the composition relationship by creating an Author object and a few Book objects, associating the books with the author, and then displaying information about the author and their books. [CO-3][L-6] **20**

PART-B

Q.5 a) Write a program to implement the following hierarchy. Also create a method count to compute total number of employees.



[CO4][L-5] **10**

b) Private members of the base class are not inheritable. Is it possible for the objects of a derived class to access the private members of the base class? If yes, how? Explain. Remember that the base class cannot be modified. [CO4][L-4] **10**

Q.6 a) Write a program to copy contents of ABC.txt to XYZ.txt. [CO5][L-5] **10**

b) Write short notes on:
   i) Abstract Classes.
   ii) Early binding and late binding. [CO5][L-3] **10**

Q.7 a) Write a program in C++ to multiply two numbers using function template. [CO-6][L-4] **10**

b) Explain how exceptions can be thrown and caught in detail. [CO-6][L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

INTRODUCTION TO IT INFRASTRUCTURE LANDSCAPE (BCS-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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) What is DBMS? [CO1][L2]
b) Discuss about data marts. [CO2][L2]
c) What is database schema? [CO3][L1]
d) Discuss data definition language. [CO2][L2]
e) What is data manipulation language? [CO4][L1]
f) Discuss storage area network. [CO1][L2]
g) What is operating system? [CO2][L1]
h) Define 'virtualization'. [CO3][L1]
i) What is a firewall? [CO4][L2]
j) What is a common messaging system? [CO5][L1] **2×10**

PART-A

Q.2 Explain all types of Joining with suitable query example. [CO1][L1] **20**

Q.3 What is storage networking technology? Discuss the different types of storage system in details. [CO4][L2] **20**

Q.4 Write short notes on:

a) Operating system.
b) Virtualization.
c) Hypervisor.
d) Partitioning. [CO3][L2] **5×4**

PART-B

Q.5 Explain LADP architecture in detail. Write a short note on 'LADP Models'. [CO4][L3] **20**

Q.6 What is network topology? Explain all type of network topology with diagram if needed. [CO2][L2] **20**

Q.7 Discuss 'data warehousing' and basic OLAP operation in details with suitable example. [CO1][L1] **20**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Define 'intrusion detection system'. [CO-2][L-1]
b) Write down the difference between 'auditing' and 'authentication'. [CO-1][L-2]
c) Define SQL injection attack. [CO-2][L-1]
d) What do you mean by substitution ciphers? [CO-3][L-2]
e) Define 'network operating system'. [CO-4][L-3]
f) Differentiate between hotfixes, service packs and patches. [CO-4][L-3]
g) Define 'data reduction'. [CO-3][L-2]
h) List the various directory services. [CO-5][L-2]
i) Define 'log management'. [CO-2][L-1]
j) What is an IP spoofing attack? [CO-4][L-3] **2×10**

PART-A

Q.2 a) Explain the role of operation security in our personal lives. [CO-1][L-3] **10**
b) Explain different types of security strategies. [CO-1][L-2] **10**

Q.3 a) Define 'physical security'. Explain the physical security controls in detail. [CO-2][L-1] **10**
b) What is the need of cryptography? Discuss the diffie-hellman algorithm in detail. [CO-2][L-3] **10**

Q.4 a) What is application security and what are the various tools available for application security? [CO-3][L-2] **10**
b) Differentiate between authentication and authorization detail. [CO-3][L-4] **10**

PART-B

Q.5 a) How can we protect the operating system against malwares? [CO-4][L-4] **10**
b) Explain the security auditing standards in detail. [CO-4][L-3] **10**

Q.6 a) State the objectives and approach followed for information security audit. [CO-5][L-2] **10**
b) Write short notes on:
i) Benefits of physical security.
ii) Scope of network security. [CO-5][L-2] **5×2**

Q.7 a) What do you mean by GRC? Write in detail about the pillars of GRC. [CO-6][L-4] **10**
b) Explain the Sarbanes-Oxley. Explain the process to handle notification and reporting of the network? [CO-6][L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

INTRODUCTION TO COMPUTER ANIMATION ALGORITHM, TOOLS AND TECHNIQUES (GG) (BCS-DS-307)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a) Discuss the features of blender graphics tools. [CO6][L2]
b) Differentiate back end verses front end with example. [CO3][L4]
c) Discuss the use of frame buffer and display file in detail. [CO1][L1]
d) Differentiate interactive and non interactive graphics. [CO1][L2]
e) Discuss the use of rotation transformation in detail with example. [CO4][L5] **4×5**

PART-A

Q.2 a) Differentiate random scan and raster scan system display technique in detail. [CO1][L4] **10**

b) Discuss the major five application areas of computer graphics in detail. [CO1][L1] **10**

Q.3 a) Illustrate in detail the anatomy of a typeface and explain the typeface classifications. [CO2][L4] **10**

b) Design a web page using the following style.
   i) Heading 2 text should be Time new Roman and centre allign,
   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. [CO2][L6] **10**

Q.4 Given a line segment with starting point as (0, 0) and ending point as (4, 4). Apply 45 degree rotation anticlockwise direction on the line segment and find out the new coordinates of the line. [CO3][L3] **20**

PART-B

Q.5 a) What do you understand by Keyframe animation? Define Facial Animation. Explain various methods by which the facial movement are done. [CO4][L2] **10**

b) Compare Blender with other open source Graphics tools. How blender is better than other softwares? Justify. [CO4][L5] **10**

Q.6 Discuss the following terms of graphics and animation:

a) Physical based animation.

b) Flocking.

c) Tensor visualization.

d) Vector visualization. [CO5][L2] **5×4**

Q.7 Describe various data representation technique. Explain the best way to represent such data. [CO6][L2] **20**

End Semester Examination, Dec. 2023

B. Tech. - Third Semester

CYBER SECURITY CONCEPTS (DFCS) (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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) List the key elements of cyber security.
b) Differentiate between a threat, vulnerability, and risk.
c) Describe the role of firewalls in network security and how they filter traffic.
d) Outline the best practices for keeping HTTP application components secure.
e) Describe the primary role of a firewall in network security, and why are they considered a crucial component of a defense strategy.
f) Differentiate between intrusion detection and intrusion prevention. How do they mitigate security threats?
g) When it comes to preventing malicious programmes from affecting computer systems, what function does anti-malware software play?
h) Define data leakage in the context of cyber security.
i) What do you understand by honeypots? Explain with the help of example.
j) Discuss a Three-Way Handshake with respect to networking. **2×10**

PART-A

Q.2 a) Identify the various cyber threats and challenges, such as cyber attacks, cyber espionage, and cybercrime that drive the need for a global convention. [CO1][L2] **10**

b) Justify the need of comprehensive cyber security policy and a nodal authority for cyber-crime handling. [CO1][L2] **10**

Q.3 a) Address issues related to log management and security, including data integrity. Also list the cyber security safeguards with respect to audit and authentication. [CO2][L1] **10**

b) Justify how the terms like firewall, scanning, response, and ethical hacking are correlated. [CO2][L3] **10**

Q.4 a) Explain how digital signatures are used to ensure the authenticity and non-repudiation of SOAP messages. [CO3][L3] **10**

b) Write short notes on security for HTTP Applications and Services. [CO3][L3] **10**

PART-B

Q.5 a) Host-based and network-based intrusion detection systems (NIDS and HIDS) are different from one another. Justify. [CO4][L4] **10**

b) Discuss about unauthorized access by outsider and malware infection. [CO4][L2] **10**

Q.6 a) Compare and contrast stateful inspection firewall and packet-filtering firewall in terms of its functionality and security capabilities. [CO3][L3] **10**

b) Write short note on PGP and S/MIME. [CO4][L1] **10**

Q.7 a) Justify how security is maintained at Network Layer-IPsec. [CO2][L3] **10**

b) Relate Message Authentication to Digital Signatures concerning cyber theft in data communication. [CO2][L4] **10**

End Semester Examination, Dec. 2023

B. Tech. – Third / Fourth Semester

COMPUTER ORGANIZATION AND ARCHITECTURE (BCS-DS-402)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a) What do you understand by stored program concept? [CO1/L1]
b) Describe the hardware implementation for P: R5← R6. [CO2/L3]
c) Explain carry look-ahead adder. [CO3/L2]
d) Differentiate between interrupts and exceptions. [CO2/L4]
e) Generate the control word for SUB instruction for general register CPU organization. [CO3/L6]
f) What is direct memory Access? [CO3/L1]
g) Differentiate between cycles stealing mode. [CO4/L4]
h) Define throughput and speedup in pipelining. [CO5/L1]
i) Explain cache size vs. block size. [CO6/L2]
j) Write the control word for $R_1 \neg R_6 + R_7$ for general register organization. [CO2/L1]

2×10

PART-A

Q.2 a) Draw block diagram of a computer architecture explaining all its concepts. [CO1/L2] **10**

b) Explain instruction set architecture of a CPU. [CO1/L2] **10**

Q.3 a) Perform the subtraction with the following unsigned decimal numbers by taking the 10'scomplement of the subtrahend:

i) 5250-1321
ii) 1753-8640
iii) 20-100
iv) 1200-250 [CO-3][L-5] **10**

b) What do you understand by instruction formats? Explain in detail. [CO2/L1] **10**

Q.4 a) Differentiate between hardwired and microprogrammed control memory. [CO3/L4] **10**

b) Sketch the block diagram of 8086 microprocessor's architecture in detail alongwith its functional blocks. [CO3/L3] **10**

PART-B

Q.5 a) Signify the role of interrupts stating that how it works. [CO4/L2] **10**

b) Differentiate between programmed I/O and DMA and interrupt initiated I/O. [CO4/L2] **10**

Q.6 a) Explain pipelining in detail with the help of an example. [CO5/L2] **10**

b) Jot down all necessary steps for concurrent access to memory and cache. [CO5/L6] **10**

Q.7 a) What is the need of memory hierarchy? Also, explain locality of reference principle. [CO6/L1] **10**

b) Write about different replacement algorithms and write policies. [CO6/L2] **10**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer the following:

a) How Identity can be compromised? Elaborate the defensible plan. [CO6][L2]
b) Pen down the steps for crisis communication. [CO6][L3]
c) Compare Virus, worms and Trojan horse. [CO4][L2]
d) Explain the usage of MAC Spoofing. [CO1][L5]
e) Summarize the concept of data breach. [CO2][L1] **5×4**

PART-A

Q.2 a) Discuss three ways that help for a Malware to spread. [CO1][L4] **10**
b) Write down the steps for vulnerability analysis. [CO6][L1] **10**

Q.3 a) Does phishing occurs only via E-mail? Suggest the mitigation of this attack. [CO1][L2] **10**
b) Assess the severity of SQL injection attack to an organization. List the steps to prevent this attack. [CO4][L6] **10**

Q.4 a) Differentiate between Denial of Service and Distributed denial of service attack. [CO.2][L2] **10**
b) Elaborate on SET toolkit and steps for website cloning. [CO3][L5] **10**

PART-B

Q.5 a) Write the steps for Diffie Key Hillman Algorithm. [CO5][L5] **10**
b) Differentiate between AES and DES. [CO4][L6] **10**

Q.6 a) Compare the data erasure and data masking. [CO4][L2] **10**
b) Assess the Three-way-hand-shake protocol. [CO6][L6] **10**

Q.7 a) Analyse the Database activity monitoring. [CO2][L4] **10**
b) Evaluate Man in the Middle attack and ARP Spoofing. [CO5][L5] **10**

End Semester Examination, Dec. 2023

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 brief:

a) A problem can be solved by dividing it into sub-problems, applying same algorithm to solve the sub-problems, and combining the solutions. State the name of the approach used to solve this problem? [CO-2][L-2]

b) An array contains n elements, (n-1) elements are same, and one is different. Find the index of the element which is different. [CO-3][L-4]

c) Can you find the nth Fibonacci term in O(n)? If yes, state the paradigm. [CO-3][L-3]

d) State an NP-Hard problem. Also state the reason why it cannot be solved in polynomial time? [CO-5][L-1]

e) Is P-space a subset of P? [CO-5][L-1]

f) Which is better insertion sort or selection sort and why? [CO-1][L-2]

g) What are the characteristics of heuristics used to solve optimization problems? [CO-6][L-1]

h) Can Deterministic Finite Acceptor be used to match strings? If yes, give an example. [CO-3][L-2]

i) What is the complexity of multiplying two matrices using Strassen's Matrix Multiplication? [CO-2][L-3]

j) Write an algorithm to find the second maximum number from a given array (naïve approach). Can you improve the complexity of the brute force algorithm for this problem? [CO-6][L-3] **2×10**

PART-A

Q.2 a) Solve the following recurrence relation using Master's theorem.

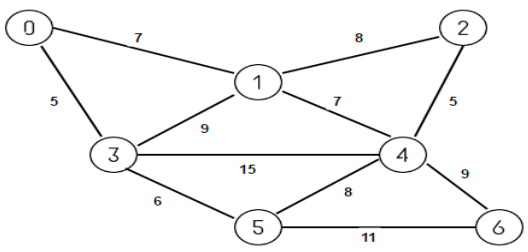
$$T(n)=2T\left(\frac{n}{2}\right)+n \text{ for } n>1 \wedge T(1)=2$$

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

b) Define O notation. What is the difference between upper bound and worst case? Find the best case and the worst case for linear search. [CO-1][L-4] **10**

Q.3 a) Write an algorithm to find the Depth First Search of a graph. Find its complexity. [CO-4][L-1] **10**

b) Find the minimum cost spanning tree for the following graph using the Kruskul algorithm.



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

P. T. O.

Q.4 Write an algorithm for solving Matrix Chain Multiplication problem using Dynamic Programming. Using this algorithm find the optimal sequence for multiplying the matrices : A(2,3), B(3,4), C(4,10) and D(10, 20) [CO-3] [L-4] **20**

PART-B

Q.5 a) Write an algorithm to solve N-Queens Problem using Backtracking. Using this algorithm solve 4 Queens Problem. [CO-2] [L-4] **10**

b) Given that number of items = 4, Profit, P = {10, 10, 12, 18} and Weights, W = {2, 4, 6, 9}. Solve the 0/1 Knapsack problem using Branch and Bound. [CO-2] [L-4] **10**

Q.6 a) Find all the occurrences of string P in string T using Knuth-Morris-Pratt algorithm. The length of P is m and length of T is n. Find the complexity of the algorithm. Using this algorithm find all occurrences of "ABA" in "ABBABBAABABABA". (Assume each character is stored using the ASCII notation. [CO-2][L-4] **10**

b) What are a) P, NP, NP-complete and NP-Hard problems? State Cook's theorem. [CO-5][L-1] **10**

Q.7 a) Discuss the idea of polynomial space complexity? Prove that 3-SAT is in P space. [CO-6][L-4] **10**

b) What are randomized algorithms? Write randomized algorithm for sorting elements of a given list. [CO-6][L-1] **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

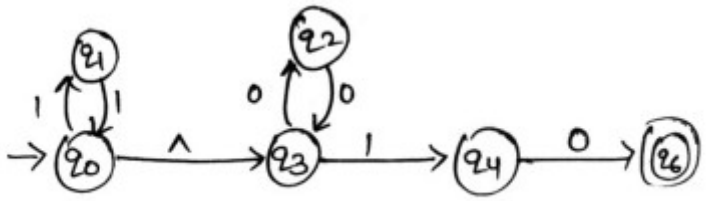
FORMAL LANGUAGE AND AUTOMATA THEORY (BCS-DS-502)

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) Define 'context free language'. Explain with an example.
b) Write the regular expression for the language L= $\{a^n b^m \mid (n+m) \text{ is Even}\}$.
c) Draw block diagram of Finite Automata.
d) Explain tuples of PDA.
e) Remove null productions from the following automata by applying null removal method:

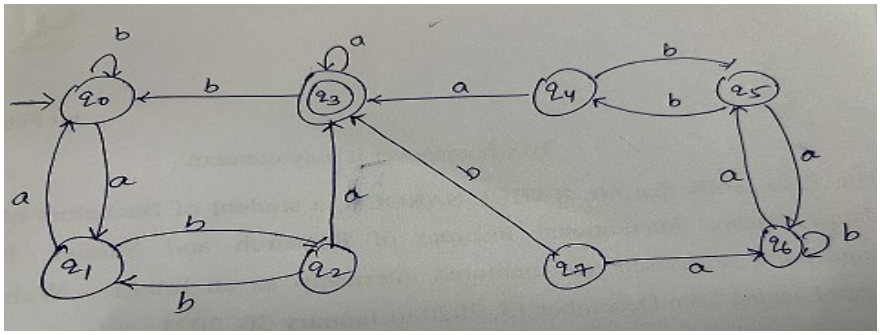


f) Compare decidable and undecidable problem.
g) State whether grammar grammar S -→ aB |ab, A -→ aAB |a, B -→ ABb |b is ambiguous or not.
h) Is regular set is closed under complementation? Justify.
i) Find the context free languages for the following grammars.
S→aSbS|bSaS| ε
j) Write the form of production allowed in CNF. **2×10**

PART-A

Q.2 a) Explain Chomsky's classification of Grammar. [CO-1][L-2] **8**
b) Design grammar for the langauge $L=\{b^n c^n a^j \mid n>=1, j>=0\}$. [CO-1][L-6] **6**
c) Find the language generated by the following grammar:
S->0A|0S|0|1B|1
A-> 0A|0
B->1B|1 [CO- 1] [L-5] **6**

Q.3 a) Construct minimum state auotmaton equivalent to the transition diagram:



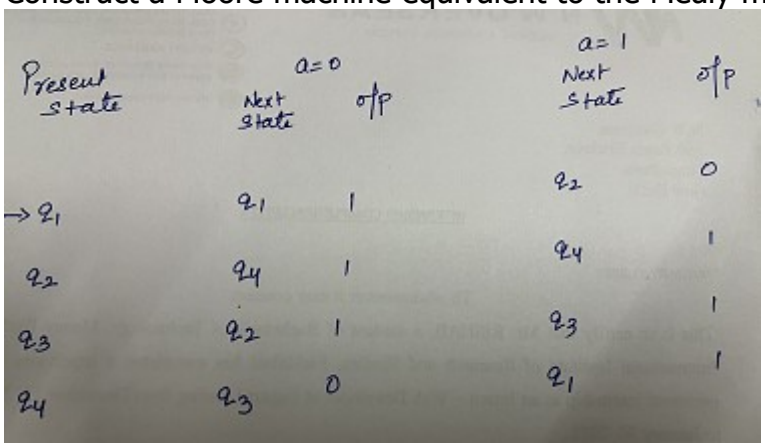
[CO-2][L-5] **10**

P. T. O.

b) Distinguish NFA and DFA with examples:

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

c) Construct a Moore machine equivalent to the Mealy machine defined by:

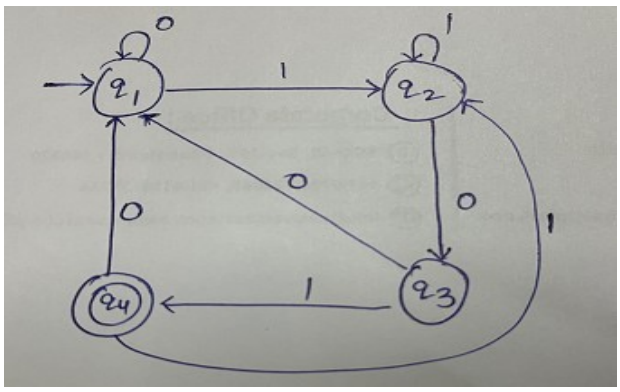


[CO-2][L-5] **5**

Q.4 a) Construct NFA and DFA for the regular Expression R=ab(a+b)+abb*. Obtain minimized DFA. [CO-3][L-6] **8**

b) State and prove pumping lemma theorem for regular set. [CO-3][L-2] **4**

c) Find the regular expression corresponding to the given automata:



[CO-3][L-5] **8**

PART-B

Q.5 a) Construct PDA for the language L = {ww^R | W in (a+b)*)} accepted by Null Store. [CO-4][L-6] **8**

b) Consider the following grammar G with productions:
S→ ABC | BaB
A→aA|BaC|aaa
B→bBb|a
C→CA|AC
Construct a CFG, by removing useless variables, that generates the same language.

[CO-4][L-5] **6**

c) Construct Greibach normal form of the following grammar:
S-→ AO
A -→ OB
B -→ AO
B -→ 1 [CO-4][L-6] **6**

Q.6 a) Draw the block Diagram of Turing machine and also explain all its Tuples. [CO-5][L-1] **6**

b) Design a Turing machine for the language L(G) ={x^n y^n z^n , where n>1}. Show the processing of string with n=2. [CO-5][L-5] **14**

Q.7 a) State and Prove Post-Correspondence Problem. [CO-6][L-1] **8**

b) Explain the properties of recursive and recursive enumerable language. [CO-6][L-1] **8**

c) Define decidability and undecidability problems with an example. [CO-6][L-1] **4**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester / AIML-Third Semester

ARTIFICIAL INTELIGENCE (BCS-DS-503)

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

No. of pages: 2

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

Q.1 Answer the following in brief:

a) Explain the characteristics of AI problems. [CO-1] [L-2]
b) Differentiate between informed and uninformed search techniques. [CO-5] [L-2]
c) Differentiate between 'CNF and DNF'. [CO-3] [L-2]
d) Elaborate PEAS in the context of an intelligent agent. [CO-5] [L-2]
e) Explain the importance of heuristics in search techniques. [CO-2] [L-2]
f) List the four categories of production systems. [CO-4] [L-2]
g) List the characteristics of an intelligent agent. [CO-6] [L-3]
h) Given that P(A)=0.2, P(B)=0.4, P(B|A)=0.5. Find P(A|B). [CO-4] [L-3]
i) Discuss the Turing test of Artificial Intelligence. [CO-1] [L-2]
j) Briefly discuss the concept of an intelligent agent. [CO-5] [L-2] **2×10**

PART-A

Q.2 a) Consider the following eight puzzle problem where initial state (left side) and goal state (right side) are given. Find a suitable heuristic function. Design the solution of the eight-puzzle problem using Hill Climbing algorithm. Illustrate the intermediate states.

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

b) Draw the state space for water jug problem considering two jugs of 4lt and 3lt capacity. There is no mark on the jugs to measure the capacity of unfilled jugs. Take (0, 0) as the initial state and (2, 0) as the final state. Write the production rules and the control strategy to be followed. [CO-2][L-3] **10**

Q.3 a) Illustrate, is constraint satisfaction? Solve the following crypt arithmetic problem using constraint satisfaction algorithm. CROSS + ROADS=DANGER. 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) Explain the A* algorithm with the help of suitable example. How the overestimation and underestimation is handled. [CO-2][L-6] **10**

Q.4 a) Illustrate, importance of knowledge. What is the role of knowledge representation in problem solving? Discuss various knowledge representation techniques. [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. **3**
ii) Declare parent relationship in the family. **3**

P. T. O

iii) Based on the relationships declared in (i) and (ii) write rules for the following relationships: Father(X,Y), Mother(X,Y), Aunt(X,Y), Uncle(X,Y) [CO-3][L-3] **4**

PART-B

Q.5 a) Differentiate between Monotonic and Non-Monotonic Reasoning systems. [CO-4][L-2] **6**

b) What is uncertainty? Explain the sources of uncertainty in reasoning process. [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 an intelligent agent? Explain in detail the architecture of a simple reflex agent. [CO-6][L-3] **8**

b) Define an expert system. Illustrate the architecture of an expert system. Construct a forward chaining inference mechanism by taking a suitable example. [CO-5][L-4] **12**

Q.7 a) What is Min Max search algorithm? How the search space can be reduced in a game tree? Take suitable example to support your answer. [CO-6][L-6] **12**

b) Briefly explain the steps involved in Natural Language Processing. [CO-2][L-4] **8**

End Semester Examination, Dec. 2023

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 is business intelligence? [CO-1][L-1]
b) Explain how business intelligence can be fitted into existing infrastructure. [CO-1][L-1]
c) Give the applications of business intelligence. [CO-2][L-2]
d) What are the assumptions that are made by the end user in BI? [CO-2][L-2]
e) Interpret the significance of Scorecards in Business Intelligence. [CO-3][L-4]
f) Define metadata models. [CO-3][L-2]
g) Define risk mitigation. [CO-5][L-5]
h) Differentiate between authentication and authorization? [CO-6][L-5]
i) Explain predictive analysis. [CO-6][L-2]
j) Describe the disadvantage of decentralized architecture in BI deployment? [CO-6][L-2] **2×10**

PART-A

Q.2
a) Explain the components used in BI architecture. [CO-1][L-2] **10**
b) What is SaaS? Explain cloud computing techniques in detail. [CO-1][L-2] **10**

Q.3
a) Differentiate OLAP and OLTP. What is the role of advanced analytics in OLAP? [CO-2][L-2] **10**
b) Explain the functional areas of BI Tools in detail. [CO-2][L-2] **10**

Q.4
a) Explain the automated tasks and events of business intelligence. [CO-3][L-2] **10**
b) Differentiate between SDK and API. Explain the role of Software development kit. [CO-3][L-3] **10**

PART-B

Q.5
a) Describe the phases of BI Design in project development. [CO-4][L-4] **10**
b) Explain the process of risk Management in detail. [CO-4][L-4] **10**

Q.6 Describe in detail the processes involved in Drill-up and Drill-down Capabilities. [CO-5][L-4] **20**

Q.7
a) Discuss EPM (Enterprise Performance Management) in BI deployment and administration. [CO-6][L-4] **10**
b) Interpret the role of Single Sign-on (SSO). Draw the diagram of data warehouse architecture. [CO-6] [L-4] **10**

End Semester Examination, Dec. 2023

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 brief:

a) Define 'domestic terrorists'. [CO1][L2]
b) Briefly discuss physical security for natural disasters. [CO3][L1]
c) What is quantitative analysis? [CO4][L4]
d) How you describe the vulnerability assessment? [CO2][L2]
e) What is security survey? [CO5][L1]
f) What is combination lock? [CO5][L1]
g) What is a smoke detector? [CO3][L2]
h) Define 'multiplexer'. [CO3][L2]
i) Briefly discuss how fire spreads? [CO3][L2]
j) Why emergency drill required? [CO5][L2] **2×10**

PART-A

Q.2 a) Discuss the importance of physical security. [CO-1][L-1] **10**
b) How do you differentiate between the physical and cyber security? [CO-1][L-4] **10**

Q.3 a) Discuss statistics and quantitative analysis. [CO-2][L-2] **10**
b) Explain reporting and using of vulnerability assessment. [CO-2][L-2] **10**

Q.4 a) Explain the classification of survey. [CO-3][L-2] **10**
b) Discuss the crime analysis. [CO-3][L-2] **10**

PART-B

Q.5 a) Discuss the physical barriers of physical security. [CO-4][L-2] **10**
b) Explain the components of alarm systems. [CO-4][L-2] **10**

Q.6 a) Explain the equipment of scene illumination and scene characteristics. [CO-5][L-2] **10**
b) How automated systems are implemented? [CO-5][L-2] **10**

Q.7 a) Describe fire safety inspection process. [CO-6][L-2] **10**
b) Discuss the function of function of guards, uniform, firearms, vehicles, guardhouses. [CO-6][L-2] **10**

End Semester Examination, Dec. 2023

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 brief:

a) Define the terms window and windowing transformation in the context of 2D viewing with suitable diagrams. [CO2][L2]

b) What are the advantages and disadvantages of DDA line drawing algorithm? [CO2][L2]

c) Explain 2D transformations with its basic types. [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 'pixel and resolution'. [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) Give the matrix representation for 2D scaling. [CO3][L2] **2×10**

PART-A

Q.2 a) Draw the block diagram and explain the working of raster display. Explain horizontal and vertical retrace. Explain random scan displays .Draw the block diagram and explain the working of raster display. [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) Find the transformation matrix that transforms the square ABCD whose center is at (2,2) is reduced to half of its size , with the center still remaining at (2,2).The coordinates of the square are A(0,0) , B(0,4) C(4,4) and D(4,0).Find the coordinates of the resultant square. [CO2][L5] **10**

Q.4 a) Use the Cohen Sutherland algorithm to clip the line joining points P1 (70,20) and P2(100,10) against a window lower left hand corner (50,10) and upper right hand corner(80,40). [CO3][L3] **10**

b) Write the steps required to convert world coordinate to view port system. Write all the equation and matrix representation. [CO3][L2] **10**

PART-B

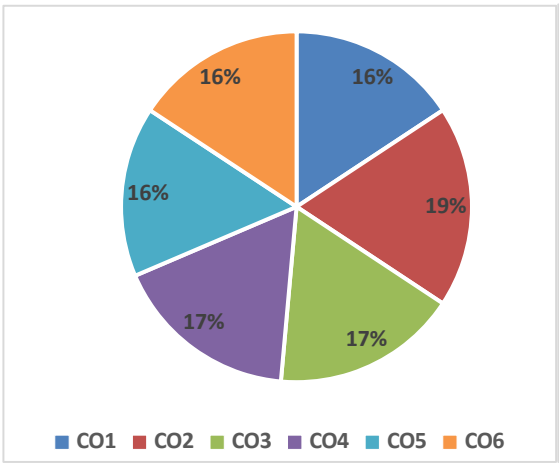
Q.5 a) Given a 3D triangle with points (0, 0, 0), (1, 1, 2) and (1, 1, 3). Apply shear parameter 2 on X axis, 2 on Y axis and 3 on Z axis and find out the new coordinates of the object. [CO4][L4] **10**

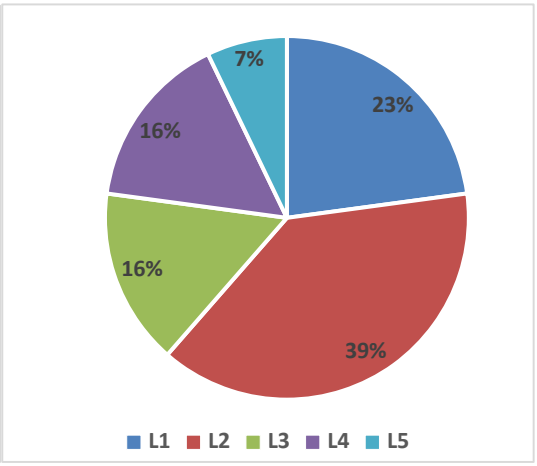
b) Explain the followings with example: Translation, Scaling, Rotation, and Composite Transformation. [CO4][L2] **10**

P. T. O.

Q.6 a) Explain Bezier curve algorithm with its properties [CO5][L2] **10**
b) Discuss Hermite interpolation method with a suitable example. [CO5][L1] **10**

Q.7 a) Explain the Z-buffer algorithm with a suitable example. [CO6][L4] **10**
b) Discuss the basic illumination models. [CO6][L1] **10**





End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer in brief:

a) Explain the concept of encapsulation using an example.
b) Differentiate between traditional and object-oriented methodologies.
c) Differentiate between iterative and incremental development.
d) What is a role name?
e) Define a component.
f) What are the capabilities of UML?
g) What are packages?
h) What is the use of boundary class in an interaction diagram?
i) Define a node.
j) What is reverse engineering? **2×10**

PART-A

Q.2 a) Give the advantages of object oriented methodologies over traditional methodologies. [CO-2][L-2] **5**

b) Explain different types of concepts used in Object Oriented methodologies by using UML notations. [CO-1][L-2] **15**

Q.3 a) Design and explain Activity diagram of ATM machine. [CO-3][L-5] **10**
b) Explain the various components of Use Case diagrams, the relationships used and their significance with the help of example. [CO-3][L-5] **10**

Q.4 a) Discuss in details "naming relationships" and "role names". [CO-4][L-2] **5**
b) Design the Class diagram of for Student Registration System. [CO-4][L-5] **15**

PART-B

Q.5 a) Design a Sequence diagram for establishing a landline telephone call. [CO-4][L-5] **10**

b) Write notes on:
i) Documenting scenario. ii) States.
ii) Representing behavior and Structure. iv) Components of a state diagram.
[CO-2][L-2] **2½×4**

Q.6 a) What is the need to revisit the model? Discuss the various scenarios where we need to split, combine or eliminate classes. [CO-6][L-3] **10**
b) Discuss the component view of 4+1 architecture. [CO-2][L-2] **10**

Q.7 Define 'patterns'. Critically examine ts utility, advantages and disadvantages. [CO-6][L-1] **10**

b) State the goals of Iteration planning? Discuss the process in details highlighting the pros and cons of the process. [CO-1] [L-1] **10**

End Semester Examination, Dec. 2023

B. Tech. – Third / Fifth Semester

CLOUD COMPUTING ARCHITECTURE AND DEPLOYMENT MODELS (BCS-DS- 527)

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

No. of pages: 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) Recollect the types of cloud computing models and differentiate between them. [CO1][L2]
b) Discuss the use of defining cloud architecture. [CO3][L1]
c) Briefly explain the business benefits involved in cloud architecture. [CO3][L1]
d) Compare private cloud with public cloud. [CO5][L2]
e) Enumerate the application of SaaS. [CO2][L1]
f) Briefly explain the concept of scalability in cloud computing. [CO1][L1]
g) How does relate Service oriented cloud SOA) with cloud architecture. [CO4][L1]
h) Identify the distinguishing features of IaaS, PaaS, and SaaS from each other. [CO1][L1]
i) Identify the key elements of SLA (Service Level Agreements) in cloud vendor selection. [CO5][L1]
j) List the primary advantages and challenges of Hybrid cloud deployment. [CO4][L1] **2×10**

PART-A

Q.2 a) Provide an example of a service that fits into each of the three primary cloud service models: IaaS, PaaS, and SaaS. [CO2][L2] **10**

b) Enumerate the benefits of cloud computing. [CO1][L2] **10**

Q.3 a) Discuss the advantages and disadvantages of using a multi-cloud strategy in cloud computing. Provide real-world examples to support your arguments. [CO2][L3] **10**

b) Evaluate the challenges faced during the adoption of cloud computing and propose solutions to overcome them. [CO1][L3] **10**

Q.4 Investigate the evolution and different versions of CCRA, highlighting their strengths and limitations. [CO5][L4] **20**

PART-B

Q.5 a) Illustrate the cloud deployments models. [CO1][L2] **10**

b) What are some considerations when selecting a cloud computing platform for a business? [CO2][L1] **10**

Q.6 Construct a comparative analysis report recommending the most suitable cloud model (IaaS,PaaS, or SaaS) for a specific industry or business sector. [CO3][L5] **20**

Q.7 Examine the complexities and challenges in developing applications for a Hybrid cloud environment using PaaS. [CO5][L4] **20**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

IT APPLICATION SECURITY (CF) (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 a) What is buffer overflow attack? Explain.
b) Discuss Network Eavesdropping.
c) Discuss CSRF attacks.
d) Differentiate between phishing and social engineering.
e) Explain DOS attacks.
f) Differentiate between public key and private key.
g) Define digital signature. How is it generated cryptographically?
h) Discuss the use of hashing in security.
i) What is a cookie and cookie replay attack?
j) Explain session replay. [CO1][L1] **2×10**

PART-A

Q.2 a) Explain SQL injection attack with examples. [CO2][L2] **10**
b) What are Cross Site Scripting attacks? Explain in detail with the help of an example. [CO2][L2] **10**

Q.3 a) Differentiate between authentication and authorization with examples. [CO1][L1] **10**
b) Explain brute force attack and dictionary attack. What is a rainbow table and what is it used for? [CO2][L1] **10**

Q.4 a) Describe man in the middle attack with examples and diagram. [CO2][L1] **10**
b) Explain in detail over privileged process and why is it dangerous? Explain. [CO4][L2] **10**

PART-B

Q.5 a) Explain in detail botnet, C2 and DDOS attack. How can the DDOS attacks be prevented? [CO5][L2] **10**
b) Differentiate between the terms intrusion detection system and intrusion prevention system. [CO3][L1] **10**

Q.6 a) Explain the term non-repudiation of user action. What are the various ways in which we can ensure this? [CO3][L1] **10**
b) Differentiate between 'auditing and logging'. [CO5][L2] **10**

Q.7 a) What is meant by code analysis? Discuss code analysis using IBM Rational AppSca . [CO6] [L3] **10**
b) What are the different types of code analysis? Discuss with examples. [CO6][L1] **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

WEB PROGRAMMING FOR GRAPHICS & GAMING (HTML 5 & WEB GL) (GG) (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) How WebGL has changed the animation scenario for Web Application? [CO-1][L-1]

b) DHTML has become the necessity. Justify your answer with an example. [CO-2][L-2]

c) Define WebGL camera/canvas? [CO-5][L-1]

d) Why we use buffers in WebGL? Give an example for the use of buffer.[CO-4][L-2]

e) Analyze the operators and functions that are used in openGL shading language. [CO-6][L-3] **5×4**

PART-A

Q.2 Illustrate different functions to draw a colorful rectangle on the canvas. 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] **20**

Q.3 a) Design a form for student registration for this semester including different form controls in HTML. Write the complete code. [CO-2] [L-5] **10**

b) Explain of HTML with suitable example five structural elements. [CO-2] [L-5] **10**

Q.4 a) Explain the process to draw lines, color and transparency using canvas. [CO-3][L-4] **10**

b) Analyze various techniques to draw text on canvas. Give and example to explain. [CO-3][L-3] **10**

PART-B

Q.5 a) What are shaders in WbeGl? Explain with code. [CO-4] [L-1] **10**

b) Explain GPU in brief. Also justify graphic pipeline in detail. [CO-4] [L-2] **10**

Q.6 a) What are rotation, translation and scaling? Write the matrix representation for rotation, translation and scaling in WebGl. [CO-5][L-3] **10**

b) How to animate the cube in WebGl? Explain the steps involved with proper syntax? [CO-5][L-3] **10**

Q.7 a) How we can view in WbebGL? How WebGl has changed the animation scenario for web application? [CO-6] [L-3] **10**

b) Compare parallel projection and perspective projection. [CO-6] [L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

IT MOBILE SECURITY (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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) What are the most common types of malware and threats that target Android devices? [CO-1][L1]

b) Explain two common mobile malware types and their potential impacts on a mobile device. [CO-1][L2]

c) What are the Five Pillars of Security complementing each other to create a strong security posture? [CO-2][L1]

d) State one method used in code signing attacks. [CO-2][L1]

e) Define ransomware with an example. [CO-3][L1]

f) Explain the concept of a symmetric encryption algorithm and its role in securing data in applications? [CO-4][L1]

g) How do hardware security keys enhance the security of authentication and access control systems compared to software-based solutions? [CO-4][L2]

h) What is a "man-in-the-middle" attack, and how can it be executed on mobile devices? [CO-4][L1]

i) Differentiate between 'SSL and IP Sec'. [CO-5][L1]

j) Give a note on virtual private networks (VPN). [CO-5][L1] **2×10**

PART-A

Q.2 a) How do malicious apps typically infiltrate Android devices, and what are the consequences for users? [CO-1] [L2] **10**

b) What are the key security settings and features built into the Android operating system that users should enable for better protection? [CO-1] [L2] **10**

Q.3 a) What is an attack vector in the context of cybersecurity and why is it important to understand them? [CO-2] [L2] **10**

b) What are some common methods used in code signing attacks and how do they undermine the security of signed code? [CO-2] [L2] **10**

Q.4 a) How do mobile malware and malicious apps compromise the security of smartphones and tablets, and what are their potential consequences? [CO-3] [L2] **10**

b) What role does phishing play in mobile security threats, and how can users recognize and protect themselves from mobile phishing attempts? [CO-3] [L2] **10**

PART-B

Q.5 a) Explain the principles of the Secure Development Lifecycle (SDLC) and how it ensures the creation of secure applications? [CO-4] [L2] **10**

b) What are the key components of a digital signature, and how do they contribute to the security of the signed data? [CO-4] [L2] **10**

Q.6 a) What are the two primary modes of IPSec operation, and how do they differ in terms of security and use cases? [CO-5] [L2] **10**

b) What is the significance of HTTPS in securing data transmission over the internet, and how does it differ from regular HTTP? [CO-5] [L2] **10**

Q.7 a) What are the security settings in Google Chrome that users can configure to enhance their browsing safety and privacy? [CO-6] [L2] **10**

b) Explain security policies and security procedures and how they complement each other in maintaining a secure environment? [CO-6] [L2] **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

DATA SCIENCE WITH PYTHON (BCS-DS-539)

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) What Boolean expressions are available in Python and how they are evaluated? [CO-1][L-2]

b) Define function routines in Python and explain their purpose in encapsulating reusable blocks of code. [CO-3] [L-1]

c) Discuss the concept of list traversal in Python and how it allows for accessing and manipulating individual elements within a list. [CO-2] [L-2]

d) Define subclasses in Python and explain how they inherit properties and behaviors from their parent classes. [CO-3] [L-1]

e) Which function in NumPy is used to generate random numbers from a uniform distribution? [CO-4] [L-1]

f) Describe how logical operators (e.g., & and |) are used to combine filtering conditions in Pandas. [CO-5] [L-2]

g) Differentiate between Series and DataFrames in Pandas? [CO-5] [L-2]

h) Explain the purpose and benefits of using a multi-index or index hierarchy in a Data Frame. [CO-5] [L-1]

i) Write Python code to generate a histogram to visualize the distribution of a numeric variable. [CO-6] [L-3]

j) Describe the components of a scatter plot, including data points, axis, and labels. [CO-6] [L-2] **2×10**

PART-A

Q.2 a) Analyze the efficiency and performance implications of using indefinite loops in Python compared to definite loops, considering factors such as execution time and resource usage. [CO-1][L-4] **10**

b) Develop a Python program that utilizes a selection control structure to recommend different courses of action based on the user's age and qualification. [CO-1][L-3] **10**

Q.3 a) Develop a Python program that calls a non-value-returning function to display a customized greeting based on the user's name. [CO-2] [L-3] **10**

b) Compare and contrast dictionaries and lists in Python, highlighting their differences in terms of data structure and usage. [CO-2] [L-2] **10**

Q.4 a) Assess the advantages and disadvantages of using NumPy for handling large datasets in comparison to traditional Python lists. [CO-4] [L-5] **10**

b) Develop a Python program that defines multiple classes and demonstrates inheritance by creating subclasses that inherit and extend the properties and behaviors of their parent classes. [CO-3] [L-3] **10**

PART-B

Q.5 a) Describe various options and parameters available when reading data from external sources using Pandas. [CO-5][L-2] **10**

b) Evaluate efficiency of Pandas methods for sorting and ordering Data Frames when working with large datasets. [CO-5][L-4] **10**

P. T. O.

Q.6 a) Write Python code to generate a scatter plot with a regression line to visualize the linear relationship between two numeric variables. [CO-6][L-3] **10**

b) Evaluate the efficiency of Joint Grids in effectively conveying bivariate relationships and patterns within a dataset. [CO-6][L-4] **10**

Q.7 a) Explain the concept of a heatmap. How it visualizes the relationships and patterns between two variables in a dataset. [CO-6][L-2] **10**

b) Analyze a real-world data analysis problem. Why using a Pandas Series would be more advantageous than a NumPy array? [CO-4] [L-4] **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth 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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Define information gain in a decision tree.
b) Write down the conditions for binomial distribution.
c) Define principle component analysis.
d) Explain the purpose of Gradient.
e) Write down the purpose of hold out method.
f) Differentiate deep learning with machine learning.
g) What is the major cause of underfitting?
h) List down the methods of parameter optimization in neural network.
i) What is supervised learning? Why it is called so?
j) Why do we need Activation Function? **2×10**

PART-A

Q.2 a) A coffee connoisseur claims that he can distinguish between a cup of instant coffee and a cup of percolator coffee 75% of the time. It is agreed that his claim will be accepted if he correctly identifies at least 5 of the 6 cups. Find his chances of having the claim:

i) Accepted
ii) Rejected, when he does have the ability he claims. [CO-2][L-3] **8**

b) Evaluate the mean, mode and median for the following data:

Class	0-10	10-20	20-30	30-40	40-50	Total
Frequency	8	16	36	34	6	100

[CO-2][L-5] **12**

Q.3 a) Write down various graph based techniques supported by deep learning model with the help of example. [CO-1][L-2] **10**

b) Discuss any four examples of machine learning applications. [CO-1][L-2] **5**

c) Explain feature selection and feature extraction. [CO-1][L-1] **5**

Q.4 a) 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**

P. T. O.

b) Differentiate between bagging and boosting. [CO-3][L-1] **5**

PART-B

Q.5 a) Divide the following data into two clusters with the help of k means clustering algorithm. Calculate SSt

X	Y
2	3
5	6
8	7
1	4
2	2
6	7
3	4
8	6

[CO-4][L-3] **12**

b) Define 'clustering'. Explain the different types of clustering algorithms explain in detail? [CO-4][L-1] **8**

Q.6 a) Consider a multi-layer feed forward neural network. Enumerate and explain steps in the back propagation algorithm used to train the network. [CO-5][L-1] **10**

b) Describe the structure of an artificial neuron. How is it similar to a biological neuron? What are its main components? [CO-5][L-1] **10**

Q.7 a) What do you mean by support vectors in SVM? Why SVM is called maximum margin classifier? Justify. [CO-6][L-2] **10**

b) Write short notes on:
i) Human cognitive learning.
ii) Inductive learning. [CO-6][L-1] **5×2**

End Semester Examination, Dec. 2023

B. Tech. – Fifth / Sixth Semester

CONTAINER ORCHESTRATION AND INFRASTRUCTURE INFORMATION (BCS-DS-609)

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

No. of pages: 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 briefly:

a) Discuss the use of containers in cloud computing environment. [CO2][L2]
b) State the role of Pods in Kubernetes. [CO2][L2]
c) Compare Hybrid Cloud and Multi -Cloud in terms of their usage in cloud environment. [CO1][L4]
d) State the role of microservices in containers. [CO1][L2]
e) How AWS is used for orchestration. [CO2][L2]
f) Write the command for creation of pods using kubectl. [CO4][L2]
g) Define Secrets in kubernetes. [CO4][L1]
h) Define Persistant Volume in terms of Storage Classes in kubernetes. [CO4][L1]
i) List the steps to set up DNS in kubernetes. [CO5][L2]
j) State the purpose of designing an information system. [CO6][L2]. **2×10**

PART-A

Q2. a) Compare Containers and Virtual Machines in cloud environment with suitable diagram. [CO1][L4] **10**
b) Why organizations use containers in their business? Explain. [CO1][L2] **10**

Q.3 a) Compare Kubernetes and Dockers in cloud computing environment. [CO2][L4] **10**
b) State the tasks that can be automated through container orchestration. [CO2][L2] **10**

Q.4 a) Analyze the usefulness of compute machines in the architecture of Kubernetes Cluster. [CO3][L4] **5**
b) Discuss the role of YAML and kubectl command in container with their syntaxes. [CO3][L2] **5**
c) Compare traditional deployment, virtualized deployment, and container deployment in cloud environment. [CO3][L4] **10**

PART-B

Q.5 a) Discuss lifecycle of a Persistant volumes in kubernetes. [CO4][L2] **10**
b) Discuss the process to schedule pods on nodes in kubernetes. [CO4][L2] **10**

Q.6 Describe Kubernetes network model showing its network implementation. [CO5][L2] **20**

Q.7 Describe the design process of information system in cloud computing environment. [CO6][L2] **20**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

NATURAL LANGUAGE PROCESSING (BCS-DS-610)

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

No. of pages: 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 linguistic ambiguity in NLP? [CO-1][L-2]
b) What are the eight traditional parts-of-speech in English grammar, and what are their primary functions? [CO-1][L-2]
c) How does N-gram language model work? [CO-2][L-2]
d) Explain the basic principles of rule-based parts-of-speech tagging. Give an example of a rule commonly used in rule-based tagging. [CO-2][L-3]
e) How does Context-Free Grammar (CFG) define the syntax of a language? [CO-3][L-3]
f) What is a Probabilistic Context-Free Grammar (PCFG), and how does it extend the traditional CFG model? [CO-3][L-4]
g) What is vector semantics in natural language processing, and how does it represent words and their meanings? [CO-4][L-]
h) Why the concept of word sense in linguisticsis important in natural language understanding? [CO-5][L-3]
i) State the importance of data preprocessing in NLP and the techniques used to clean and prepare text data. [CO-5][L-3]
j) Comment on statement: With the growth of big data, internet has influenced the development and applications of NLP. [CO-2][L-4] **2×10**

PART-A

Q.2
a) Give an example of a real-world NLP application where dealing with ambiguity or spelling errors is particularly challenging, and explain how it is addressed. [CO-1][L-4] **10**
b) Differentiate between prescriptive grammar and descriptive grammar. [CO-1][L-3] **10**

Q.3
a) Define the concept of fine-tuning in the context of pre-trained neural language models and its importance in customizing models for specific tasks. [CO-2][L-3] **10**
b) Discuss the basic techniques for smoothing in N-gram language models and why smoothing is necessary. [CO-2][L-3] **10**

Q.4
a) How does the choice of tagset affect the tagging process? Explain the concept of a tagset in parts-of-speech tagging. [CO-3][L-3] **10**
b) Discuss the architecture of a typical neural POS tagging model, including input, hidden layers, and output layers. [CO-3][L-2] **10**

PART-B

Q.5
a) Describe the process of bottom-up parsing in CFGs. What are its strengths and weaknesses compared to top-down parsing? [CO-4][L-3] **10**
b) What are the key data structures and steps involved in CKY parsing? [CO-4][L-3] **10**

Q.6
a) Discuss the advantages of representing words as vectors in NLP tasks like word similarity and analogy. [CO-5][L-3] **10**
b) How do models like Skip-gram and Continuous Bag of Words (CBOW) generate word embeddings? Explain in detail. [CO-5][L-3] **10**

Q.7
a) Discuss the hierarchical structure of Word Net and how it represents relationships between word senses. [CO-3][L-3] **10**

b) Elaborate upon the data collection process till output generation with details of all phases involved in an NLP task. [CO-1][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. - Seventh Semester

SECURITY IN CLOUD (BCS-DS-701)

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

No. of pages: 1

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

Q.1
a) Differentiate public key encryption and private key encryption. [CO-6][L-3]
b) Explain System Threats and Program Threats. [CO- 1][L-1]
c) Who uses SSL? Explain in brief. [CO-3][L-3]
d) Differentiate between authorization and authentication. [CO- 3] L-3]
e) State the solution for Cloud security concerns. [CO-5][L-1]
f) Discuss the responsibility of application layer to secure user data. [CO-6][L-2]
g) Differentiate between SSL and TLS. [CO-5][L-3]
h) What do you understand by the services offered by PGP? [CO-4][L-2]
i) Define Trojan horse. [CO-1][L-1]
j) Discuss the concept of Virtualization. [CO- 2][L-2] **2×10**

PART-A

Q.2 Explain cloud computing, its security framework, and architecture principles along with system management components. [CO-1][L-2] **20**

Q.3
a) Define vulnerability and discuss the major vulnerabilities in core cloud computing technologies. [CO-1][L-1] **10**
b) Cloud software infrastructure and environment offer abstraction level for basic IT resources that are accessible to Compute, Storage and Network. Explain and discuss each vulnerability on each service Compute, storage and network. [CO-1][L-2] **10**

Q.4 Draw and explain components of AAA in cloud infrastructure and explain authorization, authentication and accounting techniques in details. [CO-3][L-2] **20**

PART-B

Q.5
a) Differentiate between Isolated, Federated, and Centralized identity management. [CO-3][L-3] **10**
b) Discuss IAM tools and IAM transformation in detail. [CO-3][L-3] **10**

Q.6
a) Explain the working of PGP and Levels of trust in PGP. [CO-5][L-2] **10**
b) Describe Cryptography and Ceasar's cipher with suitable example when key size=3. [CO-5][L-2] **10**

Q.7
a) Explain secure socket layer crypto algorithm with its working and security technology. [CO-6][L-2] **15**
b) Write a short note on 'SSL authentication'. [CO-6][L-2] **5**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1
a) Discuss applications of computer graphics for entrainment and in designing. [CO1][L2]
b) Differentiate two-axis and three-axis vanishing point perspective projection. [CO3][L3]
c) Discuss the advantages of homogeneous coordinate systems. [CO3][L2]
d) Differentiate quard strip and quard fan in detail with example [CO6][L3]
e) Discuss the use of depth buffer in detail with example. [CO4][L3]
f) Discuss parametric continuity conditions for curve drawing. [CO4][L3]
g) Discuss the use of control points in curve drawing. [CO3][L3]
h) Differentiate rotation and reflection. [CO2][L2] **2½ ×8**

PART-A

Q.2
a) Discuss Window to view port transformation in detail with 2D viewing pipeline. [CO1][L6] **10**
b) Rotate the triangle represented by vertices A(2,4) , B (3,6) and C (4,4) by 90 degree clock wise by an arbitrary points B. [CO1][L4] **10**

Q.3
a) Discuss the types of color models used in graphics and justify why RGB is mostly commonly used. [CO2][L2] **10**
b) Use the cohen-sutherland algorithm for clipping the following line:
i) P1(30,60) and (60,25)
ii) P5 (65,10) and P6(80,40)
against a window lower left hand corner (10, 10) and upper right hand corner (50,50). [CO2][L3] **10**

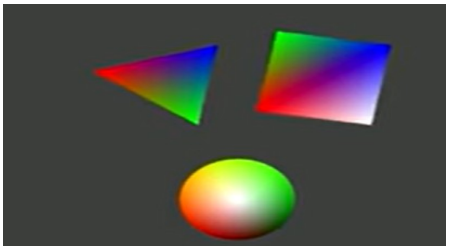
Q.4
a) Illustrate the 3-D viewing pipeline with suitable diagram and also differentiate the parallel and perspective projection method and what do you mean by projection ,define the main two basic projection method.[CO3][L3] **15**
b) Scale the pyramid defined by the co-ordinates A(0,0,0) B(1,0,0) C(0,1,0) D(0,0,1),2 units each in x,y,z directions. [CO3][L3] **5**

PART-B

Q.5 Discuss the characteristics of bezier curve and also state the differences between bezier curve and B-spline curve, number of control points are dependent on the degree of curve justify your answer. [CO4][L5] **20**

Q.6
a) Discuss the image pipeline in detail with all components. [CO5][L2] **10**
b) Discuss in detail opening up , reducing and flipping an image . [CO5][L1] **10**

Q.7
a) Write an open GL program to draw the picture given below and then rotate the triangle and quard by 90 degree about Z axis. [CO6][L6] **10**



b) Discuss shading buffer and intensity buffer and accumulation buffer in openGL. [CO6][L2] **10**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

3D COMPLEXITY TECHNIQUES FOR GRAPHICS MODELING AND ANIMATION (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 in brief:

a) Explain the basic principles of 3D animation. [CO-3][L-3]

b) What is the purpose of Movie sandbox? [CO-1][L-2]

c) What do we call the Basic shapes (spheres-cubes-cylinders) that act as building blocks to create a project? Why are they called so? Also discuss their uses. [CO-2][L-2]

d) Classify color map compression. [CO-2][L-3]

e) Discuss the main reason to use sculpting tools. [CO-3][L-4] **4×5**

PART-A

Q.2 a) What do you understand by typography? Discuss its history in detail. [CO-1][L-2] **10**

b) How would you describe the significance of balance in design and can you provide an example of how achieving balance contributes to the overall visual appeal of a design? [CO-1][L-2] **10**

Q.3 a) Explain the significance of architectural Lettering? [CO-3][L-3] **10**

b) How do the principles of timing and pacing influences of storytelling in motion graphics and can you discuss specific instances where the strategic application of these elements enhances the overall narrative impacts? [CO-3][L-5] **10**

Q.4 a) Explain filling Algorithms? Discuss Boundary fill and Scan line algorithm in detail. [CO-2][L-3] **10**

b) What is color system? Give its types? Also discuss the uses of each one them. [CO-2][L-3] **10**

PART-B

Q.5 a) Explain the steps to create animation in phase 1, phase 2 and phase 3. [CO-4][L-2] **10**

b) Discuss GIMP User-interface, Features and Capabilities. [CO-2][L-5] **10**

Q.6 a) Critique the given color map compressions: DXTC, 3Dc and A8L8. [CO-5][L-2] **10**

b) Explain different types of image filters with example. [CO-3][L-1] **10**

Q.7 Write notes on the following:

a) Real time animation.

b) Virtual studio work.

c) Character modelling.

d) Time rendering. [CO-6][L-1] **5×4**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

SOCIAL, WEB AND MOBILE ANALYTICS (BCS-DS-705)

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

No. of pages: 1

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

Q.1 a) How web analytics is different from mobile analytics? Explain each with an example. [CO-1][L-1]

b) Explain the process of social media content creation. [CO-1][L-2]

c) What are the benefits of email marketing? [CO-6][L-3]

d) Explain cold calling. What are the problems associated with cold calling email? [CO-2][L-]

e) What is the impact of social media analytics? What are the different techniques used for it? [CO-2][L-2] **4×5**

PART-A

Q.2 a) Analytics plays an important role. Discuss its importance and elaborate its different types. Explain each with an appropriate example. [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) Illustrate the waterfall strategy how it is implemented for social media analytics? [CO-2][L-2] **10**

b) List the different analytics platforms used for social media and web analytics? [CO-2][L-1] **10**

Q.4 a) List the different types of charts used in Dashboard. [CO-3][L-1] **12**

b) Elaborate the impact of following terms on Social media analytics.

i) Hot words page.

ii) Reach page. [CO-3][L-5] **8**

PART-B

Q.5 a) Elaborate with a neat diagram the WAP gateway and GGSN support. Why it is required, also explain its role. [CO-4][L-2] **20**

Q.6 a) Discuss the concept of multi-channel campaign optimization? Identify the challenges involved in it? [CO-5][L-4] **10**

b) Explain content categorization. How is it done? [CO-5][L-2] **10**

Q.7 Email marketing has become the backbone of business. Elaborate its need and list the features of email marketing tools. [CO-6][L-1] **20**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

ETHICAL HACKING (BCS-DS-706)

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

No. of pages: 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) Identify the different types of ethical hacking. [CO-1] [L-1]
b) Implement the rules of Engagement in hacking. [CO-1] [L-2]
c) Classify the categories of information security threat. [CO-2] [L-2]
d) Differentiate between DNS spoofing and DHCP spoofing. [CO-3] [L-3]
e) Give four limitations for vulnerability assessment. [CO-3] [L-1]
f) List the phases of Audit frameworks for VAPT. [CO-4] [L-1]
g) Explain countermeasures against IP spoofing. [CO-4] [L-2]
h) State different types of sniffing attacks. [CO-5] [L-1]
i) With respect to web applications, what are injection flaws? [CO-6] [L-1]
j) Explain session management attack. [CO-6] [L-2] **2×10**

PART-A

Q.2
a) Explain the classification of hackers based on the intent of hacking the system? [CO-1] [L-2] **10**
b) Differentiate between hacking and ethical hacking. What are the effects of hacking on business? [CO-1] [L-2] **10**

Q.3 Briefly discuss the information security policies. Explain the structure and contents of security policies. [CO-2] [L-3] **20**

Q.4
a) Explain in detail the concept about vulnerability assessment with Nmap and its features? [CO-3] [L-3] **10**
b) Discuss in detail different types of vulnerability scanning tools. [CO-3] [L-3] **10**

PART-B

Q.5 Discuss how can SQL injection be used for the following:
a) Transfer database to attacker's machine.
b) Interact with the operating system.
c) Interact with the file system.
d) Network reconnaissance. [CO-4][L-3] **5×4**

Q.6
a) Explain black box, grey box and white box penetration testing with help of example. [CO-5][L-2] **10**
b) Explain the different ways to detect sniffing. [CO-5][L-2] **10**

Q.7 Explain in detail the various attacks that can be done at the various layers of web services stack. [CO-6][L-3] **20**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

DEVOPS (BCS-DS-707)

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

No. of pages: 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 the utility of Nagios and Zenoss as a monitoring tool. [CO4] [L4]
b) State the conflict between Developers and IT Operations while developing the software. [CO2] [L2]
c) Differentiate between Maven and Jenkins in Devops. [CO4] [L2]
d) State any two metrics to track CI/CD practices. [CO3] [L2]
e) State any four benefits of CI/CD. [CO2] [L2]
f) Differentiate between centralized version control system and decentralized version control system. [CO4] [L2]
g) State any two functionality of Jenkins Pipeline. [CO4] [L2]
h) Differentiate between descriptive and scripted pipeline. [CO4] [L2]
i) Define a pipeline in coding. [CO4] [L1]
j) Write the steps to send the Email-Notification in Jenkins. [CO4] [L1] **2×10**

PART-A

Q.2 a) Compare and contrast Agile model and Waterfall Model in software development. [CO1][L4] **10**

b) State the 12 principles of Agile model in software development. [CO1][L2] **10**

Q.3 a) Discuss the key components of Devops Lifecycle. [CO3][L2] **10**

b) Differentiate between continuous integration and continuous management Devops. [CO1][L2] **10**

Q.4 a) Differentiate between Git and SVN version control tools in devops. [CO4][L2] **10**

b) Discuss the devops tool used for configuration management. [CO4][L2] **10**

PART-B

Q.5 a) Differentiate between Maven and Ant devops tool. [CO4][L2] **10**

b) Write the steps to build a Java App with Maven. [CO4][L2] **10**

Q.6 a) Write the steps to create a simple pipeline from Jenkins. [CO4] [L2] **10**

b) Discuss the advantages of Jenkins Pipelines. [CO4] [L2] **10**

Q.7 Write the steps to create Jenkins job in XML. [CO4] [L2] **20**

End Semester Examination, Dec. 2023

B. Tech. - Seventh Semester

SIMULATION AND MODELLING (BCS-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 in brief.

a) Explain the random number in reference to a naturally occurring event [CO-1] [L-6]
b) Enumerate the properties of Random Numbers [CO-2] [L-2]
c) Explain the PDF in case of waiting queue for hair stylist. [CO-2] [L-5]
d) Explain the chi-square test of fitness. [CO-3] [L-1]
e) List the properties to be considered in selection of simulation software [CO-4] [L-3]
f) What is muttivariate analysis? [CO-4] [L-1]
g) Explain the tems, system, delay and model in reference to simulation. [CO-2] [L-2]
h) Briefly explain covariance and correlation. [CO-1] [L-1]
i) Explain Linear congruential method for random number generation. [CO-1] [L-2]
j) Briefly explain the advantages of Simulation System. [CO-2] [L-3] **2×10**

PART-A

Q.2 a) In a shopping mall, explain the various behavior shown by people waiting in the queue. [CO-2] [L-5] **10**

b) In a shopping mall, explain the various terms related to inventory management. Explain in details the cost involved. [CO-2] [L-6] **10**

Q.3 a) Explain event scheduling/ time advance algorithms. [CO-3] [L-4] **6**

b) Using which algorithms, generate the snap shot for the following situation. For a single server Queueing system with interarrival and service time details: InterArrivalTime (3,2,6,2,,4,5), ServiceTime (2,5,5,8,4,5). Stop the simulation, when the clock reaches 20. [CO-4] [L-4] **14**

Q.4 a) Explain acceptance-rejection process for poission distribution. Generate 5 poission variates with mean alpha = 0.25, random numbers : 0.073, 0.693, 0.945, 0.739, 0.014, 0.342. [CO-4] [L-3] **10**

b) Explain the Box Mullar transformation for random variates. [CO-5] [L-2] **10**

PART-B

Q.5 a) What do you understand by model verification and validation? Describe briefly, various methods of validating input models. [CO-1] [L-3] **10**

b) Explain the goodness of fit test with the help of an example. [CO-2] [L-3] **10**

Q.6 a) Discuss output analysis for terminating simulation. [CO-3] [L-2] **10**

b) Discuss the output analysis for steady state simulation. [CO-3] [L-3] **10**

Q.7 a) Explain the various terms processes/terms used in simulation of water reservoir system. [CO-5] [L-5] **10**

b) Explain the various terms processes/terms used in simulation of an Auto Pilot System. [CO-5] [L-5] **10**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

ADVANCED COMPUTER NETWORKS (BCS-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 in brief:

a) Distinguish between Token bus and Token ring. [CO-4] [L-2]
b) Differentiate between Flow control and Congestion Control. [CO-4] [L-2]
c) List the cable access technologies in networking. [CO-1] [L-1]
d) State the reason for the need of MAC addresses. [CO-1] [L-1]
e) Discuss FTTH and its uses. [CO-1] [L-2]
f) Illustrate the use of SONET in networking. [CO-1] [L-3]
g) Show the packet format of IPv4 in a diagrammatic representation. [CO-3] [L-3]
h) Explain DHCP and its operation. [CO-5] [L-3]
i) Discuss multicast routing protocol. [CO-6] [L-2]
j) Solve- 197.178.144.208 and represent in binary notation. [CO-2][L-3] **2×10**

PART-A

Q.2 a) Illustrate Dense wavelength division multiplexing and explain the concept of bridge protocols. [CO-1][L-3] **10**

b) Explain in detail fragmentation and ICMP Checksum. [CO-1][L-4] **10**

Q.3 a) Solve the following in binary notations:
i) 197.179.199.102
ii) 201.158.157.20
iii)211.177.169.130
iv)211.138.159.132
v) 203.233.244.115 [CO-2][L-3] **10**

b) Discuss the diagrammatic representation of IPv4 and IPv6 header format with proper explanation. [CO-2][L-4] **10**

Q.4 a) Explain the phases of Mobile IP addressing and also explain the concept of Tunnelingin IP transitioning. [CO-3][L-3] **10**

b) Illustrate the concept of IP transitioning and address space allocation in IPv6. [CO-3] [L-4] **10**

PART-B

Q.5 a) Categorize the flow control techniques and explain it in detail. [CO-4][L-4] **10**

b) Draw the TCP state transition diagram and explain the concept of connection termination. [CO-4][L-4] **10**

Q.6 a) Explain the working of various protocols on World Wide Web. [CO-5][L-4] **10**

b) Discuss the use of following protocols: MIME, POP, SMTP, IMAP and SNMP. [CO-5][L-4] **10**

Q.7 a) Discuss the use and working of Distance vector with the help of an example. [CO-6][L-4] **10**

b) Explain the working of link state algorithm. [CO-6][L-4] **10**

End Semester Examination, Dec. 2023

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 questions:

a) Differentiate between worm and Trojan horse. [CO3][L4]
b) Explain the difference between public and private cryptography. [CO2][L2]
c) Discuss the role of the Pail-Fence technique in cryptography. [CO4][L2]
d) Explain email security with respect to PGP. [CO5][L2]
e) Describe different password management techniques. [CO1][L2]
f) Differentiate between the variants of DES. [CO2][L2]
g) Differentiate between MD5 and SHA algorithm. [CO4][L2]
h) Discuss the role of digital signatures in security. [CO4][L2]
i) Differentiate between SSL and TSL in network security [CO4][L2]
j) Name any two tool that identify risk in an organization. [CO3][L1] **2×10**

PART-A

Q.2 a) Evaluate the cipher text using Caeser Cipher if the plaintext is "How are you" and shift given is 3. [CO1][L5] **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) Using RSA algorithm, if p=3 and q=11, and e=7, evaluate the value of 'd' and 'cipher value ' if plaintext value m=2. [CO2][L5] **10**

Q.4 a) Explain the process of firewall and compare its various types in detail. [CO3][L2] **10**

b) Explain intrusion detection in detail with its types and how it safeguards the system. [CO-3][L-2] **10**

PART-B

Q.5 a) Explain the Authentication system and elaborate its functions and its requirements in detail. [CO4][L2] **10**

b) Name any two hash functions used in digital forensics and illustrate any one with detailed algorithm. [CO4][L3] **10**

Q.6 a) Differentiate between 'lossless and lossy compression techniques'. [CO6][L4] **10**

b) Discuss the two protocols of IPsecurity in detail. . [CO5][L2] **10**

Q.7 Write short notes on the following:

a) Change management.
b) Risk management.
c) SNMP.
d) Infrastructure for network management. [CO6][L2] **5×4**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

DISTRIBUTED OPERATING SYSTEM (BCS-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 in brief:

a) Describe the role of closed and open group communication.
b) Discuss mutual exclusion in distributed operating system.
c) Explain the working of ostrich algorithm.
d) What is release consistency? Compare eager release and lazy release consistency.
e) Explain different goals of MACH. **4×5**

PART-A

Q.2 a) Enumerate the pros and cons of client server model. Discuss the design concept of this model. [CO-1][L-2] **10**

b) What is Asynchronous Transfer Mode (ATM)? Elaborate ATM reference model with functions of each layer. [CO-1][L-2] **10**

Q.3 a) Why need deadlock detection is required? Explain primitives and properties of deadlock detection. [CO-2][L-2] **8**

b) How mutual exclusion in distributed system is handled? Explain its implementation also. [CO-2][L-5] **12**

Q.4 a) What do you mean by fault tolerance? Explain different types of system failure. [CO-3][L-2] **10**

b) Explain different models used to organize processors in a distributed system? [CO-3][L-1] **10**

PART-B

Q.5 a) Describe trends in distributed system. How is implemented semantics of file sharing in distributed file system? [CO-4][L-5] **10**

b) Explain the process of handling how the client cache in distributed file system. [CO-4][L-4] **10**

Q.6 a) What do you mean by page based distributed shared memory? Explain the methods that can improve the performance of shared memory. [CO-5][L-3] **10**

b) Discuss the following issues in context of page-based distributed shared memory:
i) Granularity. ii) Finding the copies. [CO-5][L-3] **10**

Q.7 a) How process management is achieved in MACH? Explain various primitives used by the process management. [CO-6][L-3] **15**

b) Explain memory management in Mach. [CO-6][L-3] **5**

End Semester Examination, Dec. 2023

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
a) Consider a data set consisting of variables with more than 30 percent missing values. How will you deal with them? [CO5][L3]
b) Explain the role of matrices in linear algebra. [CO2][L2]
c) Write command to create DataFrame in R. [CO5][L1]
d) Explain the use of logistic function in logistic regression. [CO4][L3]
e) What are the differences between supervised and unsupervised learning? [CO2][L2]
f) What is hypothesis testing? [CO2][L1]
g) For the given points (1, 3), (2, 5) calculate the Euclidean distance. [CO3,4][L1]
h) Write down the components of optimization problem. [CO2][L1]
i) Why do we need a validation set and test set? What is the difference between them? [CO6][L3]
j) How can we relate standard deviation and variance? [CO4][L3] **2×10**

PART-A

Q.2
a) Discuss in detail Data Science life cycle. [CO1][L2] **10**
b) Write a R program to create a list containing a vector, a matrix and a list and give names to the elements in the list. Access the first and second element of the list. [CO5][L3] **5**
c) Write a R program to sort a given data frame by multiple column(s). [CO1][L2] **5**

Q.3
a) Explain null and alternative hypothesis by considering the example for a flipping coin. [CO2][L3] **10**
b) Given the system of equations check if the system is solvable and find solution.

$$3x - 2y + z = 2$$

$$2x + 3y - z = 5$$

$$x + y + z = 6$$

[CO2][L3] **10**

P. T. O.

[CO2][L4]**10**

Q.4 a) Categorize and Explain optimization on the basis of decision variables. [CO2][L2] **10**

b) Apply multivariate optimization technique to find min/max.

Problem:

$$\min\ x_1 + 2x_2 + 4x_1^2 - x_1x_2 + 2x_2^2$$

[CO2][L3] **10**

PART-B

Q.5 a) Explain correlation and describe the impact of outlier on correlation. [CO4][L3] **10**

b) Consider the following data set

x <- c(-1,0,1,2)

y <- c(0,2,4,5)

Fit the regression and get the slope treating y as the outcome and x as the regressor. [CO4][L3] **10**

Q.6 a) Describe the Parameters of confusion matrix and explain accuracy, precision, recall. [CO4,6] [L3] **10**

b) Write R program to apply logistic regression model and check for goodness of fit. [CO4] [L2] **10**

Q.7 a) Explain the k-means clustering algorithm with its implementation in R. Discuss the advantages and disadvantages of k-means. [CO4,6][L3] **10**

b) Illustrate the working of K-NN and explain why K-NN is Non-parametric Algorithm. [CO4][L2] **10**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

SOFT COMPUTING (BCS-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:

a) Explain the characteristics of an intelligent system. [CO-1][L-2]

b) Differentiate between Hard Computing and Soft Computing. [CO-1][L-2]

c) List out the steps in perceptron learning algorithm for single output class. [CO-4][L-2]

d) Explain various fuzzy propositions with the help of examples. [CO-2][L-2]

e) Explain different methods for fuzzy approximate reasoning. [CO-1][L-2]

f) Differentiate between supervised and unsupervised learning. [CO-2][L-3]

g) Explain the importance of activation function. [CO-2][L-2]

h) Give an example where you must follow Soft computing methods instead of Hard computing. Justify your answer. [CO-1][L-2]

i) With the help of a figure, explain the features of fuzzy membership functions. [CO-2][L-2]

j) Briefly explain population based incremental learning. [CO-2][L-2] **2×10**

PART-A

Q.2 a) What is an expert system? Explain the architecture of an expert system. [CO-1][L-3] **10**

b) Explain the structure of a knowledge based system. [CO-1][L-3] **6**

c) List various knowledge representation techniques with suitable example of each. [CO-3][L-3] **4**

Q.3 a) Explain the importance of fuzzy logic in the design of an expert system. [CO-2][L-2] **6**

b) A(x)={(x1,0.6),(x2,0.3),(x3,0.8),(x4,0.1)}and B(x)={(x1,0.2),(x2,0.5),(x3,0.9),(x4,0.4)}.
Apply intersection, union, difference and complement operations on these fuzzy sets. Represent the output on a graph also. [CO-2][L-3] **8**

c) Find the Cartesian product of the following two fuzzy sets A(x)={(x1,0.2),(x2,0.3),(x3,0.5),(x4,0.5)} B(y)={(y1,0.7),(y2,0.6),(y3,0.3)}. [CO-2][L-3] **6**

Q.4 a) Discuss the applications and usage of fuzzy logic in five consumer products. Illustrate how fuzzy logic is used in these applications? [CO-1][L-5] **8**

b) Explain properties of fuzzy control. [CO-3][L-3] **4**

c) Using inference method, find the membership values of the triangular shapes; isosceles (I), right angled (R), isosceles and right angled (IR), equilateral (E), and other triangles (T); for a triangle with angles 70, 55, and 55. [CO-2][L-6] **8**

PART-B

Q.5 a) Define FIS. Construct a block diagram of FIS. [CO-2][L-4] **8**

b) Explain the methods used for decomposition of compound linguistic rules into simple canonical rules. [CO-3][L-3] **12**

P. T. O.

Q.6 a) Define artificial neural network. Draw its mathematical model. Design Neural network model with inputs [x1, x2, x3]=[0.7, 0.5, 0.4] and the weights [w1,w2,w3]=[0.2, 0.4, -0.2] with bias= 0.35. [CO-4][L-6] **10**

b) Discuss the Back propagation algorithm with the help of suitable example. [CO-4][L-4] **10**

Q.7 a) Compare and contrast traditional algorithm and genetic algorithm. CO-5][L-3] **6**

b) Illustrate the importance of stopping conditions. Describe any three stopping conditions for genetic algorithm flow. [CO-5][L-4] **6**

c) What do you mean by crossover? Explain any three crossover techniques employed in genetic algorithms with the help of examples. [CO-6][L-3] **8**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

ADVANCED GAME PROGRAMMING (BCS-DS-729)

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

No. of pages: 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 a class and a structure with the help of suitable example. [CO1] [L2]

b) Define 'function' and its type. Write and explain a C++ program to find factorial of a given number using function. [CO2][L3]

c) Differentiate between multiple and multilevel inheritance? [CO3][L2]

d) Define 'Rasterization'. Discuss different methods of Rasterization with examples. [CO1][L2]

e) How is sepia filter different from luminance filter? Discuss with help of an example. [CO4][L4] **4×5**

PART-A

Q.2 Discuss De-constructor. What are its characteristics? Write a C++ program to demonstrate the working of constructor. [CO1][L3] **20**

Q.3 Illustrate the following terms of Unity Game programming:

a) Rigid body component.

b) Update and fixed update

c) Adding force to rigid body.

d) Moving camera with the game object. [CO5][L4] **20**

Q.4 Why is game loop important in games? Discuss different how many of game loop models. [CO-3][L-6] **20**

PART-B

Q.5 Discuss the architecture of game engine in detail with the help of an example and also discuss the benefits and drawback of it. [CO4][L2] **20**

Q.6 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-6] **20**

Q.7 Discuss the use of homogenous coordinate system in Transformations and also explain how many Rigid Body Class methods in detail. [CO6][L1] **20**

End Semester Examination, Dec. 2023

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
a) Discuss the function of YARN.
b) Explain concept of array in Jaql.
c) Differentiate between name node and data node.
d) Explain Stream processing language.
e) Name any two-query languages for Hadoop.
f) Explain different types of operators in Pig.
g) Explain the steps to load data into HDFS.
h) Explain the need of big data.
i) List the reason of preprocessing before analyzing.
j) How does one decide the right BDA solutions? **2×10**

PART-A

Q.2
a) Discuss the functions of each of the five layers in Big Data architecture design. [CO-1][L-1] **5**
b) Define big data and discuss the benefits of big data. Explain the characteristics of big data in detail. [CO-1][L-2] **15**

Q.3 Explain the complete building block of Hadoop. Draw the diagram and explain each block separately and the flow diagram of the building block of Hadoop. [CO-2][L-2] **20**

Q.4
a) Explain following operators of Jaql.
i) Joining ii) Filtering. iii) Union iv) Group v) Top [CO-3][L-2] **10**
b) Discuss the pig Latin data types and examples. [CO-4][L-1] **10**

PART-B

Q.5
a) Elaborate various big data access technologies for reporting and analysis. [CO-5][L-2] **10**
b) Explain Hadoop architecture in detail with diagram. [CO-2][L-2] **10**

Q.6
a) Explain the Counting distinct elements in a stream with example. [CO-6][L-2] **10**
b) Write short note on "Finding most popular elements using decaying window". [CO-5][L-2] **10**

Q.7 Write short notes on:
a) Adapters and Toolkits.
b) Lists, Sets, and Maps. [CO-6][L-3] **10×2**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

INTRODUCTION TO IOT (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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Mention the various challenges faced in implementation of Internet of Things. [CO-1][L-1]

b) Discuss the how many peripherals/components associated with a sensor node? [CO-3][L-2]

c) Compare the characteristics of M2M and IoT. [CO-2][L-3]

d) Mention the various hardware devices used in M2M communication. [CO-3][L-2]

e) Explain the role of IEEE802.15.4 and ZigBee. [CO-1][L-3]

f) Explain the function of MQTT & CoAP. [CO-2][L-1]

g) What do you understand by WSN Coverage? [CO-3][L-1]

h) Enlist which IoT protocol stack is used for IoT communication? [CO-4][L-2]

i) Discuss the principles of secure IoT communication. [CO-5][L-2]

j) Discuss the various connected vehicles. [CO- 6][L-2] **2×10**

PART-A

Q.2 a) Explain the process of IoT application development with suitable diagram. [CO-3][L-2] **10**

b) Discuss the functionality of Wireless Sensor Networks in detail. [CO-1][L-2] **10**

Q.3 a) Define the IoT Systems and Networks. [CO-2][L-2] **10**

b) Summarize Hardware and Software design components of IoT system with help of a diagram. [CO-2][L-2] **10**

Q.4 a) Write a short note on 'how many various connectivity technologies'? [CO-3][L-1] **10**

b) Compare IoT Enabling Technologies. Name out the technologies. [CO-1][L-4] **10**

PART-B

Q.5 a) Explain different software platforms available for IOT applications. [CO-4][L-2] **10**

b) Describe component based IoT reference Model. [CO-4][L-2] **10**

Q.6 a) Discuss security requirements of IoT communications. [CO-5][L-2] **10**

b) Explain various challenges in IoT implementation. [CO-5][L-2] **10**

Q.7 a) Write short notes on following

i) Tagging and Tracking for Healthcare applications.

ii) Connected Vehicles for IoT Communication. [CO-6][L-1] **5×2**

b) Identify various Asset Management in IoT connectivity. [CO-6][L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. - Seventh Semester

IT NETWORK SECURITY (BCS-DS-733)

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

No. of pages: 1

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

Q.1
a) Differentiate between bus, ring, star and mesh topologies. [CO-1][L-3]
b) Explain Frame Relay and Frame Relay Virtual Circuits in detail. [CO-3][L-2]
c) Explain RAID. What are the advantages of RAID? [CO-4][L2]
d) Compare IDS vs IPS with help of an example. [CO-2][L2]
e) What is AAL Protocol.List the functions of AAL layer. [CO-2][L-2] **4×5**

PART-A

Q.2 What is a LAN Technology? How different LAN technologies are implemented? Differentiate between LAN and private VLAN. [CO-1][L-2] **20**

Q.3 Write short notes on:
a) PPP
b) NIS
c) NFS
d) Dynamic host configuration protocol. [CO-2][L-2] **5×4**

Q.4
a) Differentiate between router and gateway with their importance in a network in detail. [CO3][L-2] **10**
b) Explain remote access security management network. How is it implemented? List the tools that are used to implement the same. [CO3][L-1] **10**

PART-B

Q.5
a) Explain remote access and telecommuting techniques with a detailed architecture. [CO- 4] [L-2] **10**
b) Create a network supporting flow based QOS using ISDN. What type of flow specifications need to define? Explain RSVP protocol. [CO4][L-6] **10**

Q.6 Explain Sun Net Manager. Give benefits of Sun Net Manager, with capabilities of Sun Net Manager tool. [CO-5][L-2] **20**

Q.7 Penetration testing is the best chosen practice to test a network. What could be the deliverable of the process? Elaborate your views for the same. Discuss any two techniques to implement penetration testing. [CO6] [L-5] **20**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

COMPUTER NETWORK AND COMMUNICATION (BCS-ID-004)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a) Differentiate between digital and analog signals.
b) What are the four fundamental components required for effective data communication system?
c) State the difference between a unicast, multicast and broadcast transmission.
d) How do guided media differ from unguided media?
e) Name any four basic network topologies and cite an advantage of each.
f) What do you mean by switching?
g) Which layer in TCP/IP protocol suite performs the job of IP addressing? Name IP address classes.
h) What do you mean by framing?
i) What is the purpose of hamming code?
j) Name some services provided by application layer in the TCP/IP reference model.

2×10

PART-A

Q.2 a) Define Networks. Discuss in details about Network Criterion and its Physical structure. [CO-1][L-1] **10**

b) List the various transmission modes used for data transmission. Highlight the difference by taking suitable examples of each. [CO-2][L-2] **10**

Q.3 a) Code the data segment "1100111100101010" using below stated encoding schemes:

i) NRZ-L ii) NRZ-I
iii) Bi-Phase Manchester iv) Differential Manchester [CO-2][L-6] **10**

b) Compare and contrast the twisted pair, coaxial cable and optical fibre transmission medium. [CO-5][L-5] **10**

Q.4 a) Discuss in details using suitable examples:

i) Packet switched network.
ii) Frequency division multiplexing [CO-1][L-2] **10**

b) Calculate the representation of 8 bit 11001010 code into its equivalent odd parity Hamming code. [CO-4][L-6] **10**

PART-B

Q.5 a) Explain the frame format used for UDP. State the difference between TCP and UDP. [CO-3][L-2] **10**

b) Illustrate how RARP protocol requests Internet Protocol address (IPv4) from the gateway-router's ARP table. [CO-3][L-4] **10**

Q.6 a) State the significance of Routing. Differentiate between static routing and dynamic routing schemes. [CO-6][L-2] **10**

b) What is the use of OSPF? State its limitations. [CO-3][L-1] **10**

Q.7 Write short notes on:

a) Network Performance management.
b) QoS.
c) Proxy servers.
d) Firewalls and its applications. [CO-1][L-1] **5×4**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) What is a node in the network? [CO-3][L-2]
b) Explain the need of IP address. [CO-2][L-2]
c) Briefly discuss data leakage. [CO-4][L-1]
d) "Malwares are bad for the PC". Justify. [CO-3][L-2]
e) Briefly discuss Ransomeware attack. [CO-2][L-2]
f) State your thought about sensitive information and how to protect it? [CO-1][L-3]
g) What is SQL injection? [CO-3][L-2]
h) What are the evidence can be found in the browser? [CO-2][L-2]
i) In your opinion legal protection from cyber crimes are needed or not. Justify. [CO-1][L-3]
j) What is traceroute? Mention its two uses. [CO-1][L-3] **2×10**

PART-A

Q.2 a) Discuss the different types of cyber attacks. [CO- 1] [L-2] **10**
b) What is URL? Explain the role of URLs [CO- 2] [L-1] **10**

Q.3 a) Discuss the general architecture of internet. [CO- 2] [L-1] **10**
b) Write short notes on hacker, attack, virus, firewall, and vulnerability. [CO3][L1] **10**

Q.4 a) Discuss protection internet frauds, phishing, cyber stalking. [CO-3][L-1] **10**
b) Explain all secure setting of a browser and their working. [CO-2] [L-2] **10**

PART-B

Q.5 a) Write short notes on logic bomb, phishing, social engineering, back door, man in the middle. [CO-5][L-2] **10**
b) Discuss cross side scripting with example. [CO-5][L-3] **10**

Q.6 What are scanning attacks? Explain active and passive scanning with example. [CO-1][L-3] **20**

Q.7 a) Draft general guidelines of Cyber crimes and Forensics in details. [CO-1][L-2] **10**
b) Describe in details about finding evidence in various places in a computer. [CO-3][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

IOT DESIGN WITH ARDUINO (BEC-DS-201)

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

No. of pages: 1

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

Q.1
a) What is the use of setup( ) and loop( ) functions in an Arduino program? [CO-2][L-2]
b) Write a program to blink onboard LED of Arduino Uno board every 2.5 sec. [CO-3][L-3]
c) What is baud rate? [CO-1][L-1]
d) What is the significance of analogRead( ) function? [CO-2][L-2]
e) What is I2C protocol? [CO-4][L-3]
f) What is the advantage of using Servo motor over DC motor? [CO-5][L-3]
g) What is relay? How relay can be used to control AC appliance using Arduino board? [CO-5][L-3]
h) List various services that are 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

Q.2
a) Differentiate between Arduino Uno and Arduino Nano boards with respect to technical specifications. [CO-1][L-3] **10**
b) What is a microcontroller? List various salient features of ATMEGA328p microcontroller that is used in Arduino Uno board. [CO-1][L-2] **10**

Q.3
a) What are sensors? Explain different types of sensors that are widely used in IoT system. [CO-2][L-2] **10**
b) Explain different networking options that are available for implementing IoT system. [CO-2][L-2] **10**

Q.4
a) Write a program to compliment the state of pin 13 every time a data byte is received serially. [CO-3][L-3] **10**
b) Write a program to control the brightness of LED connected to pin 9 as per the following situation:
If 'A' is received serially, then LED will glow with full brightness.
If 'B' is received serially, then LED will glow with mid brightness level.
If 'C' is received serially, then LED will glow with very less brightness level.
[CO-3][L-4] **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. [CO-5][L-3] **10**
b) Home Automation. [CO-5][L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. - Third Semester

ELECTRONIC DEVICES (BEC-DS-301)

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

No. of pages: 2

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

Q.1 Answer the following in brief:

a) Differentiate between intrinsic and extrinsic semiconductors with energy band diagram. [CO1][L-3]

b) Evaluate mobility in electron moving at velocity of 73m/s in intrinsic germanium bar of length 6cm having potential difference of 12V. [CO1][L-2]

c) The reverse bias saturation current for PN junction diode is 1μA at 300k. Determine its ac resistance at 150mV forward bias. [CO2][L-3]

d) Compare series and shunt configuration of voltage regulator. [CO5][L-4]

e) Describe switching time of PN diode. [CO2][L-2]

f) Justify why one terminal of transistor is made common between input and output. [CO3][L-6]

g) Derive an expression for stability factor. [CO3][L-6]

h) State FET application as VVR. [CO4][L-2]

i) Describe region of operations of JFET. [CO4][L-5]

j) Draw block diagram of regulated power supply. [CO5][L-5] **2×10**

PART-A

Q.2 a) Given an intrinsic semiconductor specimen, state two physical processes for increasing its conductivity. Explain briefly. [CO1][L-4] **8**

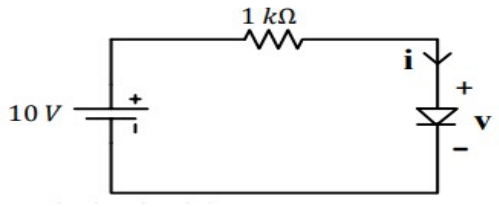
b) Restate and derive Hall effect. Also write its application. [CO1][L-4] **6**

c) How many free electrons are present in bar of extrinsic germanium of measuring 4mm x50mm x 1.5mm if intrinsic concentration is 2.4 x 1019 per m3 and extrinsic hole density is 7.85 x 1014 per m3. Assume all donor atoms are ionized. [CO1][L-4] **6**

Q.3 a) Demonstrate functioning of P-N junction diode under forward and reverse bias conditions and draw its V-I characteristics. Also differentiate its characteristic with Tunnel diode. [CO2] [L-2,3] **10**

b) Draw I-V characteristics of the given circuit (Figure 1). The current in the circuit is also given:

$$i = \begin{cases} \frac{v - 0.7}{500} A, & v \geq 0.7\ V \\ 0A, & v \geq 0.7\ V \end{cases}$$



[CO2] [L-5] **10**

Figure. 1

P.T.O.

Q.4 a) Derive an expression for the efficiency and ripple factor of full wave rectifier. [CO2][L-5] **8**

b) Draw output wave form for circuit shown in figure.2. If the peak value of a.c. input is 18V, show all voltage levels in the output. [CO2][L-5] **6**

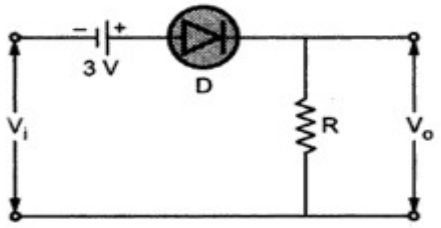


Figure. 2

c) For the circuit with ideal diodes shown in the figure-3, draw output (V_{out}) for the given sine wave input (V_i). [CO3][L-4] **6**

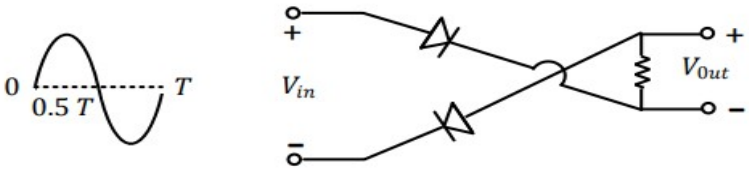


Figure. 3

PART-B

Q.5 a) Describe input and output characteristics of common emitter configuration of BJT. Also explain steps to draw load line. [CO4][L-2] **12**

b) Evaluate the bias resistor R_B for fixed bias and collector to base bias and compare the stability factor for both of them. Given that, V_{cc} =12V, RL=330ohm, IB= 0.3mA, β= 100 and V_{CEQ}=6V. [CO4][L-5] **8**

Q.6 a) Describe in details construction, drain and transfer characteristics of n-channel JFET. Also sketch transfer curve defined by I_{DSS} =10mA and Vp = - 4V. [CO4][L-5] **10**

b) Derive expression for drain current of n-channel JFET. [CO4][L-5] **10**

Q.7 a) Tabulate difference between series and shunt regulated power supply. [CO5][L-4] **10**

b) Refer to the given figure-4. If the zener diode had a rating of 1.7 V, the output voltage would be [CO5][L-5] **10**

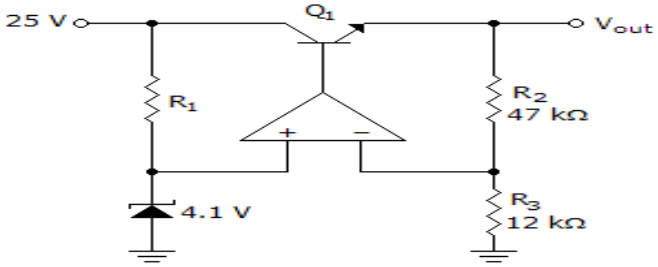


Figure. 4

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

ELECTRONIC DEVICES (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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Why quantum theory is preferred over classical theory of physics? [CO1][L-2]

b) Explain reason of selecting Silicon over Germanium. [CO1][L-2]

c) Justify the difference between energy band diagram and E-K diagram. [CO2][L-4]

d) Define dark current in photodiode. [CO2][L-1]

e) The pinch off voltage for a n – channel JFET is 4 V, when V_{GS} = 2 V, the pinch – off occurs for V_{DS} equal to _____. [CO3][L-4]

f) Find the temperature at which a diode current is 2mA for a diode which has reverse saturation current of 10^{-9} A. The ideality factor is 1.4 and the applied voltage is 0.6V in forward bias. [CO2][L-3]

g) In a common base connection, the emitter current is 1mA. If the emitter circuit is open, the collector current is 50 μA. Find the total collector current. Given that α=0.90. [CO2][L-3]

h) Differentiate between bipolar junction transistor over field effect transistor. [CO3][L-2]

i) Draw h-Parameter model of transistor. [CO4][L-2]

j) Draw the pin configuration for 3 terminals. [CO4][L-2] **2×10**

PART-A

Q.2 a) Explain E-K diagram with suitable energy band diagram. [CO1][L-4] **7**

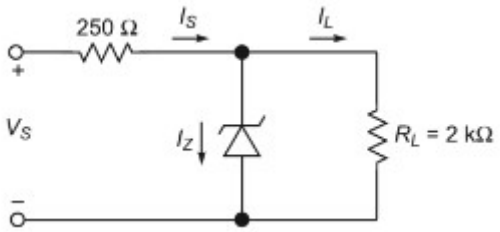
b) Explain physically the meaning of the following statement: An electron and a hole recombine and disappear. [CO1][L-2] **7**

c) Evaluate the number of free electron and drift velocity of electron in n-type silicon wafer of length 4cm and cross section area of $10mm^2$. If the bar having potential difference of 1V across the cross section area and current across the wafer is 5mA. [CO1][L-3] **6**

Q.3 a) Derive PN diode current equation. [CO1][L-3] **8**

b) Explain V-I characteristics of Tunnel diode. [CO1][L-2] **6**

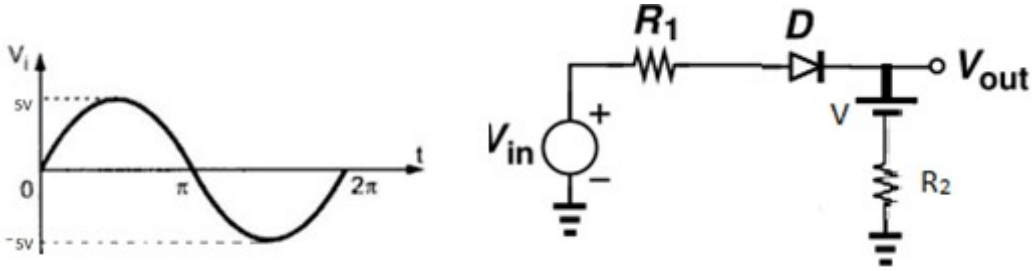
c) For the Zener regulator circuit shown in figure below, determine the range of input voltage to Zener to remain in ON state. [CO1][L-3] **6**



P. T. O.

Q.4 a) Evaluate the efficiency and ripple factor of full wave rectifier. [CO1][L-4] **10**

b) In the following clipper circuit resistance R1 and R2 is 1k. Voltage V is 1V. Cut-in voltage of diode is 0.7V. Sketch the output of the system if V_{in} is the signal given below? (Use constant voltage drop model for diode).



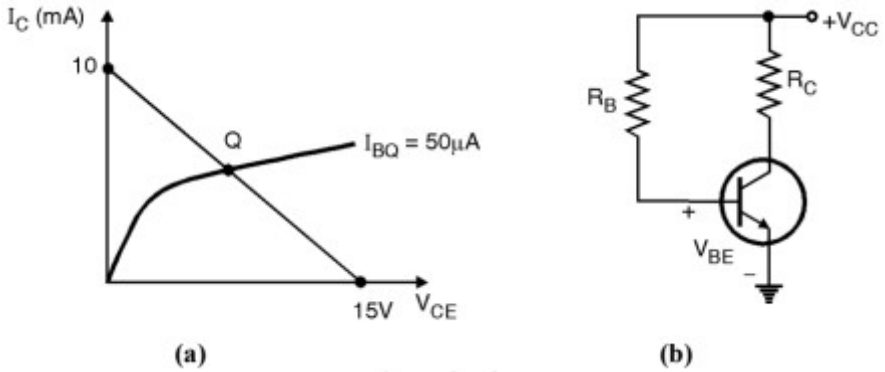
[CO1][L-4] **10**

Figure:1

PART-B

Q.5 a) Describe Input & Output characteristics of CommonBase configuration of BJT. [CO2][L-2] **10**

b) For the device characteristics shown in figure (a) calculate V_{CC}, R_B and R_C for the fixed bias circuit of figure.4 a and b. [CO2][L-5]**10**



Q.6 a) Figure 5 shows the transfer characteristic curve of a JFET. Write the equation for drain current.

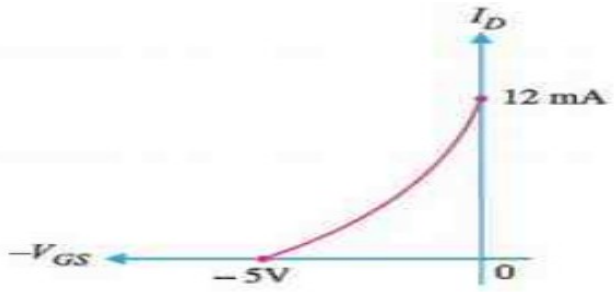


Figure 5 [CO3][L-5] **10**

b) Tabulate difference between enhancement mode MOSFET and Depletion mode MOSFET. [CO3][L-4] **10**

Q.7 a) Design a regulated power supply using a full wave bridge rectifier using diode 1N4007, capacitor filter (C_{in} =25 μF and C_{out}= 10μF) , IC regulator to provide an output of +5 V. [CO4][L-5] **10**

b) Explain transistor series feedback voltage regulator. [CO4][L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

DIGITAL ELECTRONICS (BEC-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**. Marks are indicated against each question.*

Q.1 a) Prove that $AB + BC + \overline{B}C = AB + C$. [CO-1] [L6]

b) State De-Morgan's theorem. [CO-2] [L1]

c) Identify the difference between bipolar and unipolar logic family with example. [CO-4] [L2]

d) Differentiate between combinational and sequential circuits with example. [CO-3][L2]

e) What are the advantages of digital signal over analog signal? [CO-1][L1]

f) What is the requirement of A/D and D/A converters? [CO-4][L1]

g) Find the 9's compliment of decimal number 146. [CO-1][L1]

h) Convert [543]10 into its Excess-3 code. [CO-1][L1]

i) What is the difference between toggling and race around condition? How race around condition is avoided? [CO-2][L2]

j) Justify necessity of Flip-Flop over Latch. [CO-2][L2] **2×10**

PART-A

Q.2 a) Convert the numbers into desired base:

i) $(7.FD6)_16 = (\ )_8$

ii) $(345)_8 = (\ )_{10}$

iii) $(101.01)_2 = (\ )_{10}$

iv) $(7864)_{10} = (\ )_{16}$

v) $(53.625)_{10} = (\ )_2$ [CO-1][L-3] **2×5**

b) Implement all logic gates by using only NOR and NAND gates. [CO-1][L-2] **10**

Q.3 a) Simplify the expression Y=∑m(7,9,10,11,12,13,14,15), using k-map method and realize the expression using logic gates. [CO-2][L-6] **10**

b) Prove that

i) $(A + B)(\overline{AC} + C)\overline{(\overline{B} + AC)} = \overline{A}B$

ii) $\overline{ABC} + \overline{AB}C + \overline{A}B\overline{C} + \overline{A}BC + A\overline{BC} = \overline{A} + \overline{B + C}$ [CO-2][L-6] **5×2**

Q.4 a) Design and realize circuit of full adder using half adder. [CO-2][L-6] **10**

b) Demonstrate the working of encoder and decoder. [CO-2][L-3] **10**

PART-B

Q.5 a) Classify different types of Flip-flops along with their excitation tables. [CO-2][L-4] **10**

b) What do you mean by counter? Summarize various types of counters in detail. [CO-2][L-5] **10**

Q.6 a) Draw and explain R-2R ladder digital to analog converter. [CO-3][L-2] **10**

b) Illustrate the working of single slope analog to digital converter. [CO-3][L-3] **10**

Q.7 a) Analyze the various characteristics if digital ICs. [CO-4][L-4] **8**

b) Discuss the working of ECL (Emiiter-Coupled logic) family in detail. [CO-4][L-2] **12**

End Semester Examination, Dec. 2023

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 in brief:

a) State Parseval's theorem for continuous-time Fourier series.
b) Define frequency response (or) transfer function of the discrete-time system.
c) What are the properties of convolution in discrete-time system?
d) Define causal LTI continuous-time system.
e) What is the classification of the system based on the unit sample response?
f) With regards to the Fourier series representation, justify the statement: Odd functions have only sine terms.
g) Write short note on the Dirichlet conditions, which are useful to the Fourier transform
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? **2×10**

PART-A

Q.2 a) Solve the following differential equation:

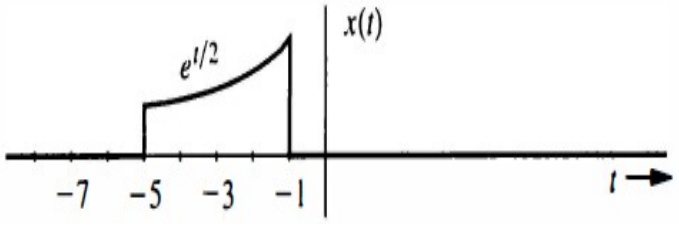
$$y(t)+3\frac{dy(t)}{dt}+2\frac{d^2y(t)}{dt^2}=1$$

for $t\geq 0$ assuming the initial conditions $y(0)=1 \wedge \left.\frac{dy(t)}{dt}\right|_{t=0}=2$ [CO-1][L-3] **10**

Express the solution in closed form.

b) Show that a system with the input *x(t)* and the output *y(t)* related by *y(t)* = Re{*x(t)*}satisfies the additivity property but violates the homogeneity property. Hence, such a system is not linear. [CO-1][L-3] **5**

c) For the signal *x(t)* illustrated in figure, sketch *x(-t)*, which is time-reversed: [CO-1][L-2] **5**



Q.3 a) Consider an LTI system S and a signal $x(t)=2e^{-3t}u(t-1)$. If

$$x(t)\rightarrow y\frac{(t)\wedge dx(t)}{dt}\rightarrow -3y(t)+e^{-2t}u(t)$$

Then determine the impulse response h(t) of S. [CO-2][L-2] **10**

b) Determine and sketch the convolution of the following two signals:

$$x(t)=\begin{cases}1, -1<t<1\\ 0, elsewhere\end{cases} \wedge h(t)=\delta(t+1)+2\delta(t+2)$$

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

P. T. O.

c) Suppose that the unit impulse response of LTI system is a unit ramp.

$$h(n)=r(n)=nu(n)$$

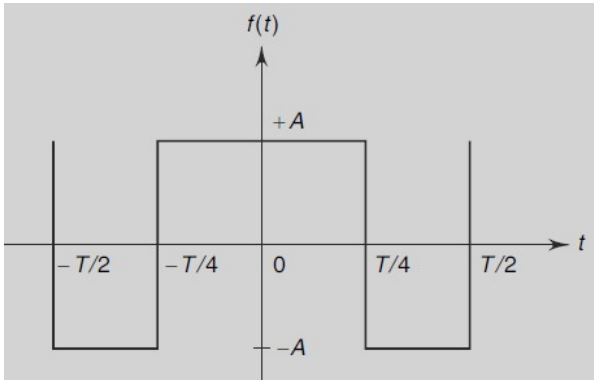
Compute the response of this system to a unit step input $x(n)=u(n)$.

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

Q.4 a) Show that a signal x(t) that satisfies half-wave symmetry contains Fourier coefficients with odd harmonics only. [CO-3][L-5] **5**

b) Obtain the Fourier components of the periodic square wave signal which is symmetrical with respect to the vertical axis attime t = 0, as shown in the figure.

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



c) Derive the cosine fourier series (polar fourier series) from exponential fourier series representation and hence prove that $A_n=2|C_n|$. [CO-3][L-3] **10**

PART-B

Q.5 a) Find the average power of the signal:

$$x(t)=2\sin^2(2500\pi t)\cos(20000\pi t)$$

If this signal is transmitted through a telephone system which blocks dc and frequencies above 12 kHz, compute the ration of received power to the transmitted power. [CO-4][L-3] **5**

b) Find the Fourier transform of the following:

(i) $x(t)=e^{-at}u(t)$

(ii) $x(t)=e^{-|t|}$ [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) Consider the discrete-time LTI system with impulse response$h(n)=\left(\frac{1}{2}\right)^n u(n)$. Use Fourier transform to determine the response of the system to the input

$$x(n)=\left(\frac{3}{4}\right)^n u(n)$$

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

Q.7 a) Determine the Laplace transform of:

$$x(t)=e^{-2t}u(t)-e^{-3t}u(t)$$

and depict the ROC and locations of poles and zeros in the s-plane. [CO-3][L-3] **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. 2023

B. Tech. - Third Semester

ANALOG ELECTRONIC (BEC-DS-321)

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

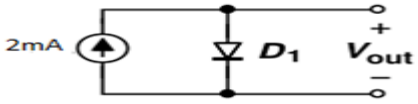
No. of pages: 2

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

Q.1
a) Derive expression for I_{rms} of full wave rectifier. [CO1][L-2]
b) Derive expression for stability factor of transistor. [CO1][L-3]
c) Describe switching time of PN junction diode. [CO1][L-1]
d) Draw h- parameters model of transistor. [CO2][L-3]
e) The pinch off voltage for a n – channel JFET is 20 V, when VGS = 2 V, the pinch – off occurs for VDS equal to_____. [CO3][L-3]
f) Tabulate differences between BJT and FET. [CO3][L-2]
g) Define cross over distortion. [CO][L-1]
h) Draw circuit diagram for operational amplifier as voltage follower. [CO5][L-2]
i) State various coupling technique of amplifier. [CO4][L-1]
j) Derive expression for gain of non- inverting configuration of Op-Amp. [CO5][L-3] **2×10**

PART-A

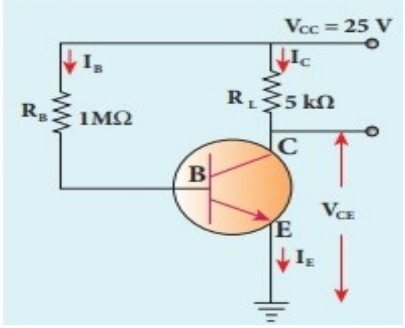
Q.2 a) Find voltage V_{OUT} if the reverse saturation current of the diode is 1.1×10^{-8}A, the cut-in voltage of diode is 0.6V and assume the temperature as 25°C. [CO1][L-4] **10**



b) Derive PN diode current equation. [CO1][L-3] **10**

Q.3 a) Describe Input and Output characteristics of Common Emitter configuration of BJT. [CO2][L-2,4] **10**

b) The current gain of a common emitter transistor circuit shown in figure is 120. Draw the dc load line and mark the Q point on it. (V_{BE} to be ignored). [CO2][L-4] **10**



P.T.O.

Q.4 a) The device parameters for an n-Channel JFET are: Maximum current I_{DSS} = 10mA, Pinch off voltage, Vp = - 4V Calculate the drain current for (a) V_{GS} = 0 (b) V_{GS} = - 1.0v (c) V_{GS} = - 4V. [CO3][L-4] **10**

b) Derive expression for drain current of p- channel JFET. [CO3][L-5] **10**

OR

b) Tabulate differences between enhancement mode MOSFET and depletion mode MOSFET. [CO3][L-4] **10**

PART-B

Q.5 a) Design and evaluate Z_{in}, Zo and A for two stage RC coupled amplifier (where C_b=20μF, R_1=5KΩ, R_2=50KΩ, R_c =1K Ω, R_e=520Ω, C_e=50μF, h_{ie}=1.1KΩ & h_{fe}=100. [CO4][L-6] **12**

b) Reanalyze DC analysis of dual input balanced output differential amplifier configuration. [CO4][L-5] **8**

Q.6 a) Derive expression for efficiency of class-B power amplifier. [CO4][L-5] **10**

b) Draw block diagram of Operational Amplifier. Also state its ideal characteristics. [CO4] [L-5] **10**

Q.7 a) Draw input and output wave form for input function applied to operational amplifier as Integrator. (Given Vswing = ±15V)
V_{in}= + 30 for 0 ≤t≤5s
V_{in}= - 30 for 5s≤t≤ 10s
Assume time constant to be unity. [CO5][L-4] **10**

b) Explain comparator for inverting configuration of Op-Amp. Also explain how it is different from Schmitt Trigger. [CO4][L-3] **10**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 a) State and prove DeMorgan's theorem. [CO-1][L-2]

b) Compare Analog and Digital signals? [CO-1][L-2]

c) Write the gray code and BCD code for $(29)_{10}$ [CO-2][L-1]

d) Convert the following hexadecimal number $(B6.2D)_{16}$ into its equivalent :
i) Binary ii) Decimal iii) Octal number [CO-2][L-1]

e) Discuss with an example showing positive and negative logic systems. [CO-2][L-2]

f) Design OR gate using NOR gate. [CO-2][L-6]

g) List the applications of Multiplexer. [CO-2][L-2]

h) Design half sub tractor circuit using ROM. [CO-2][L-6]

i) Define resolution (step size) and % resolution of a D/A converter. [CO-4][L-1]

j) Convert the following into min terms: [CO-2][L-4]
i) A'B'C+ A'B+BCD
ii) ABC+ D'C' **2×10**

PART-A

Q.2 a) Perform the following subtraction using 2's complement: [CO-2][L-3] **7**
i) $(38)_{10}$ - $(14)_{10}$
ii) $(29)_{10}$ - $(37)_{10}$

b) The seven bit hamming code is received as 1101100. Assume that even parity has been used, check whether it is correct or not. If not, find the correct code? [CO-2] [L-2] **7**

c) Write the Excess -3, BCD and Gray code for the following decimal numbers.
i) 29 ii) 57 [CO-2][L-3] **6**

Q.3 a) Minimize the following function using K-map & QM method: [CO-2][L-4]
F(A,B,C,D)= ∑m (0,2,4,6,8,10)+ d(1,12,14) **10**

b) Design 3- bit gray to binary code converter using gates. [CO-2] [L-6] **10**

Q.4 a) Do the following conversions:
i) JK to SR ii) T to D [CO-2][L-6] **10**

b) Design and explain the working of SR flip flop. [CO-2][L-6] **10**

PART-B

Q.5 a) Design MOD-5 synchronous counters using D Flip Flop. [CO-3][L-6] **6**

b) Draw and explain the working of Ring counter with its timing diagram? [CO-3][L-2] **10**

c) Design and explain the working of 4- bit PIPO shift register? [CO-3][L-5] **4**

Q.6 a) Mention different specifications of DAC converter? [CO-4][L-2] **8**

b) Design and explain the working of weighted resistor type digital to analog converter? [CO-4][L-6] **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 NOR and EXNOR gates by using CMOS technology. [CO-5][L-6] **10**

End Semester Examination, Dec. 2023

B. Tech - Fifth Semester

ARTIFICIAL INTELLIGENCE (BEC-DS-406)

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

No. of Pages: 1

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

Q.1 Answer the following in brief:

a) What are the academic disciplines related to AI? [CO-1][L-1]
b) Mention two essential properties of search algorithms. [CO-1][L-1]
c) Give two points of difference between supervised learning and unsupervised learning. [CO-4][L-2]
d) What is deep learning? [CO-1][L-1]
e) What are intelligent Agents, and how are they used in AI? [CO-2][L-1]
f) What are neural networks, and how do they relate to AI? [CO-5][L-1]
g) What role does computer vision play in AI? [CO-5][L-1]
h) What is a Chatbot? [CO-2][L-1]
i) What are the programming languages used for artificial intelligence? [CO-1][L-1]
j) What is game theory? [CO-1][L-1] **2×10**

PART-A

Q.2 a) What do you mean by AI? Explain contribution of AI in various fields. [CO-1][L-1] **12**

b) What do you mean by task environment? Explain the PEAS description of the task environment of an Automated Taxi. [CO-1][L-1] **8**

Q.3 a) Explain A* algorithm in detail with a suitable example. [CO-2][L-2] **10**

b) What is alpha-beta pruning? Explain in detail. [CO-2][L-2] **10**

Q.4 a) Explain hidden Markov model in detail. [CO-3][L-1] **10**

b) Define conditional probability and explain Bayes rule in detail. [CO-3][L-1] **10**

PART-B

Q.5 a) What are the different types of machine learning? [CO-4][L-1] **10**

b) Write a detailed note on naïve bayes linear model. [CO-4][L-1] **10**

Q.6 a) Discuss different applications of artificial intelligence. [CO-1][L-1] **10**

b) What is NLTK? How is it different from spacy? [CO-3][L-1] **10**

Q.7 Write short notes on the following:

a) Expert systems. [CO-5][L-1]
b) K-Means clustering. [CO-4][L-1] **10×2**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

DIGITAL SIGNAL PROCESSING AND ITS APPICATIONS (BEC-DS-501/BEC-DS-501A)

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) Write the expressions for even and odd parts of a signal. [CO-1] [L-1]

b) Define ROC. [CO-2] [L-1]

c) What do you understand by discrete time system? [CO-2] [L-1]

d) Define 'z-transform'. [CO-2] [L-1]

e) Define 'transfer function of a discrete time system'. [CO-2] [L-1]

f) Write scaling and time shifting properties of DFT. [CO-3] [L-1]

g) Write the differences between IIR and FIR filters. [CO-4] [L-1]

h) List main characteristics of Butterworth filter. [CO-4] [L-1]

i) Enlist four applications of DSP. [CO-5] [L-1]

j) What do you understand by multi-rating DSP? [CO-5] [L-1] **2×10**

PART-A

Q.2 a) Use a four-point DFT and IDFT to determine the circular convolution of the following sequences:

$x_1(n) = \{1, 2, 3, 1\}$

$x_2(n) = \{4, 3, 2, 2\}$ [CO-3][L-4] **10**

b) Explain the following:

i) Properties of LTI system.

ii) FFT algorithms.

iii) Linear convolution.

iv) Inverse DFT. [CO-3][L-2] **10**

Q.3 a) Find out 8-point DFT of the following sequence using DIT-FFT algorithm:

$x(n) = (-1, 0, 2, 0, -4, 0, 2, 0)$ [CO-3][L-4] **10**

b) State and prove the all properties of DTFT. [CO-3][L-3] **10**

Q.4 a) Find the inverse z- transform of $x(z) = \frac{z(z-1)}{(z+1)(z+2)(z+3)}$, ROC $|z|>3$ [CO-2][L2] **10**

[CO-2] [L-4] 1**0**

b) Derive the relationship between Z – transform and DTFT. [CO-2][L2] **10**

P. T. O.

PART-B

Q.5 Write short notes on:

a) Frequency response of linear phase FIR filters.
b) Rectangular window.
c) Methods of designing IIR filters.
d) Chebyshev filters. [CO-4][L2] **5×4**

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

Q.6 A Low pass filter is to be design with the following desired frequency response:

$$H_d(e^{j\omega}) = \begin{cases} e^{-j2\omega}, & \frac{-\pi}{4} \le \omega \le \frac{\pi}{4} \\ 0, & \frac{\pi}{4} \le \vee\omega\vee \le \pi \end{cases}$$

Determine the filter coefficients h(n) if the window function is defined as:

$$W(n) = \begin{cases} 1, & 0 \le n \le 4 \\ 0, & \text{Otherwise} \end{cases}$$

Also determine the frequency response $H(e^{j\omega})$ of the designed filter. [CO-4][L-5] **20**

Q.7 a) Explain DSP processor with types, architecture and its advantages. [CO-5][L-3] **10**
b) Explain the application of DSP in Biomedical Engineering. [CO-5][L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

ANTENNAS (BEC-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 in brief:

a) If the electric field strength of a plane wave is 4V/m, evaluate the strength of magnetic field in space. [CO-1][L-5]

b) Solve directivity of isotropic antenna. [CO-2][L-5]

c) Describe vector potential and its need with suitable flow diagram. [CO-1][L-2]

d) Identify characteristics of Broadband array. [CO-3][L-3]

e) Distinguish between "directional" and "Omni directional". [CO-2][L-4]

f) Identify needs of frequency independent antenna. [CO-3][L-3]

g) Define principle of multiplication pattern of array. [CO-3][L-2]

h) Describe challenges in microstrip antenna design. [CO-5][L-2]

i) State terms which impact wave propagation. [CO-4][L-1]

j) If the critical frequency of ionized layer is 4.0MHz, calculate electron density of the layer. [CO-4][L-3] **2×10**

PART-A

Q.2 a) Derive mathematical expression for vector potential of electric current source. [CO-1][L-4] **12**

b) For a sphere of radius r, Evaluate the solid angle ΩA (in square radians or steradians) of a spherical cap on the surface of the sphere over the north-pole region defined by spherical angles of $0 \leq \theta \leq 60^o$, $0 \leq \varphi \leq 180^o$. [CO-2][L-5] **8**

Q.3 a) Derive mathematical expression for radial component of electric field vector for short dipole. [CO-1][L-6] **10**

b) Calculate effective area of Hertzian dipole operating at frequency of 100M Hz. (Given directivity of Hertzian dipole is 1.5). [CO-2][L-3] **5**

c) An antenna has a field pattern given by $E(\theta) = \sin 2\theta$, for $0^0 \leq \theta \leq 90^0$, evaluate half power beam width of antenna. [CO-2][L-5] **5**

Q.4 a) Describe principal pattern of antenna with suitable diagram to differentiate different regions of antenna. [CO-2][L-2] **7**

b) Evaluate the nulls of the total field when $d = \lambda/2$ and $\beta = 0$ for two element array. [CO-3][L-5] **6**

c) Derive mathematical expression for directivity of end-fire array. [CO-3][L-6] **7**

PART-B

Q.5 a) Design a three element Yagi-Uda antenna to operate at frequency of 100MHz. [CO-3][L-6] **7**

b) A paraboloid reflector has radiation characteristics whose half power beam width is 30^o. Evaluate its null-to-null beam width and power gain. [CO-3][L-5] **7**

c) Prove that impedance of three fold dipole antenna is 657Ω. [CO-3][L-4] **6**

Q.6 a) Derive mathematical expression for refractive index of ionosphere region. [CO-4][L-5] **10**

b) Classify different modes of wave propagation. [CO-4][L-4] **10**

Q.7 a) Discuss methods used for calculating antenna range in free space region. [CO-5][L-2] **10**

b) Demonstrate test setup used for plotting radiation pattern of antenna. [CO-5][L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

ANTENNA (BEC-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 brief:

a) Define vector potential and explain its need with suitable flow diagram. [CO1][L-1]

b) Evaluate the current in wire having radius of 1meter with magnitude of H of 1 A/m. [CO1][L-2]

c) Distinguish among terms "Isotropic", "Directional" and "Omni directional". [CO1][L-2]

d) Show that radiation resistance of half wave dipole is 73Ω. [CO2][L-2]

e) Identity characteristics of array. [CO2][L-2]

f) Define folded dipole antenna. Derive its input impedance. [CO3][L-2]

g) Evaluate length of a half-wave dipole at frequencies of 10 MHz, 50MHz and 100 MHz. [CO3][L-2]

h) If the critical frequency of ionized layer is 1.5MHz, calculate electron density of the layer. [CO4][L-3]

i) Justify bending mechanism of ionosphere. [CO4][L-2]

j) Identify challenges in antenna design. [CO5][L-2] **2×10**

PART-A

Q.2 a) Derive expression for the vector potential a for an electric current source J.

$$\mathbf{E}_A = -\nabla\phi_e - j\omega\mathbf{A} = -j\omega\mathbf{A} - j\frac{1}{\omega\mu\epsilon}\nabla(\nabla \cdot \mathbf{A})$$

[CO1][L-3] **10**

b) Describe various type of polarization in antenna. [CO1][L-2] **10**

Q.3 a) Calculate practical antenna gain in dB to produce power density of 1.2mW/m2 in a given direction, at a distance of 1.8Km, an antenna radiates a total of 180W. An isotropic antenna would have to radiate 2400W to produce the same power density at that distance. [CO1][L-3] **8**

b) Draw field region of antenna with suitable explanation. [CO2] [L-2] **6**

c) Prove that the vector magnetic potential due to moving point charge q at a distance R is given as:

$$A = \frac{\mu}{4\pi} \cdot \frac{\mathbf{q}\,\mathbf{v}}{\mathbf{R}}$$

[CO2] [L-3] **6**

Q.4. a) Design an antenna with omnidirectional amplitude pattern with a half-power beam width of 90◦. Express its radiation intensity by U = sinn θ. Determine the value of n and attempt to identify elements that exhibit such a pattern. Determine the directivity of the antenna by analyzing its for Omnidirectional and Half power bandwidth. [CO2][L-4] **10**

b) Evaluate the nulls of the total field when d=λ/4 and β = 0 for two element array. [CO3][L-4] **10**

Or

b) Evaluate antenna array factor for two element antenna array. [CO3][L-3] **10**

P. T. O.

PART-B

Q.5 a) Design a Yagi-Uda array with a directivity (relative to a λ/2 dipole at the same height above ground) of 9.2 dB at f0 = 50.1 MHz. The desired diameter of the parasitic elements is 2.54 cm and of the metal supporting boom 5.1 cm. Find the element spacings, lengths, and total array length. [CO3][L-4] **10**

OR

a) Explain various feeding techniques of Microstrip line antenna. [CO4][L-2] **10**

b) Two dipoles of gain 1.64 each are used for transmitting and receiving purpose. They are separated by distance of 10 meter. The radiated power by Tx antenna is 15W, at frequency of 60MHz. Evaluate power received. [CO4][L-3] **10**

OR

b) Justify the role of parasitic element in different antenna design. [CO4][L-2] **10**

Q.6 a) Evaluate refractive index of Ionosphere region. [CO4][L-4] **10**

b) Calculate the maximum range of tropospheric transmission for which the height of a transmitting antenna is 100ft and that of receiving antenna is 50ft. [CO4][L-3] **10**

Q.7 a) Describe measurement range used to measure antenna parameter. Differentiate between indoor and outdoor range. Also calculate the radiation resistance of a single-turn and an eight-turn small circular loop. The radius of the loop is λ/25 and the medium is free-space. [CO5][L-3] **10**

b) Discuss the advantages and disadvantages of communication at ultra-high frequencies. [CO5][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

PROBABILITY AND STOCHASTIC PROCESSES (BEC-DS-508)

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) State Baye's theorem. [CO-1][L-1]

b) A shooter is known to hit a target 3 out of 7 shots; while another shooter is known to hit the target 2 out of 5 shots. Find the probability of the target being hit at all when both of them try. [CO-1][L-2]

c) During the day, a clock at random stops once at any time. If x be the time when it stops and the PDF for x is given by:

$f(x) = 1/24$, for $0 \leq x \leq 24$

0, otherwise

Calculate the probability that clock stops between 2 pm and 2:45 pm. [CO-1][L-3]

d) Define autocorrelation function. Write its properties. [CO-2] [L-2]

e) Find the constant c such that the function is a density function,

$f(x) = cx^2$, $0 < x < 3$

0, otherwise

Also, compute $P(1 < X < 2)$. [CO-2][L-2]

f) Explain Gaussian pdf. [CO-2][L-1]

g) State and explain Central limit theorem. [CO-3][L-2]

h) Show that if X(t) is WSS ,then

$E[[X(t+\tau)-X(t)]^2]=2[R_X(0)-R_X(\tau)]$ where $R_X(\tau)$ is the auto correlation of X(t). [CO-4][L-3]

i) What is a matched filter? Give expression for probability of error, of matched filter. [CO-4][L-2]

j) A WSS random process X(t) is applied to the input of an LTI system with impulse response $h(t)= 3\exp(-2t)\, u(t)$. Find the mean value of the output Y(t) of the system if $E[X(t)]=2$. [CO-4][L-3] **2×10**

PART-A

Q.2 a) Define uniform probability distribution function. Find its CDF and mean. [CO-1][L-3] **10**

b) The discrete random variable X can take only the values 0, 1, 2, 3, 4, 5. The probability distribution of X is given by:

$P(X=0)= P(X=1)= P(X=2)= a$

$P(X=3)= P(X=4)= P(X=5)= b$

Also, $P(X \geq 2) = 3\, P(X<3)$

Where a and b are constants. Find the values of a and b. Also, draw its CDF. [CO-1][L-4] **10**

Q.3 a) The discrete random variable X has probability distribution:

$p(x)= x/36$, $x=1,2\ldots.8$

Find E(X) and Var (X). [CO-2][L-3] **10**

b) A R.V. has an exponential PDF given by $f(x)=a\exp(-b|x|)$,where a and b are constants.Find the relation between a and b. Also find the distibution function of X. [CO-2][L-3] **10**

P. T. O.

Q.4 a) The joint density function of two continuous random variables X and Y is:
$f(x, y) = cxy \quad 0 < x < 4, 1 < y < 5$
$0 \quad$ otherwise
i) Find the value of the constant c.
ii) Find $P(X \geq 3, Y < 2)$.
iii) Are X and Y independent random variables. [CO-2][L-3] **10**

b) Let z be a random variable with probability density function $f(z) = \frac{1}{2}$ in the range $-1 \leq z \leq 1$. Let the random variable $x = z$ and the random variable $y = z^2$. Show that x and y are uncorrelated. [CO-2][L-4] **10**

PART-B

Q.5 a) Consider the random process $\{X(t)\}$ given by X(t)=A cos (wt+ɵ) where *w and ɵ are constants and* A is a random variable . Is $X(t)$ WSS? Verify. [CO-1][L-1] **8**

b) Let X(t) and Y(t) be defined by:
X(t)=A cos (wt + ɵ)
Y(t)= A sin (wt+ɵ)
Where w and A are constants and ɵ is a uniform random variable over [0,2π]. Find the cross correlation of X (t) and Y (t). [CO-3][L-4] **12**

Q.6 a) Explain the term power spectral density, $S_{XX}(f)$. Show that the power spectrum of a (real) random process is real, i.e. $S_{XX}(-f) = S_{XX}(f)$. [CO-3][L-2] **8**

b) The power spectral density of a stationary random process is given by:
$S_{xx}(f) = \begin{matrix} A & , \quad -k < f < k \\ 0 & , \quad otherwise \end{matrix}$
Determine the autocorrelation function. [CO-3][L-3] **12**

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

Q.7 What is an optimum filter? Derive the expression for probability of error, Pe and transfer function, of optimum filter. [CO-4][L-3] **20**

End Semester Examination, Dec. 2023

B. Tech. (Mechanical Mechatronics) – Fifth Semester

DIGITAL SIGNAL PROCESSING AND ITS APPICATION (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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) What do you understand by impulse signals? [CO-1][L-1]
b) What is the difference between discrete and analog signal? [CO-1][L-1]
c) Explain unit impulse signal. [CO-1][L-1]
d) Define 'ROC in z-transform system'. [CO-2][L-1]
e) Define 'FIR system'. [CO-2][L-1]
f) Write two application of sampling theorem. [CO-3][L-1]
g) Write the two properties of convolution theorem. [CO-4][L-1]
h) Write two feature of chebychave filter. [CO-4][L-1]
i) Draw Von Newman DSP architecture. [CO-5][L-1]
j) List two advantages of DSP processor. [CO-5][L-1] **2×10**

PART-A

Q.2 a) Determine the convolution y(n) of the following signals:
X(n)={1,0,2,0,3}, h(n) ={2,0,0,0,1} [CO-2] [L-4]**10**

b) Explain FIR system and IIR system with its properties and application in details. [CO-2] [L-3] **10**

Q.3 a) Explain the application of sampling theorem. [CO-3] [L-3] **10**

b) Discuss frequency domain representation of sampling. [CO-3] [L-3] **10**

Q.4 a) Find the inverse z –transform of $x(z) = z^3+2z^2+z+1-2z^{-1}-3z^{-2}+4z^{-3}$ [CO-4 [L-4] **10**

b) Explain the properties of z- transform. [CO-4] [L-2] **10**

PART-B

Q.5 Write short notes on:

a) Approximate derivative method of IIR filter.
b) Chebychev filter.
c) Comparison between IIR and FIR filter.
d) Elliptical filters. [CO-4][L-2] **5×4**

Q.6 A Low pass filter is to be design with the following desired frequency response?

$$H_d(e^{j\omega}) = \begin{cases} 1, & \frac{-\pi}{4} \le \omega \le \frac{\pi}{4} \\ 0, & \frac{\pi}{4} \le \vee \omega \vee \le \pi \end{cases}$$

Determine the filter coefficients h(n) if the window function is rectangular ,order of 5. [CO-4][L-5] **20**

Q.7 a) Discuss the DSP applications in image processing. [CO-5] [L-3] **10**

b) Explain the hardware architecture of DSP processor. [CO-5] [L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

IOT ANALYTICS AND SECURITY (BEC-DS-516)

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

No. of pages: 1

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

Q.1
a) What is the functions of analytics in cloud services? [CO-2][L-1]
b) Which password attack method uses a list that contains hashed values and clear text equivalents in order to speed up the process of gaining entry to a system? [CO-1][L-3]
c) Differentiate between structured data and unstructured one, mentioning examples of each one. [CO-1][L-2]
d) Discuss 3V's model of IoT data. [CO-1][L-3]
e) Explain any five Amazon Web services for IoT [CO-2][L-1]
f) Which data validation methods is used in data analytics? [CO-2][L-2]
g) List out the IoT characteristics of IoT generated data. [CO-1][L-1]
h) Discuss the roles of end-users and the service provider in cloud computing. [CO-2][L-1]
i) What are requirements of clustering in data mining? [CO-3][L-1]
j) Why is secure cloud important? [CO-5][L-3] **2×10**

PART-A

Q.2
a) Data Analytics Lifecycle is an approach to managing and executing analytical projects. This approach describes the process in six phases. Explain each phase. [CO-1][L-2] **10**
b) Explain in detail the need and types of data analytics for IoT and brief the challenges faced by IoT data analytics. [CO-1][L-2] **10**

Q.3
a) What is Cloud? Explain various cloud storage models used in IoT. [CO-2][L-2] **10**
b) What is WAZIUP software platform? How it is useful in IoT application development? [CO-2][L-3] **10**

Q.4
a) Explain hardware layout of VITAL architecture for IoT analytics applications. [CO-3][L-2] **10**
b) Elaborate PPI nodes and discover sensors nodes of VITAL PLATFORM for IoT data analytics. [CO-3][L-2] **10**

PART-B

Q.5
a) Illustrate CRISP methodology. What are the key deliverables expected from business understanding phase of CRISP-DM. [CO-4][L-2] **10**
b) How do you operationalize IoT data analytics process? [CO-4][L-3] **10**

Q.6
a) Why is security required in IoT? Explain in detail various security models in Internet of Things. [CO-5][L-3] **10**
b) Describe how wireless sensor networks has become one of the enabling technologies of IoT? [CO-5][L-2] **10**

Q.7
a) Discuss different kinds of attacks on physical layer. [CO-5][L-5] **10**
b) What is secure authentication mechanism to enhance the security of the IoT devices? Explain in detail. [CO-5][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech – Fifth Semester

RTL DESIGN SYNTHESIS USING HDL (BEC-DS-520)

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

No. of pages: 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) Represent Moore's Law diagrammatically. [CO-1][L-3]
b) What do you mean by sensitivity list? [CO-1][L-1]
c) Define the terms: Wire & Reg. [CO-1][L-1]
d) Write the syntax for port declaration. [CO-2,3][L-1]
e) List the differences between 'rise time and fall time'. [CO-2,-3][L-2]
f) List the types of operators used in Verilog. [CO-2,3][L-1]
g) Differentiate between 'unary and binary' operators. [CO-2,3][L-4]
h) Explain the various generate statements. [CO-2,3][L-2]
i) Differentiate between 'blocking and non blocking' assignment statements. [CO-2,3][L-4]
j) Mention the differences between task and function. [CO-4][L-4] **2×10**

PART-A

Q.2 a) Discuss with example the Top-down and bottom-up design methodology in details. [CO-1][L-2] **10**
b) Explain the evaluation of CAD. [CO-1][L-2] **10**

Q.3 a) List all the data types used in Verilog and explain then in detail. [CO-1][L-1] **10**
b) Explain the lexical convention in detail. [CO-1][L-2] **10**

Q.4 a) Explain the gate primitives used in Verilog. [CO-2,3][L-2] **10**
b) Design a 4 to 1 multiplexer using structural style of modeling. [CO-2,3][L-6] **10**

PART-B

Q.5 a) Explain any five types of operators used in data flow modeling. [CO-2,3][L-2] **10**
b) Design 4 bit carry look ahead adder using gate level modeling. [CO-2,3][L-6] **10**

Q.6 a) Differentiate between 'initial and always block of Verilog'. [CO-2,3][L-4] **6**
b) Design 1 to 4 de-multiplexer using behavioral style of modeling. [CO-2,3][L-6] **14**

Q.7 a) Explain overriding and module parameters in detail. [CO-4][L-2] **10**
b) Explain time scale in Verilog with an example. [CO-4][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

WIRELESS COMMUNICATION (BEC-DS-522)

Time: 3hrs. 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) Differentiate between selection diversity and combining diversity. [CO-4][L-2]
b) List the advantages and disadvantages of direct sequence spread spectrum technique. [CO-2][L-1]
c) Calculate the change in the received signal (in dB) in free-space propagation condition at two different distance points, considering that the second distance point is ten times the distance from the first point. [CO-3][L-3]
d) Define 'cell splitting'. [CO-1][L-1]
e) Why do paging systems provide low data rates? How does a low data rate lead to better coverage? [CO-1][L-1]
f) Compare wireless LAN to a wired LAN. [CO-2][L-2]
g) What are the advantages of TDMA over FDMA? [CO-2][L-1]
h) Mention the significance of frequency reuse in cellular networks. [CO-1][L-2]
i) If the RMS delay spread is 1 μs, will the two frequencies that are 1 MHz apart experience correlate fading? Justify. [CO-3][L-5]
j) Consider a mobile communication system using a carrier frequency of 900 MHz and traveling at a speed of 40 km/hr towards the base station in the cell. If the mobile user transmits data at the rate of 100 kbps, determine whether the channel is slow or fast fading? [CO-3][L-3] **2×10**

PART-A

Q.2
a) Discuss the evolution of mobile cellular networks from 1G to 2G. [CO-1][L-2] **10**
b) Discuss the similarities and differences between a conventional cellular radio system and a space-based (satellite) cellular radio system. [CO-1][L-2] **10**

Q.3
a) Discuss the working of frequency hopping spread spectrum technique. [CO-2][L-1] **10**
b) A wireless system was allocated a total bandwidth of B_t=20MHz for uplink and another B_t=20MHz for downlink channels. Each user was assigned Bc=30KHz of spectrum for its analog voice signal. The total uplink and downlink bandwidth also required guard bands of Bg=10KHz on each side. Find the total number of analog users that can be supported in uplink and downlink. [CO-2][L-3] **10**

Q.4
a) Explain in detail Bluetooth IEEE 802.15 standard. [CO-2][L-2] **10**
b) Write short notes on:
i) WCDMA
ii) LTE [CO-2][L-1] **10**

PART-B

Q.5
a) Distinguish between Co-channel interference and adjacent channel interference. [CO-3][L-3] **10**

P. T. O.

b) What is handoff? Explain the different types of handoffs. [CO-3][L-2] **10**

Q.6 a) Explain the two-ray ground reflection model in detail. [CO-3][L-2] **10**

b) Calculate the mean path loss using Okumara's model for d= 50km, h_{te}=100m, h_{re}=10m in a suburban environment, If the base station transmitter radiates an EIRP of 1KW at a carrier frequency of 900MHz. Find EIRP (dBm) and the power at the receiver wheregain at receiving antenna is 10dB. [CO-3][L-3] **10**

Q.7 a) Explain the block diagram of the communication system using an adaptive equalizer at the receiver with suitable mathematical model. [CO-4][L-2] **10**

b) What is the need for diversity? Explain different types of diversity techniques along with their merits and demerits. [CO-4][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech - Seventh Semester

HIGH PERFORMANCE COMPUTING (BEC-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
a) Discuss Amdahl's law for parallel processors. [CO1][L-1]
b) What is pipelining? [CO1][L-1]
c) What are threads and their types? [CO2][L-1]
d) What is the link between HPC, Artificial Intelligence and deep learning technologies? [CO3][L-3]
e) What are some common hardware components used for high performance computing? [CO4][L-1]
f) What are GPUs and how are they different from CPUs? [CO5][L-1]
g) What kinds of data structures are optimal for use in HPC solutions? [CO4][L-2]
h) What do you understand by FLOPS with reference to HPC? [CO4][L-3]
i) What are the applications of parallel computing? [CO1][L-1]
j) Explain Cache coherence in multiprocessor system. [CO3][L-1] **2×10**

PART-A

Q.2 a) Discuss Flynn's classification in detail. [CO1][L-2] **10**

(10)

b) What are the different levels of parallelism in a parallel system? [CO1][L-1] **10**

Q3 a) Discuss memory hierarchy design and its characteristics in detail. [CO2][L-2] **10**
b) Explain parallel Matrix-vector multiplication algorithm with example. [CO2][L-1] **10**

Q.4 a) What are the limitations of parallel computing? [CO1][L-1] **10**
b) Explain the performance metrics for parallel system. [CO4][L-2] **10**

PART-B

Q.5 a) Describe with a neat diagram CUDA Architecture. Explain it in detail. [CO5][L-1] **10**

b) What is Message Passing Interface (MPI)? [CO1][L-1] **10**

(10)

Q.6 a) What is vectorization and multithreading? [CO1][L-1] **10**

(10)

b) Discuss mutexes and race conditions with reference to parallel systems. [CO2][L-2] **10**

Q.7 Write short notes on the following:

a) Open MP. [CO4][L-1]

b) Intel HPC tools. [CO4][L-1] **10×2**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

AI & IOT FOR PRACTITIONERS USING NVIDIA JETSON NANO BOARD (BEC-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
a) What is deep learning? [CO-3][L-1]
b) Explain the applications of IoT. [CO-4][L-1]
c) How Jetson Nano is different from Raspberry Pi board? [CO-1][L-1]
d) What is a neural network? [CO-3][L-1]
e) What are the different types of machine learning? [CO-3][L-1]
f) What is CoAP protocol? [CO-4][L-1]
g) What is the significance of the following function of pandas: pd.DataFrame(). [CO-4][L-3]
h) What is CUDA? [CO-1][L-1]
i) Explain the purpose of following Linux command: ls, mkdir [CO-1][L-2]
j) What is the purpose of using Open CV? [CO-5][L-1] **2×10**

PART-A

Q.2
a) Discuss MQTT protocol in detail. [CO-4][L-1] **10**
b) Discuss IoT architecture and its associated security challenges. [CO-4][L-1] **10**

Q.3
a) Explain salient features of NVIDIA Jetson Nano board. [CO-1][L-1] **10**
b) Discuss the interfacing of external LED with Jetson Nano board. Write a python program to blink LED connected with Jetson board every 2 seconds. [CO-1][L-4] **10**

Q.4
a) Discuss I2C protocol in detail. How I2C communication is achieved in Jetson Nano board. [CO-1][L-3] **10**
b) Explain different applications of Jetson Nano board. [CO-2][L-2] **10**

PART-B

Q.5
a) Discuss convolutional neural network in detail. [CO-2][L-1] **10**
b) What is NLP? How is it related to text mining? [CO-3][L-1] **10**

Q.6 Discuss the interfacing of external camera module with Jetson Nano board. How can an image be captured using a python program running on Jetson Nano board? [CO-5][L-4] **20**

Q.7 Write short notes on the following:
a) Tensorflow and Keras. [CO-3][L-1] **10**
b) ResNet-18 model. [CO-1][L-1] **10**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

ANALOG AND MIXED SIGNAL DESIGN (BEC-DS-711)

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.*

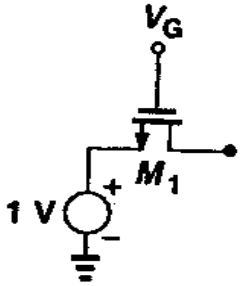
Q.1 Answer the following in brief:

a) Explain the on resistance of MOSFET. [CO-1][L-2]
b) Explain how MOSFET work as a sampling switch. [CO-1][L-2]
c) Explain the single ended operation of amplifier. [CO-2][L-2]
d) Define parasitic capacitance and list all parasitic capacitances. [CO-2][L-1]
e) Explain the input output impedance of OTA. [CO-3][L-2]
f) Describe switched capacitor filter. [CO-3][L-1]
g) Differentiate between analog and digital discrete time signals. [CO-5][L-4]
h) Define sample and hold circuits. [CO-5][L-1]
i) Illustrate the lock range and capture range of PLL. [CO-4][L-1]
j) What do you mean by frequency synthesizer? [CO-4][L-1] **2×10**

PART-A

Q.2 a) What do you mean by current mirror circuit and describe how output and reference current depends on geometry of MOSFET? [CO-1] [L-2] **12**

b) For the circuit shown below, plot the on resistance of M_1 as a function of V_G. Assume μn Cox= 50μA/V2, W/L = 10 and V_{th} = 0.7V. Assume drain terminal is open.



[CO-1] [L-3] **8**

Q.3 a) Derive the expression for voltage gain and output impedance of source follower. [CO-2] [L-3] **10**

b) Explain the type of noise and its characteristics in time and frequency domain. [CO-2] [L-2] **10**

Q.4 a) Draw and explain the folded cascade configuration of OPAMP and list out its advantages. [CO-3] [L-3] **10**

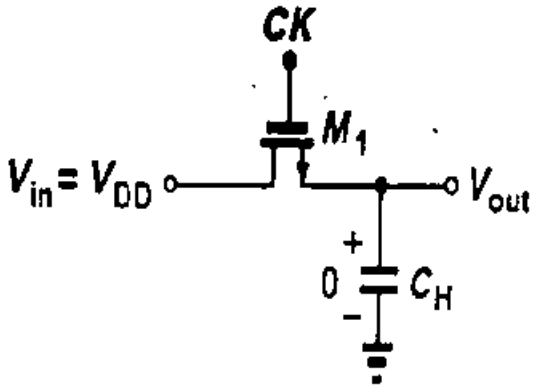
b) Explain the operational transconductance amplifier using circuit diagram and also discuss its applications. [CO-3] [L-2] **10**

PART-B

Q.5 a) Explain the switched capacitor-based circuit and its role in mixed signal circuit design. [CO-3] [L-2] **10**

P. T. O.

b) In the circuit shown in figure, calculate V_{out} as a function of time. Assume λ =0 and capacitor is initially discharged.



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

Q.6 a) What are the specifications of a DAC? Explain any four in detail. [CO-5] [L-2] **10**

b) Sketch the circuit diagram of a pipeline ADC and explain its operation. [CO-5] [L-3] **10**

Q.7 a) Draw the block diagram of a charge pump PLL and explain the functions of each block. [CO-4] [L-3] **10**

b) Differentiate between working of analog PLL circuits and digital PLL Circuits. Using necessary waveforms, explain about the non-ideal effects in PLLs. [CO-4] [L-4] **10**

End Semester Examination, Dec. 2023

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.*

Q.1
a) Define the terms: Apogee and Perigee.
b) What are the frequency bands allocated for satellite communication?
c) State Kepler's law of planetary motion.
d) Calculate the EIRP of a satellite downlink which at 12 Ghz operates with a transmit power of 6W and an antenna gain of 50.2db.
e) Differentiate between FDMA, TDMA and CDMA.
f) What do you mean by digital baseband signal?
g) Differentiate among active and passive satellites.
h) Discuss the role of eclipse effects.
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) Compare the various digital modulation techniques. **2×10**

PART-A

Q.2
a) Describe the block diagram of satellite communication system and explain each block in detail. [CO1][L2] **12**
b) Classify the various applications of satellite communication. [CO91][L4] **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. [CO2][L3] **5**
b) Discuss the various orbital elements which are required to specify the location of satellite in its elliptic orbit around the Earth. [CO2][L2] **15**

Q.4
a) Derive the expression for complete link design equation for satellite communication. [CO3][L6] **10**
b) What is system noise temperature? How does it effect the C/N and G/T ratio. [CO3][L2] **10**

PART-B

Q.5
a) Prove that for FM signal $(S/N)_o=(C/N)_I\ 3(\ 1+m)m^2$ [CO3][L5] **12**
b) Describe satellite digital link design in detail. [CO4][L2] **8**

Q.6
a) Summarize time division multiple access and explain TDMA frame structure in detail. [CO4][L5] **12**
b) Analyze demand assignment multiple access techniques (DAMA). [CO4][L4] **8**

Q.7 Write short notes on ***(any two):***
a) GPS.
b) VSAT.
c) Laser satellite communication.
d) SARSAT. [CO5][L2] **10×2**

End Semester Examination, Dec. 2023

OPEN ELECTIVE – COMMON FOR ALL BRANCHES

SOLAR TECHNOLOGY (BEC-OE-003)

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

No. of pages: 2

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

Q.1 Answer the following in brief:

a) What are the key factors that influence the flow of electricity in a circuit? [CO-1] [L-2]

b) Why appropriate choice of wires is important in PV system? [CO-2] [L-2]

c) How does the rising energy demand negatively impact the environment? [CO-1] [L-2]

d) A DC fan works on 24 V and while running it takes 3 A current. Calculate the DC power consumed by the fan. [CO-2] [L-3]

e) What are the key steps involved in identifying faults in battery technology? [CO-2] [L-1]

f) What are three renewable energy sources that are both sustainable and nearly limitless in supply? [CO-3] [L-1]

g) What is the role of a tachometer in the design of a solar setup? [CO-5] [L-1]

h) What safety measures are taken during the installation of solar PV systems? [CO-5] [L-2]

i) Input DC power of an inverter is 1000 W. Output AC power efficiency of is 50 W. Calculate the efficiency of the inverter. [CO-4] [L-3]

j) What are the fundamental safety steps to take into account during the installation of small-scale solar PV systems? [CO-5] [L-1] **2×10**

PART-A

Q.2 a) What are the key advancements and challenges in solar cell technology, and how do they impact the design and efficiency of Solar PV modules and systems? [CO-1] [L-2] **10**

b) How do solar cells generate electricity, and what are the key parameters that influence the performance and efficiency of solar cells in the electricity generation process? [CO-1] [L-3] **10**

Q.3 a) A solar cell having fill factor (FF) 68% gives 0.6V voltage at maximum power point at STC. The cell gives 3 A short circuit current and 0.7 V open circuit voltage. What is the current at maximum power point of the solar cell? [CO-1] [L-3] **10**

b) Can you provide a detailed explanation of the connections used in solar photovoltaic (PV) module arrays, including how series, parallel, and series-parallel connections work, and the advantages and considerations associated with each configuration? [CO-2] [L-4] **10**

Q.4 a) What are the key features of charge controllers, and how does Maximum Power Point Tracking (MPPT) contribute to the efficiency and performance of solar energy systems? [CO-3] [L-4] **10**

b) A house has the following AC loads rated at 230 V.(i) Three 60 W lights(ii) Two 90 W fans(iii) A 60 W radio. All the loads are powered simultaneously. A 12 V battery is available. Choose the appropriate inverter? Assume that inverter efficiency is 90%. [CO-3] [L-3] **10**

P. T. O.

PART-B

Q.5 a) Could you provide a detailed explanation of the components and functioning of a solar photovoltaic (SPV) system that integrates AC and DC loads, electronic control circuitry, and a battery for energy storage? [CO-4] [L-4] **10**

b) What is the configuration of a grid-connected solar PV system, and what are the essential components that make up a grid-connected solar PV system? [CO-4] [L-5] **10**

Q.6 a) Could you provide a comparative analysis of various software tools used for solar site planning and design, with a specific focus on Solar Design Lab software, its key features, and how it facilitates site simulation for solar energy projects? [CO-5] [L-3] **10**

b) Can you provide a detailed walkthrough of the complex RCC site design for a 400 kW solar installation, including the process for assessing solar access, shading, and calculating energy loss? [CO-5] [L-5] **10**

Q.7 a) What are the essential steps and factors involved in the installation and diagnosis of standalone solar PV systems, and how can safety precautions be maintained during the installation procedure? [CO-5] [L-3] **10**

b) What are the critical steps and components involved in the installation of solar PV power plants, and can you provide a comprehensive checklist for ensuring a successful solar PV plant installation? [CO-5] [L-6] **10**

End Semester Examination, Dec. 2023

OPEN ELECTIVE - COMMON FOR ALL BRANCHES

INTERNET OF THINGS: BASICS AND APPLICATIONS (BEC-OE-005)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a) Explain reasons of shifting from M2M to IoT. [CO-1] [L-1]
b) Illustrate the exclusive pair communication module. [CO-3] [L-2]
c) What does IoT and digitization mean? Elaborate this concept. [CO-3] [L-2]
d) How many analog pins are present on the arduino development board? [CO-4] [L-3]
e) Write the commands used to read analog and digital data from a sensor in arduino? [CO-4] [L-3]
f) What is the task of message area and text console in arduino IDE? [CO-4] [L-1]
g) Elaborate various challenges in the implementation of IOT. [CO-1] [L-2]
h) Describe the role of Internet of Things in shopping. [CO-5] [L-2]
i) Summarize the components for an IoT system [CO-1] [L-2]
j) What is the role of setup method in arduino program? [CO-4] [L-2] **2×10**

PART-A

Q.2 a) Explain the different characteristics of IoT. [CO-1][L-2] **10**
b) Explain about Industrial Internet of things (or IoT). [CO-1][L-2] **10**

Q.3 a) How do IoT devices communicate? Explain with suitable diagrams. [CO2][L3] **10**
b) With the help of neat diagrams, explain the M2M system architecture. [CO-2][L-2] **10**

Q.4 a) Mention the important characteristics of the following network configurations of IoT: Node, PAN, LAN and Gateway. [CO-3][L-2] **10**
b) List out the properties to characterize the devices. [CO-3][L-2] **10**

PART-B

Q.5 a) Write a program to blink default LED on arduino board with the delay of 2 sec. [CO-4][L-6] **10**

b) Explain the following with respect to ardiuno programming:
i) Structure
ii) Functions
iii) Variables
iv) Flow control statements
vii) Data types
viii) Constants [CO4][L2] **10**

Q.6 a) Why do security issues exist in IoT? What are the key security factors to be considered when deploying IoT devices? [CO4][L3] **10**
b) Illustrate IoT Security Threats in terms of botnet, Denial of service and man in the middle and ransomware. [CO4] [L4] **10**

Q.7 Design domain and Information model of a safe home system with features such as authorized entry using biometric (alarming/phone call for unauthorized entry), alarming for fire/smoke, auto switch -on and off during emergency. [CO-5] [L-6] **20**

End Semester Examination, Dec. 2023

B. Tech. - First Semester

BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING (BEE-103)

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

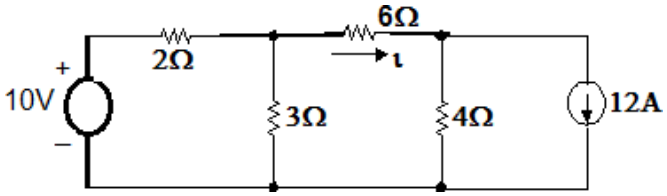
No. of pages: 1

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) Define mesh and node of a network. [CO-1][L2]
b) How can you convert a voltage source to a current source? [CO-1][L1]
c) State active and apparent power. Specify their units also. [CO-1][L2]
d) Two resistors 5Ω and 8 Ω are connected in parallel across a 10 V dc supply. Find the current flowing in each of the resistor. [CO-2][L2]
e) List the difference between ideal and practical transformer. [CO-3][L2]
f) Write the applications of induction motor. [CO-3][L2]
g) Classify the types of semiconductor switching devices. [CO-4][L1]
h) Differentiate between latch and Flip-Flop. [CO-4][L2]
i) What do you mean by ampere hour efficiency of a battery? [CO-1][L2]
j) Name the electrodes and electrolyte of a Nickel cadmium battery. [CO-1][L2]
2×10

PART-A

Q.2 a) Find the current i in the network shown in the figure using superposition theorem. [CO-2][L3] **10**



b) Analyze time domain response of first order RL circuit with dc voltage and what is the value of time constant for this system. [CO1][L2] **10**

Q.3 a) A coil of power factor 0.6 is in series with a 100 μF capacitor, when connected to 50 Hz supply the potential difference across the coil is equal to potential difference across the capacitor. Find the resistance and inductance of the coil. [CO-2][L3] **10**
b) Derive the relation between phase and line current in a delta-connected system. [CO-2][L3]**10**

Q.4 a) Differentiate shell type and core type transformer. [CO-3][L2] **5**
b) List different losses in the transformer. [CO-3][L2] **5**
c) Explain the working principle of a 3-phase induction motor. [CO-3][L2] **10**

PART-B

Q.5 a) Discuss the working of the step-up DC-DC Converter. [CO-4][L-3] **10**
b) Draw enhancement n channel MOSFET and explain its working and applications. [CO-4][L-2] **10**

Q.6 a) Prove the following expressions:
$(A + B)(A + C) = A + B.C$
$(A + B)(B + C)(C + A) = AB + BC + CA$ [CO-4][L3] **5**
b) State first and second law of De Morgan's theorem. [CO-2][L3] **5**
c) Analyze the S -R flip-flop with its truth table. [CO4][L4] **10**

Q.7 a) What is the necessity of earthing and explain any one type of earthing with diagram. [CO1][L2] **10**
b) Describe the charging and discharging equations for the Lead Acid Battery.

[CO-1][L2] **10**

End Semester Examination, Dec. 2023

B. Tech. — Third Semester

ELECTRICAL CITCUIT AND ANALYSIS (BEE-DS-301)

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) State maximum power transfer theorem. [CO-1][L-1]

b) Differentiate independent and dependent current and voltage sources. [CO-1][L-2]

c) Calculate inverse laplace transform of F(s) = $\frac{1}{S^2 + AS + 5}$. [CO-2][L-3]

d) Discuss steady state representation of inductor and capacitor. [CO-2][L-2]

e) Differentiate one port and two port networks. [CO-3][L-2]

f) List the restrictions on pole and zero locations for driving point functions and transfer functions. [CO-3][L-1]

g) Determine the characteristic impedance of T-section low pass filter. [CO-4][L-3]

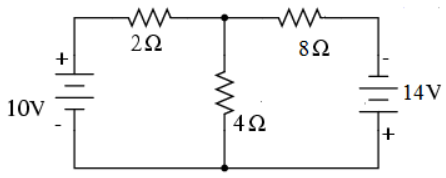
h) What is the m-derived filter and what are its advantages over constant k filters. [CO-4][L-2]

i) State properties of cut-set- matrix. [CO-1][L-1]

j) Write the condition of reciprocity and symmetry [CO-3][L-1] **2×10**

PART-A

Q.2 a) Obtain the current in 8Ω resistor using Thevenin's theorem.



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

b) Explain the concept of duality and dual networks with circuit diagram. [CO1][L-2] **10**

Q.3 a) Analyze an expression for transient response of series RLcircuit with step input. [CO-2][L-4] **10**

b) A series RLC circuit with R=300 ohms, L=1H and C=100 μF has a constant voltage g 50V applied to it at $t = 0$. Find the maximum current value. Assume zero initial conditions. [CO-2][L-3] **10**

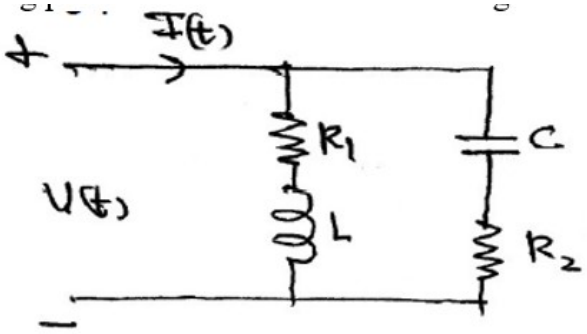
P.T.O.

Q.4 a) Define poles and zeros of a transfer function. For the given transfer function find poles and zeros and draw the pole-zero plot.

$$I(s) = \frac{20(s+5)}{(s^2+5s+6)}$$

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

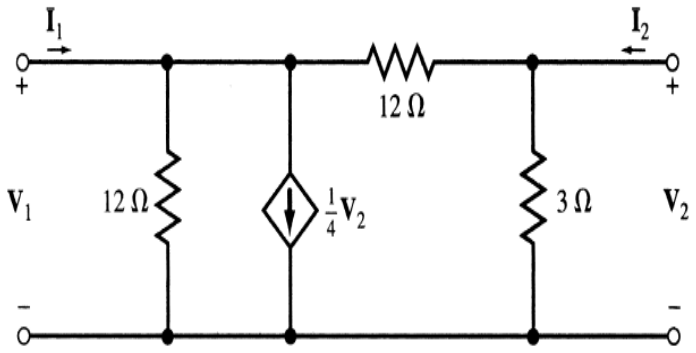
b) Calculate the driving point admittance of the network shown in the figure:



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

PART-B

Q.5 a) Find the Y parameters of the following network.



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

b) Explain the interconnection of two- port networks for parallel connections.

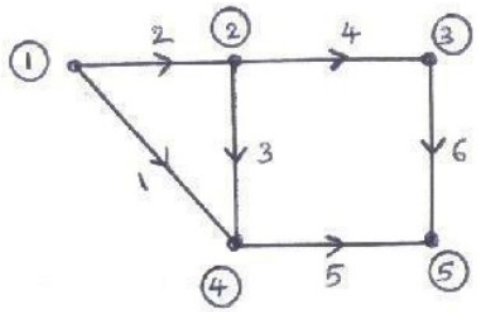
[CO-3][L-2] **10**

Q.6 a) Design a T-section constant K-high pass filter having cut-off frequency of 10KHZ and design impedance Ro=600ohm. Find its characteristics impedance and phase constant at 25khz. [CO-4][L-3] **10**

b) Explain m-derived high pass filter with expressions.

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

Q.7 a) Write the incidence matrix and reduced incidence matrix for the following graph:



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

b) Write short notes on:
i) Loop matrix. ii) Cut set matrix. [CO-1][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

ELECTRICAL MACHINES-I (BEE-DS-302)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a) What is back emf?
b) Transformer is rated in kVA. Why?
c) Air gap between the pole and armature in kept very small. Give reason.
d) Can a transformer work mole? Justify your answer.
e) Differentiate between lap winding and wave winding of DC machine.
f) What is the function of a commutator?
g) State the condition for maximum efficiency of transformer.
h) Why starters are used in DC motors?
i) List application of DC series motor.
j) Why DC series motor cannot run at no load? **2×10**

PART-A

Q.2 a) Derive an expression for energy stored in a magnetic field. [CO-1][L-3] **10**
b) Draw and explain B-H curve of magnetic materials. [CO-1][L-2] **10**

Q.3 a) Explain the different parts of a DC machine. [CO-1][L-1] **10**
b) Evaluate the effect of armature flux on main flux in a DC machine. [CO-2][L-3] **10**

Q.4 a) Explain open circuit characteristic of separately excited DC generator. [CO-2][L-4] **10**
b) Compare rotor and stator side speed control of DC machines. [CO-2][L-2] **10**

PART-B

Q.5 a) Explain the principle of operation of a transformer. Draw the vector diagram to represent load at unity, lagging and leading power factor. [CO-1][L-2] **10**
b) A 500 KVA transformer has 95% efficiency at full load and also at 60% of full load both at unity power factor. i) Separate out the transformer losses. ii) Determine the transformer efficiency at 75% full load, unity power factor. [CO-1][L-5] **10**

Q.6 a) Draw and explain Scott connection. Prove that if secondary load is balanced then primary side is also balanced. [CO-2][L-4] **10**
b) Explain the construction and working of Auto transformers. Prove that there is Cu saving in case of auto transformer as compared to 2 winding transformer of same rating. [CO-2][L-4] **10**

Q.7 Write short notes on ***(any two):***

a) Reluctance motor.
b) Permanent magnet brushless motor.
c) Stepper motor. [CO-5][L-1] **10×2**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

POWER ELECTRONICS (BEE-DS-501A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 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) Why n channel MOSFET called as n channel enhancement MOSFET? [CO-1][L-1]
b) Explain the term reverse recovery time. [CO-1][L-1]
c) Enumerate the term holding current of SCR [CO-1][L-2]
d) Classify the converters based upon the load pulses. [CO-2][L-2]
e) Write expression of output voltage of step down converter. [CO-4][L-2]
f) List the applications of the dc-dc converters. [CO-2][L-2]
g) Enumerate the effect of chopping frequency on filter size. [CO-4][L-2]
h) List the different PWM techniques. [CO-3][L-1]
i) List the types of AC Voltage Regulator [CO-4][L-1]
j) What are circulating currents in cyclo converters [CO-4][L-2] **2×10**

PART-A

Q.2
a) Discuss the operational modes of SCR. List the various turn On methods and explain the most common method to turn on SCR. [CO-1][L-1] **10**
b) What do you mean by commutation? Classify different types of commutation techniques. Explain any one forced communication technique in detail with appropriate waveforms and circuit diagrams. [CO-1][L-1] **10**

Q.3
a) Analyze the operation of single-phase full wave converters with RLE load. Sketch the waveforms of load voltages and current in continuous conduction. Also, derive the expression for average and rms Load voltage. [CO-2][L-4] **15**
b) A single phase full wave converter is connected with RLE load .The source voltage is 230 V ,50 Hz .The average load current is 10 A. For R = 0.4 ohms L= 2mH. Compute firing angle delay for E=120V. [CO-2][L-3] **5**

Q.4
a) Analyze the operation of Buck converter considering discontinuous mode of operation. [CO-4][L-4] **10**
b) Discuss the multi quadrant operation choppers. [CO-4][L-2] **10**

PART-B

Q.5
a) Examine the operation of Boost Converter. Derive the expression for average output voltage of the boost converters [CO-4][L-4] **10**
b) Discuss the working of fly back converter with appropriate circuit diagram and wave form of load voltage. [CO-4][L-2] **10**

Q.6
a) Examine the operation three phase bridge inverter working in 120 degree mode of conduction. Draw the waveforms of phase voltages and line voltage.[CO-3][L-4] **15**
b) Compare voltage source inverters and current source inverters. [CO-3][L-2] **5**

Q.7
a) Discuss the operation of step up cycloconverters with appropriate waveforms of load voltage. [CO-3][L-2] **10**

b) Enumerate the concept of AC Voltage regulators. Draw the waveforms of load voltage and load current. [CO-3][L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

CONTROL SYSTEMS (BEE-DS-502)

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

No. of pages: 2

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

Q.1 Answer the following:

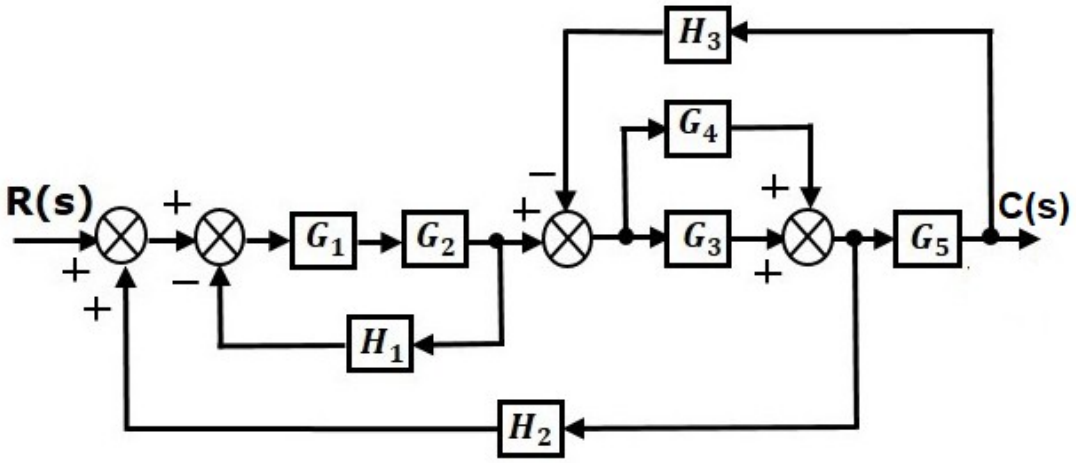
a) Give an example each of open loop and closed loop system. [CO1][L2]
b) Define 'characteristic equation'. [CO2][L1]
c) What is a regulator problem? [CO5][L2]
d) Name the test signals used in control system. [CO3][L1]

e) Draw the response of a second order system with roots lying on the imaginary axis. [CO3][L3]
f) What do you mean by break away point in root locus analysis? [CO2][L2]

g) What is controllability? [CO1][L2]
h) What is the significance of corner frequency? [CO3][L2]
i) Draw the polar plot of transfer function K/s(1+sT1). [CO2][L2]
j) Name time domain specifications of a second order system. [CO3][L1] **2×10**

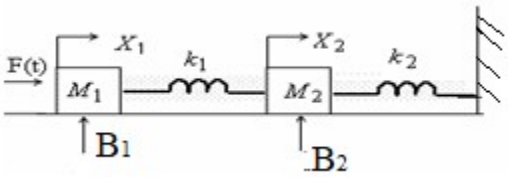
PART-A

Q.2 a) Convert the following block diagram to signal flow graph. Determine the transfer function *C(s)/R(s)* using Mason's gain formula.



[CO1][L3] **10**

b) Write the differential equations describing the dynamics of mass spring damper system. Also obtain the transfer function $\frac{X_2(s)}{F(s)}$



[CO1][L3] **10**

Q.3 a) Using Routh Hurwitz criterion, find the range of *K* for which the system with transfer function $\frac{K}{s(s^2+s+1)(s+4)+K}$ is stable. [CO2][L4] **10**

b) Draw the root locus of a system with $G(s)H(s)=\frac{K}{(s+3)(s+1)(s+2)}$ when *K* is varied from 0 to ∞. [CO3][L3] **10**

Q.4 a) Explain the steps followed for drawing Bode plot. [CO3][L2] **10**

b) Using Nyquist stability criterion, find the stability of closed loop system with $G(s)H(s)=\frac{10}{s(5s+1)}$. [CO2][L3] **10**

PART-B

Q.5 a) Discuss phase lag compensation with circuit diagram and Bode plot. [CO4][L2] **10**

b) Explain PID Controller and its applications. [CO4][L4] **10**

Q.6 a) A feedback system is characterized by the closed loop transfer function $T(s)=\frac{s^2+3s+3}{s^3+2s^2+3s+1}$. Construct the state space model of the system. [CO1][L3] **10**

b) The state space model of a system is given by $\dot{x}=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ -6 & -11 & -6\end{bmatrix}x+\begin{bmatrix}0\\0\\6\end{bmatrix}u$ and $y=\begin{bmatrix}1 & 0 & 0\end{bmatrix}x$. Find the transfer function model of his state space system. [CO1][L3] **10**

Q.7 a) Explain tracking problem in optimal control theory. [CO5][L2] **10**

b) Explain the different non linearities like saturation, dead zone and hysteresis. [CO5][L2] **10**

End Semester Examination, Dec. 2023

B. Tech. - Fifth Semester

INTRODUCTION TO SMART GRID (BEE-DS-527)

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

No. of pages: 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) Why is there a need for the concept of Smart Grid? [CO-1][L-2]

b) Define Energy Management System (EMS). [CO-2][L-1]

c) Define smart energy resources. [CO-2][L-1]

d) What is power quality, and how does it impact the operation of a Smart Grid? [CO-2][L-2]

e) What are FACTS and HVDC technologies, and why are they important in grid management? [CO-2][L-1]

f) Home automation is integral part of a smart grid infrastructure. Justify [CO-3][L-2]

g) What is a power quality audit, and why is it important in a smart grid? [CO-2][L1]

h) Differentiate between Automatic Meter Reading (AMR) and AMI. [CO-3][L-2]

i) What is the primary purpose of smart meters, and how do they enable real-time pricing and interaction with smart appliances? [CO-3][L-2]

j) What is a Home Area Network (HAN), and how does it relate to consumer participation in demand response programs? [CO-3][L-2] **2×10**

PART-A

Q.2 a) Discuss the evolution of the electric grid, highlighting key milestones and changes in its structure and functionality. [CO-1][L-2] **10**

b) Explain the differences between a conventional grid and a Smart Grid, emphasizing how the latter introduces concepts like resilience and self-healing. [CO-1][L-2] **10**

Q.3 a) Define Distribution Management System (DMS) and explain its functions in the context of distribution grid management. [CO-2][L-2] **10**

b) Discuss the potential impact of widespread PHEV adoption on the electrical grid and the concept of vehicle-to-grid (V2G) technology. [CO-2][L-2] **10**

Q.4 a) Differentiate between Automatic Meter Reading (AMR) and Advanced Metering Infrastructure (AMI). [CO-1][L-2] **10**

b) Discuss how building automation systems contribute to energy efficiency and occupant comfort in commercial buildings. [CO-1][L-2] **10**

PART-B

Q.5 a) How can web-based power quality monitoring help in early detection of power quality issues in the grid? [CO-2][L-2] **8**

b) What are some common power quality issues grid? How can the power quality audit reply to find corrective measures? [CO-2][L-2] **12**

Q.6 a) What are the potential power quality issues that grid-connected renewable energy sources, such as solar and wind, can introduce to the grid? [CO-2][L-2] **10**

b) Explain the role of LAN in facilitating communication among devices within a specific area of a smart grid. [CO-3][L-2] **10**

Q.7 a) Describe the components and devices typically connected to a HAN in a smart grid. How does HAN enable consumers to actively participate in demand response programs and manage their energy consumption? [CO-3][L-2] **10**

b) How can smart grids ensure the security and privacy of data transmitted through these communication systems? Discuss the potential cyber security risks associated with communication systems in smart grids and measures to mitigate them. [CO-3][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech – Fifth Semester

DISTRIBUTED GENERATION (BEE-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 in brief:

a) What is meant by distributed generation? [CO-1][L-1]
b) List different resources used in distributed generation. [CO-1][L-1]
c) Compare conventional and non conventional energy resources. [CO-1][L-2]
d) List different storage systems used in distributed generation. [CO-1][L-1]
e) What are the different issues related with islanded power system? [CO-2][L-2]
f) What is meant by voltage regulation? [CO-2][L-1]
g) How does change in load effects system frequency? [CO-2][L-2]
h) What is need of tap changer in distributed generation? [CO-3][L-2]
i) How is reactive power compensated? [CO-3][L-1]
j) Which power electronic devices are used for voltage control? [CO-3][L-2] **2×10**

PART-A

Q.2 a) Evaluate the present energy sector and explain how distributed generation can solve the issues related with it? [CO-1][L-2] **10**

b) Compare different techniques available for obtaining energy from biomass. [CO-1][L-3] **10**

Q.3 a) What is photovoltaic effect? Draw and explain system utilizing solar energy for power generation in standalone mode. [CO-1][L-2] **10**

b) How wind energy can be used for power generation? Give advantages and disadvantages of wind energy conversion system. [CO-1][L-1] **10**

Q.4 a) With diagram explain the grid interfacing of distributed generation system. [CO-2][L-1] **10**

b) What are the different types of storage systems available and how distributed generation is dependent on these storage systems? [CO-2][L-2] **10**

PART-B

Q.5 a) Explain different power quality issues in distributed generation system. [CO-2][L-1] **10**

b) Compare standalone and grid connected distributed systems. [CO-2][L-3] **10**

Q.6 a) With diagram explain wind turbine configuration for independent, partially dependent and totally dependent on power electronics. [CO-3][L-2] **10**

b) Explain central, string and multistring inverter configuration of solar photovoltaic system with the help of an diagram. [CO-3][L-2] **10**

Q.7 a) Explain the configurations of two-stage power converters for fuel cells using a diagram. [CO-3][L-1] **10**

b) Briefly explain structure of communication in a smart grid network. [CO-3][L-1] **10**

End Semester Examination, December. 2023

B. Tech (Mechanical (Electric Vehicle), - Fifth Semester

DESIGN ARCHITECTURE AND CONTROL OF ELECTRIC VEHICLE (BEE-DS-535)

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

No. of pages: 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) Recall the effect of rolling resistance and factors on which the rolling coefficient is dependent [CO-1][L-1]
b) Differentiate between hybrid electric vehicles and Plug in vehicle. [CO-1][L-2]
c) List the power converters that can be employed in hybrid vehicles. [CO-2][L-1]
d) Comment on the suitability of DC and AC machines for electric and hybrid electric vehicle operations [CO-2][L-2]
e) List the application of DC Drives. [CO-1][L-1]
f) Discuss the importance of controllers in EV. [CO-2][L-2]
g) Give the examples of open loop and closed-loop control system. [CO-3][L-1]
h) List various types of motors used in electric vehicles. [CO-2][L-1]
i) Enumerate the importance of firing angle control [CO-1][L-1]
j) What are the different configurations of Inverters? [CO-2][L-2] **2×10**

PART-A

Q.2
a) Discuss the block diagram of series configuration and enumerate power flow also. [CO-1] [L-2] **10**
b) Summarize the economic and environmental impact of hybrid vehicles. [CO-1] [L-2] **10**

Q.3
a) Discuss the components of plug in hybrid vehicle with detail block diagram. [CO-1][L-2] **10**
b) Explain the working of Fuel Cell based Electric Vehicles and List the factors considered for implementation. [CO-1] [L-2] **10**

Q.4
a) Analyze the operation of buck converter with appropriate waveforms of load voltage and load current. [CO-2] [L-4] **10**
b) Illustrate the operation of Multi-quadrant operation of DC-DC Converters. [CO-2] [L-3] **10**

PART-B

Q.5 Analyze the operation of three phase bridge star connected inverter in 180 degree mode of conduction and star connected. Determine its conduction state and draw the waveform of phase voltages. Also lists its application. [CO-2] [L-4] **20**

Q.6
a) Discuss the block diagram of electric Drives. Also list factors influencing the choice of electrical drive. [CO-3] [L-2] **10**
b) Describe the operation single phase controlled rectifier fed DC drives. [CO-3] [L-2] **10**

Q.7
a) Explain the operation of The Electronic Control Unit (ECU). [CO-3] [L-2] **10**
b) Discuss the block diagram of closed loop control system and explain its components employed in EV. [CO-3] [L-2] **10**

End Semester Examination, Dec. 2023

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
a) List the five fundamental sources of energy. [CO-1][L-1]
b) Label the energy scenario in the form of a pictorialrepresentation in INDIA. [CO-1][L-2]
c) Why anemometer is used in the wind energy system? [CO-3][L-2]
d) What are the advantages of using wind energy? [CO-4][L-1]
e) Compare fixed-speed and variable-speed wind Turbine Generators. [CO-2][L-2]
f) Give the name of the instruments used to measure the solar radiation and sunshine hours. [CO-6][L-1]
g) Discuss I-V characteristics of solar Cells. [CO-2][L-2]
h) Which type of solar cell has higher efficiency? [CO-5][L-1]
i) Draw the power curve of the wind turbine. [CO-3][L-3]
j) Is solar thermal power generation AC or DC?Justify reason. [CO-6][L-1] **2×10**

PART-A

Q.2
a) Discuss Indian and Global statistics of wind power. [CO-1][L-2] **10**
b) Relate the impact of wind energy on environment. [CO-2][L-3] **10**

Q.3
a) Examine the energy conversion process of wind energy System. [CO-2][L-2] **10**
b) Interpret the operation of a doubly fed Induction generator used in wind energy system when fed to the grid. [CO-3][L-3] **10**

Q.4
a) Express the working of the sunshine recorder with a diagram. [CO-3][L-2] **10**
b) Outline the challenges and remedies associated with the use of solar energy. [CO-4][L-2] **10**

PART-B

Q.5
a) Develop the mathematical model of PV Cells. [CO-6][L-5] **10**
b) Summarize the different converters used solar photovoltaic applications. [CO-5][L-2] **10**

Q.6
a) Explain solar PV and wind farm behavior during grid disturbances. [CO5][L2] **10**
b) Illustrate the purpose of fault ride-through for wind farms. [CO-4] [L-3] **10**

Q.7
a) Differentiate fresnel and solar pond system. [CO-6] [L-2] **10**
b) Analysis of various methodologies of solar thermal power generation. [CO-4] [L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

SMART GRID TECHNOLOGY (BEE-DS-725)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a) What is the main aim of smart grid? [CO-1][L-1]
b) How does smart grid save energy? [CO-1][L-1,2]
c) Compare the concept of resilient and self healing Grid. [CO-5][L-4]
d) What do you understand by AMI? [CO-3][L-2]
e) What is the effect of microgrid on the reliability? [CO-5][L-2,4]
f) Why power quality conditioner is required? [CO-4][L-2]
g) What is a Macro grid? [CO-2][L-1]
h) Describe the advantage of plastic solar cell over solar cell? [CO-3][L-4]
i) Explain OMS and why it is required. [CO-4][L-2]
j) Why smart meter is an important component of the smart grid. [CO-2][L-3] **2×10**

PART-A

Q.2 a) Compare conventional grid and smart grid. [CO-2][L-1] **10**
b) Describe the opportunities and challenges relate to smart grid. [CO-1][L-1,2] **10**

Q.3 a) Explain how smart meters can be play an important role to make a system smart. [CO-2][L-1,2] **10**
b) Discuss benefits of using PMU. Also compare PMU with SCADA. [CO-3] [L-2,4] **10**

Q.4 a) Describe and explain the power quality issues of grid connected renewable energy resources. [CO-2][L-1,2] **10**
b) How reliability of smart grid can be enhanced by integrating Intelligent Electronics Devices into it? [CO-3][L-4] **10**

PART-B

Q.5 a) Explain the concept of plug in hybrid electric vehicle technology and it challenges. [CO-4][L-4,2] **10**
b) Write short note on cyber security for smart grid. [CO-5][L-1,2] **10**

Q.6 a) Differentiate between AC and DC type Microgrid. [CO- 5][L-1,2] **10**
b) Explain in detail the concept of micro grid its need and applications. [CO-5][L-1,3] **10**

Q.7 a) Discuss the role of HAN and NAN in smart grid. [CO-4] [L-2] **10**
b) Illustrate power quality monitoring concept and also explain monitoring considerations. [CO-4][L-1,2] **10**

End Semester Examination, Dec. 2023

OPEN ELECTIVE - COMMON FOR ALL BRANCHES

ROBOTICS AND ITS APPLICATIONS (BEE-OE-002)

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

No. of pages: 1

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

Q.1 Answer the following questions:

a) Define 'robot'. [CO1] [L2]
b) What is an end effector? [CO1] [L2]
c) What do you mean by reverse kinematics? [CO2] [L2]
d) Name the different types of wheels used in mobile robot. [CO3] [L2]
e) What is a force sensor? [CO1] [L2]
f) What are the important blocks in a robot navigation? [CO1] [L2]
g) What are drones? [CO4] [L2]
h) Compare prismatic and revolute joint. [CO1] [L2]
i) What is a rehabilitation robot? [CO4] [L2]
j) Name the basic blocks of robot vision system. [CO4] [L2] **2×10**

PART-A

Q.2 a) Explain the classification of robots. [CO-1] [L-2] **10**
b) Narrate the history of robots. [CO-2] [L-2] **10**

Q 3 a) Compare magnetic and pneumatic grippers. [CO-1] [L-2] **10**
b) Differentiate accuracy and repeatability of an industrial robot. [CO-2] [L-2] **10**

Q.4 a) Explain pneumatic drive systems with diagram. [CO-2] [L-2] **10**
b) Explain any two tactile sensors used in robots. [CO-1] [L-2] **10**

PART-B

Q.5 a) Explain the forward Kinematics of a 3 link robot manipulator. [CO-2] [L-2] **10**
b) Compare legged and wheeled locomotion. [CO-3] [L-2] **10**

Q.6 a) Explain the architecture of map based localization. [CO-3] [L-2] **10**
b) Analyze the different tasks involved in digital image processing. Describe its advantages and disadvantages. [CO-3] [L-2] **10**

Q.7 a) Explain the applications of robots in industrial sector. [CO-4] [L-2] **10**
b) Explain the applications of robots in healthcare sector. [CO-4] [L-2] **10**

End Semester Examination, Dec. 2023

OPEN ELECTIVE – COMMON FOR ALL BRANCHES

AUTOMATION IN INDUSTRY (BEE-OE-003)

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

No. of pages: 1

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

Q.1 Answer the following questions:

a) Enlist the types of automation. [CO-1][L-1]
b) Examine the shape of output in ladder programming in PLC language.
c) What are analog and digital signals? CO-3][L-2]
d) Write examples of output devices used in PLC systems? [CO-1][L-1]
e) List the programming languages commonly used for programming PLCs. [CO-1][L-1]
f) Which types of sensors are typically used for water level control in industrial applications? [CO-1][L-1]
g) To reset the time for a PLC which condition must be true? [CO-1][L-1]
h) List two applications of Industrial Automation. [CO-1][L-1]
i) Define DCS (Distributed Control System). [CO-1][L-1]
j) How is addressing implemented in PLC programming typically? [CO-2][L-2] **2×10**

PART-A

Q.2 Design a program in PLC for digital logic gates: AND, OR, XOR, NOR and NAND. [CO-1][L-1] **20**

Q.3 Explain the block diagram and design of a Programmable Logic Controller (PLC). What are the different types of input and output devices used in PLC? [CO-2][L-1] **20**

Q.4 a) Explain the wiring diagram for input and output modules for PLC. [CO-3][L-1] **10**
b) Discuss the steps in PLC scanning process. [CO-3][L-2] **10**

PART-B

Q.5 Demonstrate with examples the use of counters in programmable Logic Controllers. [CO-2] [L-1] **20**

Q.6 Describe the detailed distributed control system (DCS) used in industrial automation, including its components and their connections, using a block diagram. [CO-3][L-1] **20**

Q.7 Enumerate the diverse applications of robots across various industries. [CO-4][L-1] **20**

End Semester Examination, Dec. 2023

OPEN ELECTIVE – COMMON FOR ALL BRANCHES

GREEN ENERGY RESOURCES (BEE-OE-004)

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

No. of pages: 1

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

Q.1
a) Provide an example each for classification of energy sources as renewable and non-renewable. [CO-1][L-2]
b) Why improving energy efficiency is considered a cost-effective way to address energy challenges. [CO-1][L-2]
c) Explain the basic concept of solar energy conversion. [CO-2][L-1]
d) Name two common types of solar collectors. [CO-2][L-2]
e) Mention one characteristic of photovoltaic systems that makes them suitable for distributed energy generation. [CO-2][L-2]
f) What factors are considered when designing the layout of a photovoltaic array? [CO-2][L-1]
g) List the primary components of a wind power system. [CO-3][L-1]
h) Define biomass. [CO-4][L-2]
i) Define the concept of geothermal energy. [CO-3][L-2]
j) List advantages of using wave energy as a renewable energy source. [CO-4][L-2] **2×10**

PART-A

Q.2
a) Discuss the importance of renewable energy resources in the context of addressing India's energy needs. [CO-1][L-2] **10**

b) Define energy efficiency and discuss its significance in sustainable energy practices. [CO-1][L-2] **10**

Q.3
a) Discuss the components and working of solar collection systems. [CO2][L-2] **10**

b) Explain the different types of solar collectors used for harnessing solar energy. [CO-2][L-2] **10**

Q.4
a) Discuss the factors considered in designing PV arrays for efficient energy production. [CO-2][L-2] **10**
b) Describe the characteristics of photovoltaic (PV) systems and their components. [CO-2][L-2] **10**

PART-B

Q.5
a) Describe different types of wind turbines and their ratings. [CO-3][L-2] **8**
b) What factors influence the choice of generators in wind energy systems, and how suitable site is selected? [CO-3][L-2] **12**

Q.6
a) Define biomass and biogas and their relevance in renewable energy. [CO-4][L-2] **10**
b) Discuss the fermentation and wet processes involved in bioenergy production. [CO-4] [L-2] **10**

Q.7
a) Explain the concept of waste-to-energy conversion and its environmental benefits. [CO-4][L-2] **10**

b) Explain the concept of geothermal energy and its applications. [CO-3][L-2] **10**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Express the objectives of Cyber Law and how it is useful for the society. [CO-3][L-2]
b) What are the three most important aspects of information security? [CO-1][L-2]
c) Define the term 'Hacking' and explain its essentials. [CO-1][L-3]
d) Briefly explain the benefits of Cyber Laws. [CO-4][L-1]
e) Discuss Network Security and Cryptography? [CO-2][L-3]
f) List out some tools used by ethical hackers. [CO-5][L-1]
g) Write down the measures, taken to protect from cyber crime. [CO-6][L-5]
h) Describe any two violations of intellectual property rights. [CO-6][L-2]
i) Explain how IT Act illustrates the authentication of electronic records. [CO-6][L-1]
j) Briefly discuss why intellectual property rights are important and crucial?

[CO-6][L-1] **2×10**

PART-A

Q.2 a) Explain in detail about different typologies of Internet Theft/Fraud. [CO-1][L-1] **10**
b) Explain the terms: Trojans, Phishing, Spam and Web encroachment. [CO-1][L-1] **10**

Q.3 a) Describe the building blocks of a secure system. [CO-2][L-2] **10**
b) Who is a cybercriminal? Give different examples of cybercrimes. [CO-2][L-1] **10**

Q.4 a) Discuss the importance of cyber law in India. What caused the development of cyber law? [CO-3][L-2] **10**
b) Write short notes on:
i) SQL scripting.
ii) Cross-site scripting. [CO-3][L-2] **5×2**

PART-B

Q.5 a) 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] **10**
b) Explain the cyber laws in India, their scope and coverage in detail. [CO-4][L-2] **10**

Q.6 a) Explain the importance of cyber ethics with suitable example. [CO-5][L-1] **10**
b) Explain freedom of speech and expression in cyber space. [CO-5][L-2] **10**

Q.7 a) Why is intellectual property important to information technology? Explain the four types of intellectual property. [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-1] **10**

End Semester Examination, Dec. 2023

B. Tech. – First / Second Semester

PROFESSIONAL COMMUNICATION – I (BHM-100/BHM-101)

Time: 2 hrs. Max. Marks: **50**

No. of pages: 1

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

Q.1 Explain the concept of LSRW in communication with examples. [CO-2][L-1] **10**

PART-A

Q.2 What do you understand by non-verbal communication? Explain with examples. [CO-2][L-1] **10**

Q.3 Discuss the barriers of effective listening. [CO-2][L-1] **10**

Q.4 What all aspects need to be taken into consideration for delivering an effective presentation? [CO-3][L-1] **10**

PART-B

Q.5 Explain common errors in communication with five examples. [CO-1][L-1] **10**

Q.6 Discuss the essentials of paragraph writing process. [CO-3][L-1] **10**

Q.7 Explain the various types of reading with examples. [CO-2][L-1] **10**

End Semester Examination, Dec. 2023

B. Tech. – First / Second Semester

ENGLISH (BHM-201/ BHM-201A/ BHM-121/ HSMC-101)

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 Rahul and his friends _____ also invited to the party. [L1][CO1]

A] is B] was

C] had D] were

Q.2 _____ is the only component of attitude which is visible and can be observed directly. [L1][CO1]

A] Behavior B] Cognitive

C] Happiness D] Kinesthetic

Q.3 What is an effect of attitude: [L1][CO1]

A] Get you fired B] Get you nowhere

C] Helps you do more D] None of the above

Q.4 Which tense is used to express general truths and facts? [L2][CO1]

A] Present continuous tense B] Present perfect tense

C] Past perfect tense D] Present indefinite tense

Q.5 According to the prevailing rate, two dozen _____ rupees one hundred. [L1][CO1]

A] costs B] cost

C] costing D] Costed

Q.6 Each and every member _____ to vote. [L3][CO1]

A] has B] have

C] having D] are

Q.7 A large number of soldiers _____ died for the country. [L1][CO1]

A] has B] is

C] are D] have

Q.8 Half of the class _____ empty. [L3][CO1]

A] were B] was

C] has D] have

Q.9 He _____ (write) to me every month. [L1][CO1]

A] is writing B] writing

C] has been writing D] has been writing

Q.10 All the actors and performers _____ in the theatre. [L1][CO2]

A] Are present B] Is present

C] Have present D] had present

Q.11 The way you feel or think about something or someone is known as your [L1][CO1]

A] Emotions B] Personality

C] Genetics D] Attitude

Q.12 I _____(write) to her last week. [L3][CO1]

A] wrote B] has been writing

C] had been writing D] written

Q.13 He _____ (be) weak in English in the beginning. [L1][CO1]

A] being B] been

C] was D] had been

Q.14 He _____ (teach) in this college for five years. [L1][CO1]

A] teaches B] is teaching

C] taught D] has been teaching

Q.15 Physics _____ difficult to understand. [L3][CO1]

A] were B] was

C] has D] is

Q.16 Jameson has been assigned to complete an important project using new software. She is afraid that she will be unable to do so. Judy's fear is an example of the _____ attitude component. [L3][CO1]

A] Cognitive B] Affective

C] Group D] Individual

Q.17 What is the rule to decide the color of the belt (for men)? [L3][CO1]

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.18 Listening is the ability to _____ and appropriately respond to the meaning of another person's spoken and nonverbal messages. [L3][CO1]

A] Understand B] Analyze

C] Respect D] All of these

Q.19 How many types of memory are there? [L3][CO1]

A] one B] two

C] three D] four

Q.20 Which of the following is not a type of Memory _____. [L3][CO1]
A] Short Term Memory B] Working Term Memory
C] Both A] and B] D] None

Q.21 Which of these is not a step in the listening process? [L3][CO1]
A] To stop talking B] Receiving
C] Misinterpreting D] Responding

Q.22 How many listening levels are there? [L1][CO1]
A] one B] two

C] four D] five

Q.23 Mostly emotional barriers are faced by: [L1][CO1]
A] Introverts B] Extroverts

C] Listeners D] Talkative persons

Q.24 Fear of rejection is a type of:

[L1][CO1]
A] Depression B] Failure

C] Sadness D] Speech anxiety

Q.25 Some of the grapes at the local market _____ from Mexico. [L3][CO1]
A] Come B] Comes
C] Came D] Coming

Q.26 Either my aunts or my uncle _____ going to be at my party.
[L3][CO2]
A] were B] was

C] has D] is

Q.27 Claudia, as well as Judy, _____ American Sign Language. [L1][CO1]
A] Speaking B] Speak
C] Spoke D] Speaks

Q.28 The football team _____ every day.
[L1][CO1]
A] Practices B] Practicing
C] Practiced D] Practice

Q.29 Each of the winners_____ a scholarship and a trophy. [L3][CO2]
A] Received B] Receiving
C] Receives D] Recieve

Q.30 Everyone in class _____ to study. [L1][CO1]
A] Need B] Needing
C] Needs D] Needed

Q.31 Where _____ your grandmother and grandfather live? [L1][CO1]

A] Does B] Do

C] Did D] None of these

Q.32 A lot of people always say that they don't have time to do what they want or need to do when in fact. [L3][CO2]

A] They know how to organise their activities

B] They don't know how to calculate their activities

C] They don't know how to organise their activities

D] They don't know how to reduce their activities

Q.33 To spend your time productively, you need to have set some _____. [L1][CO1]

A] Short Term Goals B] Long Term Goals

C] SMART Goals D] Goals

Q.34 Which word means to delay or put off doing something by wasting your time on less important tasks? [L3][CO2]

A] Postpone B] Procrastinate

C] Abandon D] Cancel

Q.35 You and your family need to be at an important appointment by 7:00 p.m. It's a 30-minute drive. When do you leave your house?

[L3][CO1]

A] At 6:45, unfortunately. We'll call to say we're running late

B] At 6:30, obviously.

C] Early enough to allow time to load up the kids and all our stuff, so that we're in the car and on the road by 6:30.

D] Depends on when we are ready to leave.

Q.36 What's the one thing that doesn't belong on a to-do list? [L3][CO1]

A] A detailed list of all tasks for the day.

B] The amount of time each task will take.

C] The movie you want to watch.

D] That yoga class you'd like to take.

Q.37 What's your relationship with social media? [L3][CO1]

A] We're tight. I check Twitter and Instagram first thing in the morning and last thing before bed.

B] It's reasonable. I use it to keep up with people and events, but it doesn't dominate my life.

C] Its over. I quit using it because it's such a time suck.

D] I was only going to check Facebook for five minutes, I swear! What happened to the last two hours?

Q.38 How many minutes does the average Indian spend commuting to work/college each day? [L3][CO1]

A] 29. B] 25.

C] 38. D] 20.

Q.39 You've got some unexpected downtime while waiting to pick up family or friends. What do you do? [L3][CO1]

A] Text a friend. B] Check my social accounts.
C] Play some games. D] Any of the above.

Q.40 What part of SMART is missing from this goal? I will improve my grade in science. [L1][CO1]

A] Not Time Bound B] Not Specific enough
C] Not attainable D] Not measurable

Q.41 What part of SMART is missing? This month, the first time my mother asks me to do something; I will do what she asks. [L1][CO1]

A] Not Time Bound B] Not Specific enough
C] Not attainable D] Not measurable

Q.42 For me breakfast is_____best meal of the day. [L1][CO2]

A] A B] An
C] The D] No article

Q.43 ____ children recited_____ poem in_____honour of____ Prime minister. [L1][CO2]

A] the,a,an,a B] a, the, the, the
C] no article, a, an, the D] the, a, the, the

Q.44 They wanted to hear _____ end of story. [L1][CO2]

A] a B] an
C] the D] No article

Q.45 Which of these must be avoided by the speaker? [L1][CO3]

A] He must convey precise information.
B] He must ensure that the information is understood by the audience.
C] He must inspire the audience to totally accept his point of view.
D] He must force the audience to totally accept his point of view.

Q.46 Kabir had already finished the task when his boss_____. [L1][CO2]

A] Arrives B] Arrived
C] Arriving D] None of these

Q.47 It snows in Shimla. (Identify the tense): [L1][CO2]

A] Simple Present B] Simple Past
C] Present Continuous D] Simple Future

Q.48 Radhika always_____ an apple jam in her breakfast. [L1][CO2]

A] Eat B] Eats
C] Eating D] Ate

Q.49 My classmates_____practicing. (Put the correct present continuous tense) [L1][CO2]

A] is B] are
C] were D] was

Q.50 Which of these qualities are important in a group discussion? [L1][CO3]

A] Emotional stability B] Hostility
C] Ignorance D] Aggressiveness

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

UNIVERSAL HUMAN VALUES (BHM-320)

Time: 2 hrs. Max Marks: **50**

No. of pages: 4

Note: *All questions are **compulsory**. Each question has **FOUR** options with **ONE** correct answer. Select the correct answer. All questions are of **ONE** mark each. There is **no NEGATIVE** marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.*

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

Q.1 What are the basic desires of every human being for which they are working: [CO-1][L-1]

a) Physical facilities b) Realization and understanding
c) Happiness and prosperity d) Continuous happiness and prosperity

Q.2 What is called living with assumption for oneself as body and Living of Human being only based on physical facilities, and not with right understanding and relationship? [CO-1][L-1]

a) Human Consciousness b) Happiness
c) Right Understanding d) Animal Consciousness

Q.3 Self-exploration is a process which helps us to find out "What I am and What I really want to be". Two mechanisms involved in self-exploration are: [CO-1][L-2]

a) Realization and Understanding
b) Natural and Verifiable
c) Natural acceptance and experimental validation
d) Correctable and identifiable

Q.4 Contents of self-exploration are: [CO-1][L-2]

a) Desire and Needs b) Program and Needs
c) Program and Practical d) Desire and Program

Q.5 What is necessary but not complete for human beings: [CO-2][L-1]

a) Physical facility b) Happiness c) Prosperity d) Relationship

Q.6 Human-Human Interaction is called as: [CO-2][L-1]

a) Work b) Behaviour c) System d) None

Q.7 Imagination is continuous with: [CO-1][L-1]

a) Time b) Place c) Height d) None

Q.8 Imagination is the activity of: [CO-1][L-1]

a) Desires b) Thoughts c) Expectation d) All of these

Q.9 What is the fourth level of living? [CO-1][L-1]

a) Society b) Nature c) Individual d) Family

Q.10 What helps self in exploration and interaction with rest of the nature? [CO-1][L-2]

a) Body b) Soul c) Mind d) Spirit

Q.11 The needs of body are: [CO-1][L-1]

a) Qualitative b) Quantitative
c) Neither Qualitative nor Qualitative d) Both Quantitative and Qualitative

Q.12 The activities of desire, thoughts and expectation at the level of the self are collectively called as: [CO-2][L-1]
a) Imagination b) Knowing c) Recognizing d) Understanding

Q.13 Which of the following leads to variety of problems at different levels of our living? [CO-2][L-2]
a) Lack of right understanding of happiness
b) Lack of right understanding of prosperity
c) Lack of right understanding of happiness & prosperity
d) Lack of awareness towards health

Q.14 Which of the following is NOT a response of the Self? [CO-1][L-2]
a) Knowing b) Assuming c) Recognising d) Preconditioning

Q.15 Preconditioning is: [CO-1][L-2]
a) Assuming without Knowing b) Knowing without Assuming
c) Only Assuming d) Only Knowing

Q.16 Prosperity deals with: [CO-2][L-2]
a) Right understanding in the self
b) Fulfilment in relationship
c) Ensuring more than required physical facility
d) None

Q.17 The human goal at the level of individual is: [CO-1][L-1]
a) Prosperity b) Fearlessness c) Co-existence d) Right Understanding

Q.18 In which way body system works? [CO-1][L-2]
a) Self Organized b) Unorganized
c) Poorly Organized d) Self Centered

Q.19 Which of the following capacity leads to desires? [CO-1][L-1]
a) Power b) Expectation c) Realization d) Thoughts

Q.20 Which of the following comprises the activities of choosing and imaging? [CO-1][L-1]
a) Self b) Body c) Mind d) None

Q.21 Sah-astitva means. [CO-2][L-1]
a) Co-existence b) Co-operation c) Cooption d) Corporate Identity

Q.22 The process of education and right living leads to ……in the individual. [CO-2][L-2]
a) Right understanding b) Health
c) Prosperity d) None

Q.23 Ensuring justice in the relationship, on the basis of values leads to ___in society. [CO-2][L-2]
a) Fearlessness b) Confusion c) Confidence d) Fear

Q.24 _____is foundational value in relationship. [CO-2][L-2]
a) Respect b) Love c) Trust d) Glory

Q.25 To be assured of others at all the time is feeling of_____. [CO-3][L-1]
a) Respect b) Love c) Trust d) Glory

Q.26 _____means right evaluation. [CO-3][L-1]
a) Respect b) Love c) Trust d) Glory

Q.27 The feeling that other is related to me is called: [CO-2][L-2]
a) Love b) Affection c) Gratitude d) Respect

Q.28 The feeling to nurture and protect the body of our relative is called_____. [CO-2][L-2]
a) Care b) Affection c) Gratitude d) Respect

Q.29 Ensuring right understanding and feeling in the others called_____. [CO-2][L-1]
a) Care b) Affection c) Gratitude d) Guidance

Q.30 Acceptance of excellence in others is called _____ . [CO-2][L-1]
a) Reverence b) Glory c) Gratitude d) Guidance

Q.31 Co-existence is ever-present,ever-effective,ever_____. [CO-2][L-1]
a) Expensive b) Expressive c) Exteded d) Exhausted

Q.32 Aspects to understand any unit are: [CO-2][L-3]
a) Form & Property
b) Form, Property & Natural Characteristics
c) Form, Property, Natural Characteristics & Innateness
d)Form, Property, Natural Characteristics,Innateness & Coexistence

Q.33 All the units are _____in _____. [CO-2][L-2]
a) Conscious,Material b) Submerged,Space
c) Recognizes,Fulfills d) Covered,Space

Q.34 Form, seen at the level of _____. [CO-2][L-2]
a) Analyzing b) Imaging c) Realizing d) Selecting/Tasting

Q.35 Knowledge means. [CO-1][L-1]
a) Specialization in Skill b) Speaking about Right or Wrong
c) Having degrees d) To know the reality as it is

Q.36 As the outcome of submergence animal self expresses. [CO-1][L-1]
a) Interaction b) Pulsation
c) Sensitivity d) Knowability/Potential to know

Q.37 Conscious Units are:
[CO-1][L-1]
a) Gathansheel b) All pervading c) Gathanpoorna d) Inactive

Q.38 To live in co-existence with entire nature-family to world family order [CO-3][L-1]
a) Knowledge b) Resolution
c) Undivided Human Society d) Universal Human Order

Q.39 Resolution means. [CO-3][L-1]
a) Immediate Solution of the problem b) Spontaneous working on the issues
c) Solution in bits d) Feeling and thought of Co-existence

Q.40 Co-existence, the submergence, is seen by the self at the level of its activity. [CO2] [L2]
a) Realization b) Contemplation c) Understanding d) Imaging

Q.41 Right Understanding includes. [CO-1][L-2]
a) Knowledge of Human Being b) Knowledge of Existence
c) Knowledge of Human Conduct d) All of the above

Q.42 The participation of the human being in ensuring the role of physical facility in nurture, protection and providing means for the body is called its _____. [CO-1][L-1]
a) Utility value b) Artistic Value c) Both a and b d) None of the above

Q.43 The participation of the human being in ensuring the role of physical facility to help and preserve its utility is called its_____. [CO-1][L-2]
a) Utility value b) Artistic Value c) Both a and b d) None of the above

Q.44 The ethical human conduct can be characterized by: [CO-1][L-2]
a) Mulya b) Mulya-Neeti
c) Mulya-Neeti-Charitra d) None of these

Q.45 The concept of Abhyudaya tells about: [CO-1][L-1]
a) Welfare of Honest People b) Welfare of Wealthy People
c) Welfare of all d) Welfare of Next Generation

Q.46 Policy for right utilization of Self,Body, Physical Facility is known as: [CO-2][L-2]
a) ArthNeeti b) Raj Neeti c) DharamNeeti d) ShastraNeeti

Q.47 Satisfaction is the state of: [CO-3][L-1]
a) Harmony at the level of selecting and tasting
b) Harmony at the level of analysing and comparing
c) Harmony at the level of desire and contemplation.
d) Harmony at the level of determination and understanding

Q.48 Peace is the state of: [CO-3][L-1]
a) Harmony at the level of selecting and tasting
b) Harmony at the level of analysing and comparing

c) Harmony at the level of desire and contemplation.
d) Harmony at the level of determination and understanding

Q.49 Bliss is the state of: [CO-3][L-1]
a) Harmony at the level of selecting and tasting
b) Harmony at the level of analysing and comparing
c) Harmony at the level of desire and contemplation.
d) Harmony at the level of determination and understanding [CO-3][L-2]

Q.50 All my efforts will now be for authenticating co-existence is the activity of:
a) Realization b) Authentication c) Imagination d) Selection

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

ENTREPRENEURSHIP AND STARTUP (BHM-520)

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

No. of pages: 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) List the traits of an entrepreneur. [CO-2][L-1]
b) Define "Business idea". [CO-1][L-2]
c) What do you understand by the term "Mompreneur and Infopreneur"? [CO-1][L-1]
d) What is the difference between "Marketing" and "Accounting"? [CO-2][L-1]
e) State with an example of a target market in market analysis. [CO-3][L-2]
f) What is "competitive analysis"? [CO-3][L-2]
g) What are the notable policies to support the start-up business in India? [CO-1][L-2]
h) State the significance of startup exit strategy. [CO-2][L-2]
i) State the function of an "activity map". [CO-2][L-1]
j) Differentiate "business pitch" and "elevator pitch". [CO-2][L-1] **2×10**

PART-A

Q.2 a) Differentiate between "entrepreneurship" and "intrapreneurship". [CO-1][L-4] **8**

b) Classify and explain entreprenurship based on the following:
   i) Based on functional characteristics.
   ii) Based on types of business.
   iii) Based on motivational aspects.
   iv) Based on technological aspects. [CO-1][L-4] **12**

Q.3 Try to generate an idea for which a potential idea can be identified as suitable for starting a business. Construct an "activity map" for your business ideas: i) What are the four key processes to deliver your idea? ii) What are the key sub-processes? iii) What conclusions can you draw regarding your operations for key the key competencies and skills you need? [CO-3][L-6] **20**

Q.4 a) Describe "value propositions" of potential innovative product/services. [CO-3][L-3] **10**

b) Recognise success stories: Intrapreneurship examples from India and abroad. [CO-1][L-3] **10**

PART-B

Q.5 a) Create a detail team/organization structure with their role and responsibilities for a "Technology" OR "Manufacturing" OR "Fintech" OR" BioTech" **START UP.** (Choose anyone). [CO-3][L-5] **15**

b) Explain "Patent Licensing". Categorizing the various types of Patent Licensing. [CO-3][L-4] **5**

Q.6 Analyze "Target Market Analysis" and elaborate in details the various strategies to identify a target market. [CO-2][L-4] **20**

Q.7 Discuss how the following entity helps the establishment of India startups:

a) Venture capitalist
b) Angel Investors
c) Crowd fundings
d) External Commercial Borrowings (ECBs)
e) Investment Banking. [CO-3][L-3] **5×4**

End Semester Examination, Dec. 2023

B. Tech. – First / Second Semester

CONSTITUTION OF INDIA (BHM-MC-001)

Time: 1½ hrs. Max Marks: **50**

No. of pages: 3

Note: *The paper consists of **TWENTY FIVE** multiple choice questions; each question has **FOUR** options with **ONE** correct answer. Tick **(√)** the correct answer. All questions are **compulsory**. All questions are of **TWO** marks each. There is no negative marking.*

Q.1 Which of the following is a type of constitution?
a) Spoken constitution
b) Written constitution
c) Royal constitution
d) Democratic constitution

Q.2 Which type of constitution India has?
a) Unwritten constitution
b) Legislative constitution
c) Documented constitution
d) Written constitution

Q.3 Which of the following is not among the fundamental elements of any constitution?
a) Organization of the government of the country
b) Demarcation of powers of center and provinces
c) Basic set of laws of governance
d) Number of states in the country

Q.4 How many parts are there in the Indian constitution?
a) 10 b) 18 c) 25 d) 40

Q.5 What was the primary job of the Constituent Assembly?
a) To decide on the number of provinces India will have
b) To draft the constitution of India
c) To elect the interim Prime Minister of the country
d) To negotiate with the British on the date of independence

Q.6 Who was the Chairman of the Drafting Committee of the Constitution?
a) B.N. Rau b) B.R. Ambedkar
c) Jawaharlal Nehru d) Rajendra Prasad

Q.7 When was the words "Secular'" and "Socialist" were added in the Preamble of Indian constitution?
a) 1976 (42 Constitution Amendment Act)
b) 1958 (18th Constitution Amendment Act)
c) 1980 (50th Constitution Amendment Act)
d) 1982 (52nd Constitution Amendment Act)

Q.8 Which among the following is not a fundamental rights as per Indian constitution?
a) Right to equality b) Right against exploitation
c) Right to clean environment e) Right to constitutional remedies

Q.9 Kesavananda Bharti case is associated to which of the following concepts about Indian constitution?

a) Basic Structure Doctrine
b) Separation of Power between center and states
c) Legislative Reforms in government
d) Panchayati Raj System

Q.10 Which of the following is not true about Fundamental Rights

a) Fundamental Rights are included in Part 111 of constitution
b) Fundamental Rights are justiciable
c) Fundamental Rights can be suspended under some circumstances
d) Fundamental Rights allows citizens to demand basic income from government

Q.11 Directive Principle of State Policy aims to achieve_____.

a) An efficient administration
b) A crime free society
c) A welfare state
d) Honest political party system

Q.12 Schedule 7 of the constitution talks about which the following.

a) Division of power between center and states
b) Fundamental Rights and Directive Principles
c) Emergency powers of the President
d) Judicial appointments

Q.13 What is the meaning of "Double Jeopardy" as mentioned in Article 20 of the Indian constitution?

a) No person will be allowed to jeopardize the integrity of the country
b) A person will not be allowed to hold double citizenship
c) A person will have the right to claim double salary for the period he was unlawfully sacked
d) No person can be convicted for the same offence more than once

Q.14 In a unitary state, how many levels of government exist in any part of the country?

a) 3
b) 1
c) 2
d) Any number that the government wants

Q.15 Which of the following is a type of federalism?

a) Unilateral
b) Holding together
c) Bicameral
d) None of the above

Q.16 Article 1 of Indian constitution defines India as:

a) Fully federal state
b) Quasi unitary state
c) Union of states
d) All of the above

Q.17 In the Indian federal set up, who has more powers.

a) The center
b) The states
c) Both have equal powers

d) President has more powers than both center and states

Q.18 Article 370 related to which state.
a) Jammu & Kashmir
b) Nagaland
c) Dadra & Nagar Havel I
d) All of the above

Q.19 Which of the fol Sowings is not a federal feature of Indian constitution?
a) Two levels of government
b) Division of power
c) Bicameral legislature
d) Center's supremacy

Q.20 The constitution permits parliament to make laws on any items in the State List, if:
a) The central government wants to make laws
b) There is any inter-state festival requiring common laws
c) Land needs to be acquired to set up an industry of national importance
d) A national emergency is declared

Q.21 The central government can advise states on issues related to:
a) Military communication infrastructure
b) ST welfare
c) Railway safety
d) All of the above

Q.22 "India has an integrated judicial system in charge of enforcing both federal and state laws."
a) True
b) False
c) Depends on the nature of law
d) Only the President can decide on the judicial enforceability

Q.23 Which among the following is not a criteria for deciding revenue distribution as per the XVth Finance Commission?
a) Needs
b) Equity
c) Seats in legislature
d) Performance

Q.24 Article 131 gives the Supreme Court the original jurisdiction to resolve which types of disputes.
a) Water sharing disputes
b) Sedition related cases
c) Center-State relations
d) Agricultural policies

Q.25 Article 19 comprises of:
a) Right to assemble
b) Right to freedom of expression
c) Right to settle
d) All of the above

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

QUANTITATIVE APTITUDE AND PERSONALITY DEVELOPMENT (BHM-MC-004/MA-301/MA-301A)

Time: 2 hrs. Max Marks: **50**

No. of pages: 4

Note: *All questions are **compulsory**. Each question has **FOUR** options with **ONE** correct answer. Select the correct answer. All questions are of **ONE** mark each. There is **no NEGATIVE** marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.*

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

PART-A (Aptitude Section)

Q.1 The average weight of first 9 persons among 10 persons is 50 kg. The weight of 10th person is 27 kg more than the average weight of all the 10 persons. The weight of the 10th person is: [CO-1][L-2]

a) 65 kg b) 78 kg c) 85 kg d) 80 kg

Q.2 If the average marks of three batches of 30, 40 and 50 students respectively is 50, 40 and 30 then the average marks of all the students is: [CO-1][L-3]

a) 54.68 b) 38.33 c) 55 d) None

Q.3 Find the sum of first 52 natural numbers. [CO-1][L-3]

a) 1378 b) 1457 c) 1275 d) None

Q.4 log 2 = 0.3010 and log 3 = 0.4771, the values of $\log_5 512$ is: [CO-1][L-2]

a) 2.875 b) 3.875 c) 4.875 d) 5.875

Q.5 $\sqrt{2}$ is a – [CO-1][L-1]

a) Rational number b) Irrational number

c) Can't say d) None of these

Q.6 The remainder when 2^{65} is divided by 7? [CO-1][L-3]

a) 4 b) 1 c) 2 d) 3

Q.7 The sum of fourth and tenth term of an A.P is 8. Find the sum of the first 13 terms of the progression. [CO-1][L-3]

a) 46 b) 52 c) 42 d) 48

Q.8 If log 64 = 1.8061, then the value of log 16 will be (approx.)? [CO-1][L-2]

a) 1.9048 b) 1.2040 c) 0.9840 d) 1.4521

Q.9 Solve for x: $2\log(x + 2) = \log(x + 2) + 1$ [CO-1][L-3]

a) 8 b) 6 c) 9 d) 10

Q.10 What is the fractional value of 0.789789789…… [CO-1][L-4]

a) 263/333 b) 30/337 c) 79/992 d) None of these

Q.11 In a north facing row of NCC Cadets, Trisha is 9th from the left end and Tina is 12th from the right end. There are 5 cadets between Trisha and Tanya which is equal to the number of cadets between Tanya and Tina. Find how many cadets are there in the row? [CO-2][L-3]

a) 34 b) 32 c) 31 d) 33

Q.12 Introducing A, B says, "She is the wife of only nephew of only brother of my mother." How A is related to B? [CO-2][L-3]
a) Wife b) Sister c) Sister-in-law d) Data is inadequate

Q.13 What is the average of first 50 natural numbers? [CO-1][L-3]
a) 24.5 b) 25.5 c) 25 d) 26

Q.14 Find the number of factors of 84. [CO-1][L-3]
a) 12 b) 16 c) 20 d) 24

Q.15 What is the unit digit of 1! + 2! + 3! + ……+ 900!? [CO-1][L-4]
a) 0 b) 1 c) 2 d) 3

Q.16 Pointing to The Aman, Ramandeep said, "He is the son of the only son of my grandfather." How is Aman in the photograph related to Ramandeep? [CO-2][L-1]
a) Brother b) Uncle c) Son d) Data is inadequate

Q.17 The average of 15 different whole numbers is 15. Find the largest possible value a number can attain? [CO-1][L-4]
a) 120 b) 126 c) 134 d) 135

Q.18 Find the sum of the infinite series 4 + 2 + 1 + 1/2 + 1/4 + 1/8..... [CO-1][L-3]
a) 8 b) 7 c) 6 d) 5

Q.19 In a row where all are facing north, Priya is 15^{th} from the left end and Garima is 19^{th} from the right end. They interchange their positions, and Ram who sits 24th from the left end sits at the 5th place to the left of Priya's new position. How many persons were there in the row? [CO-2][L-1]
a) 36 b) 42 c) 47 d) 56

Q.20 Find the remainder if $(13)^{17} + (5)^{17}$ is divide by 19. [CO-1][L-5]
a) 18 b) 1 c) CND d) 0

Q.21 The average age of 8 men is increased by 2 years when two of them whose age are 21 and 25 years replaced by two new men. The average age of the two new men is: [CO-1][L-2]
a) 22 years b) 31 years c) 28 years d) 30 years

Q.22 If South-East becomes North, North-East becomes West and so on. What will West become? [CO-2][L-2]
a) East b) North-West c) South-East d) West

Q.23 If A represents the arithmetic mean, H represents the harmonic mean and G represents the geometric mean, then what is the relation between them? [CO-1][L-2]
a) A x H = G b) A x H = G*G c) A/H = G2 d) A/H = G

Q.24 Solve: $49^{\log_7 4}$ [CO-1][L-1]
a) 7 b) 14 c) 16 d) 18

Q.25 One morning after sunrise, Suresh was standing facing a pole. The shadow of the pole fell exactly to his right. To which direction was he facing? [CO-2][L-2]
a) East b) West c) South d) North

Q.26 M is the sister of Z. K is the father of Z. H is the husband of M. How is K related to H? [CO-2] [L-2]
a) Father b) Son in law c) Grandmother d) Father in law

Q.27 Find the remainder when 1! + 2!+3!+4!+……..200! is divided by 7? [CO-1][L-4]
a) 4 b) 5 c) 2 d) 3

Q.28 In a queue of students facing north, Ayesha and Anisha are standing at 10th and 8th position from the left and right end respectively. If another student Ariva who is 12th from the left end is exactly in between Ayesha and Anisha then find the position of Ayesha from right end? [CO-2] [L-1]
a) 10th b) 12th c) 15th d) 8th

Q.29 Find the Highest Common Factor of $4p^5q^2r$, $8p^6q^6r^8$, $16p^2q^7r^9$ [CO-1][L-2]
a) $4p^2q^4r^3$ b) $4p^2q^2r$ c) $16p^2q^2r$ d) $16p^2q^4r^3$

Q.30 From his house, Ram went 15 km to the north. Then he turns to west and covered 20 km. Then he turned north and covered 5 km. Finally turning to east, he covered 25 km. In which direction is he from his house? [CO-2][L-2]

a) North- West b) North-East c) South-East d) South-West

PART-B (Soft Skill Section)

Directions: In the question a part of the sentence has been highlighted in bold. Alternatives of the highlighted part are given which may improve the construction of the sentence. Select the correct alternative.

Q.31 As per MBTI _____ personality people take a laid back, relaxed approach. They're open to change, and like to explore. [CO-4][L-1]

a) Introversion b) Sensing c) Perceiving d) Thinking

Q.32 Choose the most specific goal amongst the following: [CO-4][L-1]

a) Wish to buy a car b) Wish to travel

c) Wish to travel to US next year d) None

Q.33 What part of SMART is missing from this goal? I will improve my grade in science by the end of the semester? [CO-5][L-3]

a) Not Attainable b) Not time-bound

c) Not specific enough d) Not measurable

Q.34 Stress Management is: [CO-5][L-1]

a) Learning about connection between mind and body

b) Helping us control our health in positive sense

c) Learning to avoid all kinds of stress

d) Only 'A' & 'B' are right.

Q.35 Which of the following are basic sources of stress? [CO-5][L-3]

a) The Environment b) Social Stressors

c) Physiological d) All of these

Q.36 In terms of the acronym SMART, what does it mean when a goal is measurable? [CO-5][L-1]

a) A team can collect data on GOAL

b) The GOAL can easily be achieved

c) The Goal will challenge a student

d) The goal includes a deadline for completion

Q.37 Examples of environmental stressors are: [CO-5][L-1]

a) Weather b) Traffic

c) Financial Problems d) 'A' & 'B'

Q.38 As per MBTI _____ personality people like real-life examples, prefer practical exercises, and get the facts while possibly missing the main idea. [CO-4][L-1]

a) Introversion b) Sensing c) Intuition d) Thinking

Q.39 The following are the characteristics of positive stress: [CO-5][L-1]

a) Improves Performance b) Feels Exciting

c) It motivates d) All of the above

Q.40 The following are the characteristics of negative stress: [CO-5][L-1]

a) It causes anxiety b) It feels unpleasant

c) It decreases performance d) All of the above

Q.41 The following are the examples of negative stressors: [CO-5] [L-1]

a) Unemployment b) Legal Problems

c) Exams d) All

Q.42 To make a request we use ONLY... WOULD, CAN, COULD, WOULD MIND [CO-4][L-1]

a) True b) False

Q.43 Yes, please. I _____ like one of those shirts. [CO-4][L-1]
a) Can b) Thanks c) have d) 'd

Q.44 A lot of people always say that they don't have time to do what they want or need to do when in fact [CO-5][L-1]
a) They know how to organize their activities
b) They don't know how to calculate their activities
c) They don't know how to organize their activities
d) They don't know how to reduce their activities

Q.45 To spend your time productively, you need to have set some _____. [CO-4][L-1]
a) Long-term Goals b) Short-Term Goals
c) SMART Goals d) Goals

Q.46 Which word means to delay or put off doing something by wasting your time on less important tasks? [CO-5][L-1]
a) Procrastinate b) Postpone c) Abandon d) Cancel

Q.47 Failing to manage your time can lead to some consequences, like. [CO-5][L-1]
a) Less Stress b) Greater productivity & Efficiency
c) Missed Deadlines d) Better Professional Reputation

Q.48 Time management refers to a range of skills, tools, and techniques used to manage time when accomplishing specific tasks, projects, and goals. [CO-5][L-1]
a) True b) False

Q.49 The term that describes our thoughts, feelings, and behaviours in relation to other individuals is _____. [CO-4][L-1]
a) Intergroup Relations b) Interpersonal Relations
c) Attraction d) Affiliation

Q.50 _____ refers to the ability or competence to express one's feelings, needs or desires openly and directly but in a respectful manner or without hurting ones feelings. [CO-4][L-1]
a) Assertiveness b) Empathy c) Sympathy d) Communication Skill

End Semester Examination, Dec. 2023

B. Tech. (Only CSE) – Fifth Semester

QUANTITATIVE APTITUDE AND PERSONALITY DEVELOPMENT-II (BHM-MC-008)

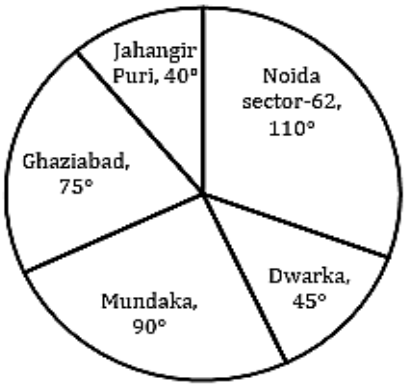
Time: 2 hrs. Max Marks: **50**

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.**

PART-A (Aptitude Section)



ven below shows the distribution (in degrees) of MAINS were allotted. In the table the ratio of boys er the following questions. [CO-1][L-1]

Centres	Boys : Girls
Noida sector-62	6 : 5
Dwarka	2 : 1
Mundaka	3 : 2
Ghaziabad	4 : 1
Jahangir Puri	5 : 3

Q.1 What is the value of the average no. of boys from the centers Noida sector-62 and Mundaka.

a) 12600 b) 16100 c) 18100 d) 17100

Q.2 Find that the total no. of boys from Ghaziabad center is how much percent more than the total no. of boys from Jahangir puricenter?

a) 160 % b) 140% c) 80% d) 120 %

Q.3 Find the difference between total no. of girls from CentersDwarka and Ghaziabad together and total no. of girls from centersMundaka and Jahangir puri together?

a) 7300 b) 8300 c) 6300 d) 5300

Q.4 If the biometric fingerprint of 6% students of Noida sector 62 center was mis-matched out of which 33 1/3%were girls, then find the total no. of boys whose fingerprints were mis-matched from center Noida sector-62?

a) 1620 b) 1430 c) 1220 d) 1320

Q.5 Total no. of girls from centers Noida sector 62 and Dwarka together are what percent of total no. of girls from centers Ghaziabad and Jahangir puri together? [CO-2][L-1]

a) 216(1/3)% b) 216(2/3)%

c) 212(2/3)% d) Cannot be determine

Q.6 A passenger sitting in a train of length l m, which is running with speed of 60 km/h passing through two bridges, notices that he crosses the first bridge and the second bridge in time intervals which are in the ratio of 7 : 4 respectively. If the length of first bridge is 280 m, then the length of second bridge is: [CO-2][L-1]

a) 490 m b) 220 m

c) 160 m d) Can't be determined

Q.7 Two guns are fired from the same place at an interval of 6 minutes. A person approaching the place observes that 5 minutes 52 seconds have elapsed between the hearing of the sound of the two guns. If the velocity of the sound is 330 m/sec, the man was approaching that place at what speed (in km/hr)? [CO-2][L-1]

a) 24 b) 27 c) 30 d) 36

Q.8 Two cyclists start simultaneously towards each other from A and B which are 28 km apart. An hour later they meet and keep pedaling with the same speed without stopping. The second cyclist arrives at B, 35 minutes later than the first arrives at A. Find the speed of the cyclist who started from B. [CO-2][L-1]

a) 12 km/h b) 16 km/h c) 15 km/h d) 10 km/h

Q.9 A and B undertake to do a piece of work for Rs 900. A alone can do it in 8 days while B alone can do it in 10 days. With the help of C, they can finish it in 4 days, Find the share of C? [CO-2][L-1]

a) RS. 75 b) Rs. 90 c) Rs. 60 d) Rs. 120

Q.10 A tank is already filled up to X% of its capacity. An Inlet pipe can fill full tank in 40 minutes and an outlet pipe can empty full tank in 30 minutes. Now both pipes are opened then the tank is emptied in 50 minutes. Then initially up to what % of its capacity is tank filled? [CO-2][L-1]

a) 48% b) 41.66% c) 38.26% d) 66.66%

Q.11 The Ganga river flows at 12 km/hr. A boy who can row at m/s in still water had to cross it in the least possible time. The distance covered by the boy is how many times the width of the river Ganga? [CO-2][L-1]

a) 3.2 b) 2.8 C) 2.6 d) 1.8

Direction (Q.12-Q.13): Study the following information carefully to answer the given questions [CO-2][L-1]

'Online tests for IT Company interview' is written as ' 54 260 120 101 308'

'Questions for the Interview' is written as ' 54 90 120 213'

'Prepare for the Interview test' is written as ' 156 54 260 90 120'

'Interview for IT company' is written as ' 120 308 54 210'

Q.12 What is the code for 'test' in the given code language?

a) 120 b) 260 c) 101 d) 308

Q.13 308 is the code for which of the following?

a) Interview b) IT Company c) Online d) for

Q.14 My watch was 8 minutes behind at 8 p.m. on Sunday but it was 7 minutes ahead of time at 8 p.m. on Wednesday. During this period, at which time has this watch shown the correct time. [CO-2][L-1]

a) Tuesday 10.24 a.m. b) Wednesday 9.16 p.m.

c) Tuesday 10.24 p.m. d) Wednesday 9.16 a.m.

Q.15 If we suppose the 60th independence day of India was on Thursday, then the 85th independence day would have been on? [CO-2][L-1]
a) Monday b) Wednesday c) Friday d) Sunday

PART-B (Verbal Ability + Soft Skill Section)

Direction (Q.16-Q.21): Read each sentence to find out whether there is any grammatical error in it. The error, if any, will be in one part of the sentence. The letter of that part is the answer. If there is no error, the answer is 'D'. (Ignore the errors of punctuation, if any). [CO3][L2]

Q.16 a) After the humiliating exposure b) he hanged his head
c) in shame d) No error
Q.17 a) Will you lend me b) little money
c) to tide over this crisis d) No error
Q.18 a) The Sharmas are living b) in this colony
c) for the last eight years d) No error
Q.19 a) A group of friends b) want to visit the new mall
c) as soon as possible d) No error
Q.20 a) When I get a cold b) it takes me weeks
c) to shake it off d) No error
Q.21 a) He was in a hurry b) because he had an appointment
c) with the Company's Director d) No error

Direction (Q.22-Q.23): Choose the word which best expresses the meaning of the given word

Q.22 DEBACLE
a) Collapse b) Decline c) Defeat d) Disgrace
Q.23 INSATIABLE
a) Insoluble b) Unchanging c) Unsatisfiable d) Undesirable

Direction (Q.24-Q.25): Choose the word which is the exact OPPOSITE to the meaning of the given word

Q.24 BARBARIAN
a) Cruel b) Civilised c) Uncivilised d) Bad
Q.25 CRESTFALLEN
a) Disturbed b) Boastful c) Cheerful d) Down to earth
Q.26 The main purpose of a cover letter is to _____ your experience from internship & projects with the job description. [CO-1][L-1]
a) tie b) break c) separate d) boundary
Q.27 The cover letter is the summary of your resume, should be _____, in a single page. [CO1][L-1]
a) long b) short c) lengthy d) concise
Q.28 In the acronym VUCA U stands for _____. [CO-2][L-2]
a) useless b) unique c) uncertainty d) uniform
Q.29 To make a start, setting an activity in motion can also be stated as get the ball _____. [CO-2][L-2]
a) playing b) walking c) washing d) rolling
Q.30 The team associated an idea with the other idea like they were _____ the dots. [CO-2][L-1]
a) connecting b) breaking c) dividing d) detaching
Q.31 LinkedIn helps me to keep updating myself, _____ the right connection and handle information carefully. [CO-2][L-2]
a) think b) build c) break d) breech

Q.32 Be cautious while building your resume, check for spelling mistakes, _____ errors, avoid crazy fonts. [CO-2][L-1]

a) perfect b) accurate c) typo d) correct

Q.33 A moderator assesses you on your patience, people skills and ____ skills. [CO-2][L-1]

a) deception b) division c) fighting d) leadership

Q.34 Usage of _____ words and phrases helps you to put forth your point in a better way. [CO-2][L-2]

a) effective b) inadequate c) weak d) worthless

Q.35 A resume is a tool which markets your _____ . [CO-1][L-1]

a) weakness b) skills c) failures d) flaws

PART-C (Technical Section)

Q.36 Find the correct output that will be generated for the below code snippet. [CO-3][L-2]

```
myfuction(){
int rows = 4;          int n = 1;
for (inti = 0; i< rows; i++) {
for (int j = 0; j <= i; j++) {
print(n++);
      }
print("\n");            }                  }
```

a)
```
1
2 3
4 5 6
7 8 9 10
```

b)
```
1
2 3
5 7 9
10 11 12 14
```

c)
```
3
5 7
9 11 13
15 17 19 21
```

d)
```
2
4 6
8 10 12
14 16 18  20
```

Q.37 Find the correct output that will be generated for the below code snippet. [CO-3][L-3]

```
myfunction(){
int rows = 5;
for (inti = 0; i< rows; i++) {
for (int j = 0; j < rows; j++) {
if (i> 0 &&i< rows - 1 && j > 0 && j < rows - 1) {     print("  "); }
else {                 print("* ");          }
       }               print("\n");
   }                   }
```

a)
```
* * * * *
*       *
*       *
*       *
* * * * *
```

b)
```
 * * * * *
 * *   * *
 * *   * *
 * *   * *
 * * * * *
```

c)
```
 * * * * *
 * * * * *
 * * * * *
 * * * * *
 * * * * *
```

d)
```
 * * * * *
  * * * *
   * *
    *
```

Q.38 Choose the correct option that represents the functionality for the below code snippet. N is the number of elements in an array, intarr[] = {1, 3, 8, -2, 6, -8, 5} can have +ve and –ve elements in unsorted order. [CO-4][L-3]

```
publicintmyfunction(int[] arr, int n) {

int m = Integer.MIN_VALUE;
for (inti = 0; i<= n - 1; i++) {              int c = 0;
for (int j = i; j <= n - 1; j++) {          c += arr[j];
if (c > m) {          m = c;                  }
         }                    }
return m;               }
```

a) minimumsubarray product b) maximum subarray sum

c) minimumsubarray product d) maximum subarray sum

Q39. Complete the below code snippet which has a non-empty 1d two array of non-negative integers and x integer is given. Code snippet finds the pair from both arrays such that the sum of the pair is closest to x. m and n is the length of array1 and array2. [CO-3][L-4]

```
voidprintClosest(int ar1[], int ar2[], int m, int n, int x)              {
int diff = Integer.MAX_VALUE;              intres_l = 0, res_r = 0; int l = 0, r = n-1;
while (l<m && r>=0){
if (_____________________________________)
        {     res_l = l;     res_r = r;     diff = Math.abs(ar1[l] + ar2[r] - x);              }
if (ar1[l] + ar2[r] > x){ r--;                }
else{     l++;        }
     }
print("The closest pair is [" + ar1[res_l] + ", " + ar2[res_r] + "]");
   }
```

a) Math.abs(ar1[l] - ar2[r] - x) < diff b) Math.abs(ar1[l] + ar2[r] - x) < diff
c) Math.abs(ar1[l] / ar2[r] - x) < diff d) Math.abs(ar1[l] * ar2[r] - x) < diff

Q.40 Complete the below code snippet which finds the smallest subarray length whose sum of elements is greater than `k`. Input: arr={1, 2, 3, 4, 5, 6, 7, 8}, k = 20, Output: 3. [CO-4][L-3]

```
publicintfindSmallestSubarrayLen(int[] arr, int k){
intwindowSum = 0;       intlen = Integer.MAX_VALUE;       int left = 0;
for (int right = 0; right <arr.length; right++){
windowSum += arr[right];
while (_____________________________________){
len = Integer.min(len, right - left + 1);
windowSum -= A[left];
left++;
         }
      }
if (len == Integer.MAX_VALUE) {          return 0;                }
returnlen;
   }
```

a) windowSum> k || left <= right b) windowSum>= k && left <= right
c) windowSum> k && left <= right d) windowSum> k && left > right

Q.41 Choose the correct option that completes the below code snippet that counts the number of zeroes in the given 1d array of 1s and 0s which has all 1s first followed by all 0s. Below code uses the binary search approach. [CO-4][L-3]

```
publicintfirstZero(intarr[], int low, int high){
if (high >= low)
      {
int mid = low + (high - low) / 2;
if ((_____________________________________){     return mid;      }
if (arr[mid] == 1){      return firstZero(arr, (mid + 1), high);     }
else{              return firstZero(arr, low, (mid - 1));                }
      }
return -1;
   }
```

a) mid == 0 &&arr[mid - 1]==1) &&arr[mid] == 0
b) mid == 0 || arr[mid - 1]== 1) || arr[mid] == 0
c) mid == 1 || arr[mid - 1] == 0) &&arr[mid] == 1
d) mid== 0 || arr[mid - 1]== 1) &&arr[mid]== 0

Q.42 Choose the correct option that completes the below code snippet that sort an array of 0s 1s And 2s. The array will have only 3 distinct numbers, at least once but could have duplicates in unsorted order. arr[] = {0, 1, 2, 2, 1, 0, 0, 2, 0, 1, 1, 0}, n is the number of elements. [CO-2][L-4]

Consider the function of swap(int[] arr, inti, int j){ int temp = arr[i]; arr[i] = arr[j]; arr[j] = temp; }

```
public void sort_array(int[] arr, int n){
int low = 0;        int mid = 0;            int high = n - 1;
while (mid <= high)       {
if (A[mid] == 0){ swap(__________________);++low;           ++mid;              }
    else if (arr[mid] == 1){                ++mid;                       }
    else {              swap(arr, mid, high);     --high;                  }
      }                 }
```

a) arr, high, mid b) arr, low, mid c) arr, low, high d) arr, mid, high

Q.43 Complete the below code snippet that counts the number of substrings that have an equal number of 0s, 1s, and 2s as characters for a given input String using the Hashing. Input: str = "0102010" so the Output is 2 where Substring str[2, 4] = "102" and substring str[4, 6] = "201" has equal number of 0, 1 and 2. [CO-3][L-4]

```
private static int getSubstringWithEqual012(String str){

HashMap<String, Integer> map = new HashMap<>();
    //  zc (Count of zeroes), oc(Count of 1s) , and tc(count of twos)
map.put("0*0", 1);  intzc = 0, oc = 0, tc = 0;                    intans = 0;
for (inti = 0; i<str.length(); i++) {
if (str.charAt(i) == '0')
zc++;
else if (str.charAt(i) == '1')
oc++;
else
tc++;
  String key = ___________________________;
ans += map.getOrDefault(key, 0);
map.put(key, map.getOrDefault(key, 0) + 1);
      }
returnans;              }
```

a) (zc + oc) + "*" + (zc + tc) b) (zc - oc) + "*" + (zc + tc);
c) (zc + oc) + "*" + (zc - tc); d) (zc - oc) + "*" + (zc - tc);

Q.44 Choose the correct option that represents the functionality by the below code snippet. Function receives the String A, inti and j that represents pointer pointing to start and end position characters. [CO-4][L-3]

```
publicbooleanmyfunction(inti, int j, String A){

if (i>= j) {            return true;            }
if (A.charAt(i) != A.charAt(j)) {
return false;
      }
returnmyfunction (i + 1, j - 1, A);
   }
```

a) check for Anagram b) check for palindrome

c) check for duplicate d) check for Isomorphic

Q.45 Choose the correct option to find the output for the given below code. The [] value is always a positive integer. Input: s = "3[a]2[bc]". [CO-3][L-3]

```
public String myfunction(String s) {
StringBuildersb = new StringBuilder();
while (i<s.length() &&s.charAt(i) != ']')
if (Character.isDigit(s.charAt(i))) {
int k = 0;
while (i<s.length() &&Character.isDigit(s.charAt(i)))
        k = k * 10 + (s.charAt(i++) - '0');
       ++i; // '['
final String decodedString = myfunction (s);
       ++i; // ']'
while (k-- > 0)
sb.append(decodedString);
     } else {
sb.append(s.charAt(i++));
     }
returnsb.toString();
  }
```

a) aaabcbc b) 3a2bc c) abc d) aaabc

Q.46 Choose the correct option that defines the functionality for the below code snippet. [CO-2][L-3]

```
publicintmyfunction(int number){
int r = 0;              int re = 0;
do{
re = number%10;      r = r*10 + re;number = number/10;
}while(number > 0);
return reverse;          }
```

a) 10 multiple of number b) reverse of number
c) remainder of number d) same number

Q.47 What is the difference between method overloading and method overriding? [CO-2][L-1]

a) Method overloading is determined at compile time, while method overriding is determined at runtime.
b) Method overloading can only be done with methods of the same class, while method overriding can only be done with methods of different classes.
c) Method overloading can only be done with methods with different signatures, while method overriding can only be done with methods with the same signature.
d) All of the above.

Q.48 Complete the below code which Count the number of bits to be flipped to convert int A=10 to int B=20 using the XOR operator and the parameter n in function call is n=A^B. [CO3][L3]

```
publicintcountSetBits(int n) {
int count = 0;
while (n != 0) {      count++;            n _____;          }
return count;                }
```

a) &= (n - 1) b) == (n - 1); c) != (n - 1); d) >= (n - 1);

Q.49 Complete the below code which swap the two integer A and B using the bitwise and arithmetic operators and print the swapped values of A and B. [CO-3][L-3]

```
public void swap(int a, int b) {
        a = _____                   // same as a = a + b
        b = a + (~b) + 1;           // same as b = a - b
        a = a + (~b) + 1;           // same as a = a - b
print("After swapping: a = " + a + ", b = " + b);                    }
```

a) (a | b) + (a & b); b) (a & b) + (a & b);
c) (a | b) + (a | b); d) (a & b) + (a | b);

Q.50 Complete the below code which checks whether the given number is power of 2 or not using the bit operation to check count of set bits. [CO-3][L-3]

```
publicbooleanisPowerofTwo(int n) {
intcnt = 0;
while (n > 0) {       if ((n & 1) == 1) {   cnt++;    }
              n = _____________;       }
    if (cnt == 1) {           return true;       }
return false;          }
```

a) n << 1 b) n >> 1 c) n >= 1 d) n <= 1

End Semester Examination, Dec. 2023

B. Tech. (All Branches except CSE)– Fifth Semester

QUANTITATIVE APTITUDE AND PERSONALITY DEVELOPMENT-II(BHM-MC-008/HM-505/HM-505A/HM-505B)

Time: 2 hrs. Max Marks: **50**

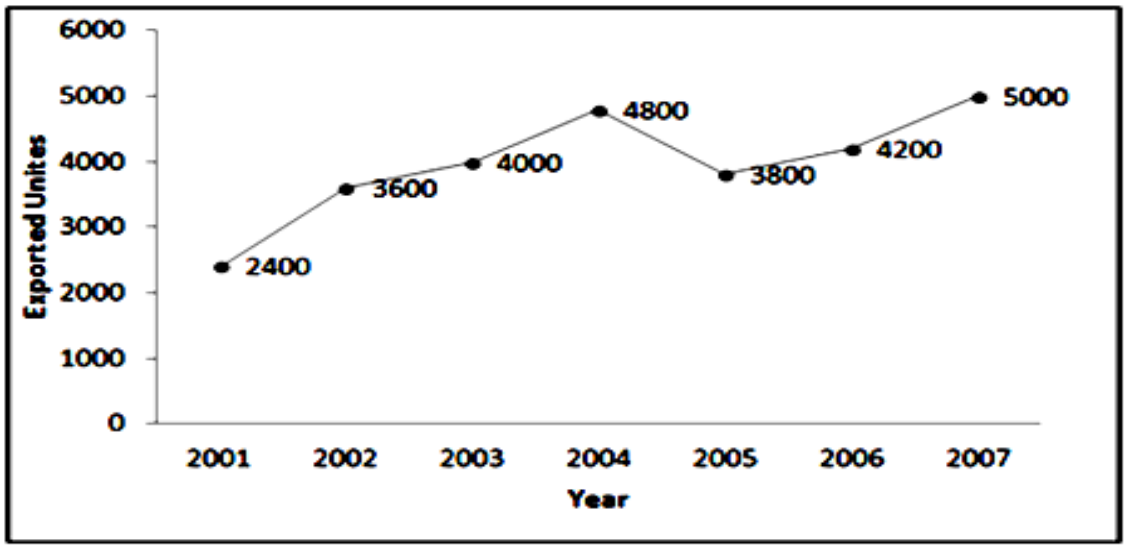
No. of pages: 5

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 **noNEGATIVE** 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.**

The table below gives the number of units of product A exported from 2001 to 2007, as a percentage of total production of product A during these years. The line graph gives the number of units of product A exported from 2001 to 2007.

Year	Export as a percentage of Total production
2001	30
2002	40
2003	25
2004	30
2005	20
2006	20
2007	40



Q.1 Find the average number of units of product A produced per year over the given period.

a) 12500 b) 14500 c) 15500 d) 16500

Q.2 The average exports of product A formed what percent of the average total

production for the given period?

a) 27.3% b) 31.3% c) 34.3% d) 37.3%

Q.3 The percentage increase in the number of units exported in a year over the previous year was minimum in which of the following years?

a) 2007 b) 2006 c) 2004 d) 2003

Q.4 If in 2008 the total number of units exported increased by 30% compared to 2007 and total production is 250% of number of units exported in 2008, Then find the difference in number of units produced in 2008 to that of 2003

a) 250 b) 750 c) 1250 d) 7500

Direction for question (Q.5–Q.7):A cube is colored red on two opposite faces, blue on two adjacent faces and yellow on the two remaining faces. It is then cut into two halves along the plane parallel to the red faces. One piece is then cut into four equal cubes and the other one into 32 equal cubes. [CO–1][L-1]

Q.5 How many cubes have each a yellow face with other faces blank?

a) 4 b) 14 c) 16 d) 18

Q.6 How many cubes have at least one blue face?

a) 4 b) 14 c) 16 d) 17

Q.7 How many cubes do not have any colored face?

a) 0 b) 2 c) 4 d) 8

Q.8 9 men and 12 boys finish a job in 12 days, 12 men and 12 boys finish it in 10 days. 10 men and 10 boys shall finish it in how many days? [CO–1][L-1]

a) 15 days b) 11 days c) 14 days d) 12 days

Q.9 Two pipes can fill a tank in 20 and 24 minutes respectively and a waste pipe can empty 3 gallons per minute. All the three pipes working together can fill the tank in 15 minutes. Find the capacity of the tank in gallons. [CO–1][L-1]

a) 100 b) 110 c) 120 d) 140

Q.10 A can do a piece of work in 80 days. He works at it for 10 days & then B alone finishes the remaining work in 42 days. In how much time will A and B, working together, finish the work? [CO–1][L-1]

a) 30 days b) 20 days c) 25 days d) 35 days

Q.11 A train met with an accident 150 km from station A. It completed the remaining journey at 5/6 of the previous speed and reached 15 min. late at station B. Had the accident taken place 30 km further, it would have been only 7 min. late. Find the speed of the train and the distance between the two stations A and B? [CO–1][L-1]

a) 55 km/h, 208.5 km b) 60 km/h, 212.75 km

c) 45 km/h, 206.25 km d) 48 km/h, 207.25 km

Q.12 Two ladies simultaneously leave cities A and B connected by a straight road and travel towards each other. The first lady travels 2 km/hr faster than the second lady and reaches B one hour before the second lady reaches A. the two cities A and B are 24 km apart. How many kilo metres does each lady travel in one hour? [CO–1][L-1]

a) 5 km, 3 km b) 7 km, 5 km c) 8 km, 6 km d) 16 km, 14 km

Q.13 Two guns were fired from the same place at an interval of 12 min. but a person in a train approaching the place hears the second shot 10 min. after the first shot. Find the speed of the train if the speed of the sound is 330 m/s? [CO–1][L-1]

a) 66 m/s b) 165 m/s c) 60 m/s d) None of these

Direction for (Q.14-Q.16): Study the following information carefully to answer the given questions

'Online tests for IT Company interview' is written as ' 54 260 120 101 308'

'Questions for the Interview' is written as ' 54 90 120 213'

'Prepare for the Interview test' is written as ' 156 54 260 90 120'

'Interview for IT company' is written as ' 120 308 54 210' [CO–1][L-1]

Q14. What is the code for 'test' in the given code language?

a) 120 b) 260 c) 101 d) 308

Q.15 308 is the code for which of the following?

a) Interview b) IT Company c) Online d) for

Q.16 What is the code for 'prepare questions for test'?

a) 120 54 101 54 b) 260 308 54 120

c) 90 120 101 213 d) 156 213 54 260

Q.17 At what angle are the two hands of a clock inclined at 32 minutes past 9? [CO–1][L-1]

a) 94° b) 95° c) 93° d) 92o

Q.18 At what angle are the two hands of a clock inclined at 17 minutes past 9? [CO–1][L-1]

a) 167 b) 172 c) 166 d) 176

Q.19 At what angle are the two hands of a clock inclined at 38 minutes past 7? [CO–1][L-1]

a) 01° b) 02° c) 03° d) 1

Q.20 At what angle are the two hands of a clock inclined at 48 minutes past 12? [CO–1][L-1]

a) 264° b) 263° c) 265° d) 266°

Q.21 A passenger sitting in a train of length l m, which is running with speed of 60 km/h passing through two bridges, notices that he crosses the first bridge and the second bridge in time intervals which are in the ratio of 7 : 4 respectively. If the length of first bridge is 280 m, then the length of second bridge is: [CO-2][L-1]

a) 490 m b) 220 m

c) 160 m d) Can't be determined

Q.22 Two guns are fired from the same place at an interval of 6 minutes. A person approaching the place observes that 5 minutes 52 seconds have elapsed between the hearing of the sound of the two guns. If the velocity of the sound is 330 m/sec, the man was approaching that place at what speed (in km/hr)? [CO-2][L-1]

a) 24 b) 27 c) 30 d) 36

Q.23 Two cyclists start simultaneously towards each other from A and B which are 28 km apart. An hour later they meet and keep pedaling with the same speed without stopping. The second cyclist arrives at B, 35 minutes later than the first arrives at A. Find the speed of the cyclist who started from B. [CO-2][L-1]

a) 12 km/h b) 16 km/h c) 15 km/h d) 10 km/h

Q.24 A and B undertake to do a piece of work for Rs 900. A alone can do it in 8 days while B alone can do it in 10 days. With the help of C, they can finish it in 4 days, Find the share of C? [CO-2][L-1]

a) RS. 75 b) Rs. 90 c) Rs. 60 d) Rs. 120

Q.25 A tank is already filled up to X% of its capacity. An Inlet pipe can fill full tank in 40 minutes and an outlet pipe can empty full tank in 30 minutes. Now both pipes are opened then the tank is emptied in 50 minutes. Then initially up to what % of its capacity is tank filled? [CO-2][L-1]

a) 48% b) 41.66% c) 38.26% d) 66.66%

Q.26 The Ganga river flows at 12 km/hr. A boy who can row at m/s in still water had to cross it in the least possible time. The distance covered by the boy is how many times the width of the river Ganga? [CO-2][L-1]

a) 3.2 b) 2.8 c) 2.6 d) 1.8

Q.27 My watch was 8 minutes behind at 8 p.m. on Sunday but it was 7 minutes ahead of time at 8 p.m. on Wednesday. During this period, at which time has this watch shown the correct time? [CO-2][L-1]

a) Tuesday 10.24 a.m. b) Wednesday 9.16 p.m.

c) Tuesday 10.24 p.m. d) Wednesday 9.16 a.m.

Q.28 If we suppose the 60th independence day of India was on Thursday, then the 85th independence day would have been on? [CO-2][L-1]

a) Monday b) Wednesday c) Friday d) Sunday

Q.29 A cube is coloured red on all faces. It is cut into 64 smaller cubes of equal size. Now, answer the following questions based on this statement. How many cubes have no face coloured? [CO-2][L-1]

a) 24 b) 16 c) 8 d) 0

Q.30 Three adjacent faces of a cube are coloured blue. The cube is then cut (once horizontally and once vertically) to form four cuboids of equal size, each of these cuboids is coloured pink on all the uncoloured faces and is then cut (as before) into four cuboids of equal size. How many cuboids have three faces coloured pink? [CO-2][L-1]

a) 9 b) 7 c) 5 d) 3

PART-B (Verbal Ability + Soft Skill Section)

Direction (for Q.16-Q.21): Read each sentence to find out whether there is any grammatical error in it. The error, if any, will be in one part of the sentence. The letter of that part is the answer. If there is no error, the answer is 'D'. (Ignore the errors of punctuation, if any). [CO-2][L-3]

Q.31 a) I could not put up in the hotel
b) because the boarding and lodging charges
c) were exorbitant
d) No error

Q.32 a) The Indian radio, which was previously
b) controlled by the British
c) is free now from their clutches
d) No error

Q.33 a) My friend asked me b) if I can lend him my
c) Parker pen for a day d) No error

Q.34 a) I am thinking to b) going to Agra
c) for my cousin's wedding d) No error

Q.35 a) You will b) come to my party tomorrow
c) Isn't it? d) No error

Q.36 a) Ram said that he would b) rather fail than copying
c) in the examination d) No error

Direction (for Q.37-Q.38): Choose the word which best expresses the meaning of the given word [CO-2][L-3]

Q.37 AUGUST
a) Common b) Ridiculous c) Dignified d) Petty

Q.38 VIGOUR
a) Strength b) Boldness c) Warmth d) Enthusiasm

Direction (for Q.39-Q.40): Choose the word which is the exact OPPOSITE to the meaning of the given word [CO-2][L-3]

Q.39 ZENITH
a) Acme b) Top c) Nadir d) Pinnacle

Q.40 PERRENIAL
a) Frequent b) Regular c) Lasting d) Rare

Q.41 Group discussion is a tool where they gauge how _____ you are when you disagree with someone. [CO-2][L-2]
a) graceful b) crude c) awkward d) rigid

Q.42 In a Group discussion you are assessed on Content, _____ skills, team behavior.
a) suppression b) communication c) deceptive d) delude

Q.43 Group discussion helps the potential employer to assess how mature you are and whether you attack the _____ or the person. [CO-2][L-2]
a) solution b) situation c) issue d) answer

Q.44 The assessor assesses your people skills, knowledge, _____ skills along with how creative you are. [CO-2][L-2]
a) submission b) plotting c) navigation d) leadership

Q.45. There is a proverb which says, it is not what you say, it is ____ you say it. [CO-2][L-2]
a) how b) where c) when d) why

Q.46 A cover letter can be defined as an introduction to your resume, highlighting your _____ Skills. [CO-2][L-2]

a) reading b) writing c) speaking d) listening

Q.47 The basic principle of effective writing includes using active voice and writing _____sentences. [CO-2][L-2]

a) long b) absurd c) short d) meaningless

Q.48 Another word for brainstorming is _____thinking. [CO-2][L-2]

a) pink b) red c) black d) blue

Q.49 Desmond Tutu once wisely said that, "there is only one way to eat an _____ : a bite at a time." [CO-2][L-2]

a) elephant b) giraffe c) ant d) whale

Q.50 In acronyms PESTEL, l stands for _____. [CO-2] [L-2]

a) lovable b) legal c) lethal d) liquid

End Semester Examination, Dec. 2023

B. Tech. - First / Second 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**. Marks are indicated against each question.*

Q.1 Answer the following:

a) Are the following vectors linearly dependent?
$X = \{(2,3,1,-1),(2,3,1,-2),(4,6,2,1)\}$ [CO:1:L-2]

b) Is R is not a vector space over C? [CO: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) Prove that $\beta(m,n) = \beta(n,m)$. [CO:3:L-2]

e) Examine the area bounded by the curve $y=\frac{1}{\sqrt{x}}$, y-axis and the ordinate $x=1$ [CO:2L-2]

f) If $A=\begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$ is any orthogonal matrix, then find A^{-1} [CO:4:L-2]

g) Find the n^{th} derivative of $\sin 2x$ [CO:2,L:3]

h) Evaluate $Lim_{x\to 0}\frac{e^x - e^{\sin x}}{x-\sin x}$ [CO:1,L:2]

i) Evaluate: $\lim_{x\to 0}(cotx)^{1/logx}$ - [CO:1,L:2]

j) If A and B are two matrices such that $\rho(A)=m$ and $\rho(B)=n$. Find $\rho(AB)$.

[CO:5:L-2] **2×10**

PART-A

Q.2 a) For the matrix A= $\begin{pmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 0 & -1 & -1 \end{pmatrix}$, find non-singular matrices P and Q such that PAQ is in the normal form. Hence find the rank of A. [CO-1][L-3] **10**

b) Using integration, find the surface area of the given sphere: $x^2+y^2+z^2=16$ [CO-1] [L-2] **10**

Q.3 a) Prove that for any quadratic function px^2+qx+r, the value of θ in lagrange's theorem is always ½ whatever *p, q, r, a, h* may be. [CO-2][L-2] **10**

b) Show that the maximum value of $\left(\frac{1}{x}\right)^x is (e)^{1/e}$. [CO-2][L-2] **10**

Q.4 a) For what value of k the equations:
$x+y+z=1; 2x+y+4z=k; 4x+y+10z=k^2$ $x+y+z=1\,;2x+y+4z=k\,;4x+y+10z=k^2$
have a solution and solve them in each case. [CO-3][L-4] **10**

P. T. O.

b) Solve using Gauss Jordan method:

$-x+3x-2z=5;$

$4x-y-3z=-8$

$2x+2y-5z=7$

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

PART-B

Q.5 a) Find the dimension of the subspace spanned by the vector (1,0,2),(2,0,1),(1,0,1) in V_3 (R). [CO-4][L-3] **10**

b) Show that $B = \{(1, 1, 1), (1, -1, 1), (0, 1, 1)\}$ is a basis of R^3. [CO- 4] [L-3] **10**

a) Find the eigen values and eigen vectors of the matrix: $A = \begin{bmatrix} 7 & 4 & -1 \\ 4 & 7 & -1 \\ -4 & -4 & 4 \end{bmatrix}$

Q.6

[CO-5][L-3] **10**

b) Let $T : R^2 \to R^2$ for which T(1,2)=(2,3) and T(0,1)=(1,4). Find T^{-1}=(-2,7). [CO-5][L-2] **10**

Q.7 a) Apply the Gram Schmidt process to the columns of matrix $\begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$.

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

b) Prove that V is a vector space, where V is a set of all functions from R to R. Define addition and scalar multiplication as:

$(f+g)x = f(x) + g(x)$ *for every* $x, f(x), g(x) \in V$

$(\alpha f)x = \alpha f(x)$ *for every* $\alpha \in R$

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

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer the following:

a) Evaluate: i) $\Gamma\left(\frac{7}{2}\right)$ ii) $B(8,7)$ [CO:1; L:2]

b) Evaluate: $\int_0^{\frac{\pi}{2}} \sqrt{\tan\theta}\, d\theta$ [CO:1; L:3]

c) 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:2]

d) Find the n^{th} derivative of $f(x)=\sin(5x+3)$ [CO:2; L:3]

e) For what value of a , the vector $\bar{V}=(x+7y)\,i+(2y-3z)\,j+(x+az)\,k$ is solenoidal. [CO:3;L:3]

f) What is the half range sine series for $f(x)=k$ in¿) [CO:3;L:4]

g) What are the sufficient conditions for the existence of fourier series? [CO:4; L:1]

h) Find $\frac{\partial u}{\partial r}$ and $\frac{\partial u}{\partial \theta}$, if $u = r\cos(r\sin\theta)$ [CO:4; L 3]

i) If A = $\begin{bmatrix} 1 & 2 & 3 \\ 0 & -7 & 5 \\ 0 & 0 & 5 \end{bmatrix}$ 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 $A=\begin{bmatrix} 1 & 1 & 4 \\ 0 & 0 & 2 \\ k & 5 & 10 \end{bmatrix}$ [CO:5 L:2] **2×10**

PART-A

Q.2 a) Evaluate: $\int_{-\infty}^{-1} \frac{1}{x^3}\, dx$ [CO:1; BTL:3] **5**

b) Using the applications of beta and gamma function, evaluate

$$\int_0^1 x^5\left(1-x^3\right)^{12} dx$$ [CO:1; L:3] **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; L:2] **10**

Q.3 a) Find the extreme value of the function x^3+y^3-3axy [CO:2;L:3] **7**

P.T.O.

b) Find the value of a and b such that $\lim_{x\to 0}\left[\frac{x(1+a\cos x)-b\sin x}{x^3}\right]=1$ [CO:2;L:3] **5**

c) Prove that:

$$\cos(m\sin^{-1}x)=1-\frac{m^2}{2!}x^2-\frac{m^2(2^2-m^2)}{4!}x^4-\frac{m^2(2^2-m^2)(4^2-m^2)}{6!}x^6+..$$

$f(x)=\log(1-x), \forall x \epsilon ¿$. [CO:2;L:4] **8**

Q.4 a) Discuss the convergence of series: $1+\frac{x}{2}+\frac{2!}{3^2}x^2+\frac{3!}{4^3}x^3+\frac{4!}{5^4}x^4+\ldots$ [CO:3; L:3] **8**

b) Expand $f(x)=x\ \sin x; 0<x<2\pi$ in terms of fourier series. [CO:3; L:4] **12**

PART-B

Q.5 a) If $u=\log(x^3+y^3+z^3-3xyz)$, show that $\left(\frac{\partial}{\partial x}+\frac{\partial}{\partial y}+\frac{\partial}{\partial z}\right)^2 u=\frac{-9}{(x+y+z)^2}$

[CO:4; L:3] **10**

b) Find the directional derivative of $f(x,y,z)=xy^2+yz^3$ at the point $(-2,0,-1)$ in the direction of the vector $\hat{i}-\hat{j}+2\hat{k}$ [CO:4;L:3] **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. [CO:5;L:4] **8**

b) Find the eigen values and the corresponding eigen vectors of $A=\begin{bmatrix}1&1&3\\1&5&1\\3&1&1\end{bmatrix}$

$A=\begin{bmatrix}8&-6&2\\-6&7&-4\\2&-4&3\end{bmatrix}$

[CO:5;L:3] **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;L:3] **10**

b) Find the characteristic equation of the matrix $A=\begin{bmatrix}1&3\\2&3\end{bmatrix}$ and use it to find the matrix represented by $A^5-4A^4-7A^3+11A^2-A-10I$ [CO:5;L:4] **10**

End Semester Examination, Dec. 2023

B. Tech. - First / Second Semester

MATHEMATICS FOR BIO-TECHNOLOGY- I (BMA-103)

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

No. of pages: 2

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

Q.1 Answer the following:

a) Is the given matrix A, a skew-symmetric matrix, A= $\begin{bmatrix} cos\theta & -sin\theta \\ sin\theta & cos\theta \end{bmatrix}$? [CO-2][L-2]

b) For what value of k , the given matrix has rank 2. $A=\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & k & 1 \end{bmatrix}$ [CO-2][L-2]

c) Express $\frac{(5+\sqrt{2}i)}{1-\sqrt{2}i}$ in the form $a+bi$ [CO-1][L-2]

d) Find the value of $\sin 35^0$ [CO-1][L-3]

e) Write the necessary condition of the series to be convergent? [CO-1][L-1]

f) Examine the nature of sequence $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \ldots\ldots$ [CO-1][L-2]

g) Find $\frac{df}{dx}$, if $f(x)=\frac{\cos x}{1+\sin x}$ [CO- 3][L-2]

h) Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$, if $Z=\log\,(x^2+y^2)$ [CO-3][L-2]

i) Evaluate $\int_0^x \sqrt{x}dx$ [CO-3][L-2]

j) Find dy/dx . When $(\cos x)^y=¿¿$ [CO-3][L-3] **2×10**

PART-A

Q.2 a) Investigate the value of λ so that the equations: $x+y+4z=1;$ $x+2y-2z=1; \lambda x+y+z=1$have unique solution. [CO-2][L-3] **10**

b) Find the inverse of a matrix $A=\begin{bmatrix} 3 & 2 & -1 \\ 4 & 2 & 6 \\ 7 & 4 & 5 \end{bmatrix}$ [CO-2][L-3] **10**

Q.3 a) Prove that: $\tan\left(142\frac{1}{2}\right)^o = 2+\sqrt{2}-\sqrt{3}-\sqrt{6}$ [CO-1][L-2] **8**

b) Solve: $\cos\frac{5\pi}{36}+\cos\frac{7\pi}{36}$ [CO-1][L-3] **7**

c) Represent the complex number $z=\frac{-16}{1+\sqrt{3}i}$ in polar form. [CO-1][L-1] **5**

Q.4 Discuss the convergence of the following series:

a) $x+\frac{2^2x^2}{2!}+\frac{3^3x^3}{3!}+\frac{4^4x^4}{4!}+\frac{5^5x^5}{5!}+\ldots\infty$. [CO-1][L-3] **10**

b) Test the convergence of the series $\sum u_n=\sum Sin\frac{1}{n}$ [CO-1][L-3] **10**

PART-B

Q.5 a) Compute the value of $\cos 32^0$ upto 4 decimal places using Taylor's series. [CO-3][L-3] **10**

b) Expand $\sin\left(m\sin^{-1}x\right)$ by Maclaurin's theorem as far as x^5. [CO-3][L-3] **10**

Q.6 a) $u=\sin^{-1}\left(\frac{x+2y+3z}{\sqrt{x^8+y^8+z^8}}\right)$, prove that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}+z\frac{\partial u}{\partial z}=-3\tan u$ [CO-3][L-3] **10**

b) Find the extreme value of the function: x^3+y^3-3axy [CO-3][L-3] **10**

Q.7 a) Change the order of integration in the integral:

$$\int_0^{2a}\int_{\sqrt{2ax-x^2}}^{\sqrt{2ax}} f(x,y)\,dxdy$$

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

b) Using triple integral, find the volume of the sphere $x^2+y^2+z^2=1$ [CO-3][L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. – First / Second Semester

MATHEMATICS-II (BMA-201/BSC-MA-201)

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 a) Find the value of c such that $f(x) = ce^{x}, 0 < x < \infty$ represents probability density function. [CO-1][L-2] **2**

b) In a Normal distribution 17% of the items are under 30 and 17% are over 60. Find the mean andstandard deviation of the distribution. [CO-1][L-2] **3**

c) A policeman fires 6 bullets on a dacoit. The probability that the dacoit will be killed by a bullet is 0.6.What isthe probability that the dacoit is still alive? [CO-1][L-2] **2**

d) A normal population has a mean of 6.8 and standard deviation of 1.5. A sample of 400 members gave a meanof 6.5.Is the difference significant at 5% level of significance? [CO-3][L-2] **3**

e) Write a short note on measure of skewness and Kurtosis. [CO-1][L-2] **2**

f) Find $Q_2, D_7 \text{ and } P_{10}$ for the data 40,42,44,46,48,50,52,54. [CO-1,2][L-1] **2**

g) If z is the standard normal variate, then find the following probabilities:

i) $P(-2.3 \le z \le -1.5)$

ii) $P(z \le -0.56)$ [CO-1][L-2] **2**

h) Find the coefficient of correlation between x and y, when the lines of regression are: $-8x + 5y + 17 = 0 \text{ and } 2y - 5x + 14 = 0$ [CO-3][L-2] **2**

i) State normal equation for fitting a second degree polynomial. [CO-2][L-1] **2**

PART-A

Q.2 a) An e-mail filter is planned to separate valid e-mails from spam. The word free occurs in 50% of thespam messages and only14% of the valid messages. Also, 20% of the messages are spam. Determine thefollowing probabilities:

i) The message contains free.

ii) The message is spam given that it contains free.

iii) The message is valid given that it does not contain free. [CO-1][L-3] **6**

b) In a Nicd battery, a fully charged cell is composed of nickelic hydroxide. Nickel is an element that hasmultiple oxidation states. Assume the following proportions the states.

Nickel charge	0	2	3	4
Proportions found	0.17	0.35	0.33	0.15

i) What is the cumulative distribution function of X

ii) Determine the mean and variance of X. [CO-1][L-2] **4**

c) Contamination is a problem in the manufacture of magnetic storage disks. Assume that the number of particles of contamination that occur on a disk surface has a Poisson distribution, and the average number of particles per square centimeter of media surface is 0.1. The area of a disk under study is 100 square centimeters.

i) Find the probability that 12 particles occur in the area of a disk under study.
ii) Find the probability that zero particles occur in the area of a disk under study.
iii) Find the probability that 12 or fewer particles occur in the area of a disk under study. [CO-1][L-3] **10**

Q.3 a) The probability density function for the diameter of a drilled hole in millimeters is $20e^{-20(x-3)}$ for x > 3 mm. Although the target diameter is 3 millimeters, vibrations, tool wear, and other nuisances produce diameters greater than 3 millimeters.
i) Determine the mean and variance of the diameter of the holes.
ii) Determine the probability that a diameter exceeds 3.1 millimeters.[CO-2][L-3] **10**

b) The length of stay at a specific emergency department in Phoenix, Arizona, in 2009 had a Mean of 4.6 hours with a standard deviation of 2.9. Assume that the length of stay is normally distributed.
i) What is the probability of a length of stay greater than 10 hours?
ii) What length of stay is exceeded by 25% of the visits?
iii) From the normally distributed model, what is the probability of a length of stay less than 0 hours? Comment on the normally distributed assumption in this example. [CO-2][L-3] **10**

Q.4 The following distribution satisfies the properties of a joint probability mass function.

x	-1	-0.5	0.5	1.0
y	-2	-1	1	2
$f_{XY}(x,y)$	1/8	1/4	1/2	1/8

Determine the following
a) P (X < 0.5,Y< 1.5)
b) P (X< 0 .5)
c) P (Y< 1. 5)
d) P (X >0.25 ,Y< 4.5)
e) E(X) , E(Y) , V (X) and V (Y)
f) Marginal probability distribution of X .
g) Conditional probability distribution of Y given that X = 1
h) Conditional probability distribution of X given that Y = 1
i) E(X/ y = 1)
j) Are X and Y are independent [CO-1,2][L-3] **20**

PART-B

Q.5 a) Calculate first four Moments for the following frequency distribution:

Marks	0-10	10-20	20-30	30-40	40-50	50-60
No. of students	1	6	10	15	11	7

[CO-1,2][L-3] **10**

b) Calculate Rank correlation coefficient from the following data:

x	68	64	75	50	64	80	75	40	55	64
y	62	58	68	45	81	60	68	48	50	70

[CO-1,2][L-3] **10**

Q.6 a) In two large populations there are 30% and 25% respectively of fair haired people.Is this difference likely to be hidden in samples of 1200 and 900 respectively from the two populations.(Level of significance is 10%). [CO-3][L-3] **10**

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

x	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y(x)	1.1	1.3	1.6	2.0	2.7	3.4	4.1

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

Q.7 a) Verify whether Poisson distribution can be assumed from the data given below:

No. of defects	0	1	2	3	4	5
Frequency	6	13	13	8	4	3

(Given $\chi^2_{tab} = 1.2864$ corresponding to $\alpha = 5$). [CO-3][L-3] **10**

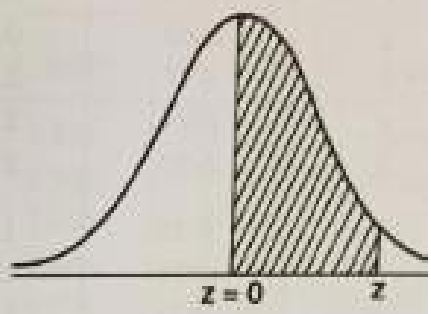
b) The height of 6 randomly chosen sailors in inches are 63,65,68,69,71 and 72.Those of 9 randomly chosen soldiers are 61,62,65,66,69,70,71,72 and 73. Test whether the sailors are on the average tallerthan soldiers. (Given $t_{tab} = 1.77$ corresponding to $\alpha = 10$) [CO-3][L-3] **10**

Table.pdf

Table 1 : NORMAL TABLE

AREAS UNDER THE STANDARD NORMAL

$$\text{CURVE} = \frac{1}{\sqrt{2\pi}} \int_0^z e^{-\frac{z^2}{2}} dz$$



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
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0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
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0.8	.2881	.2910	.2939	.2967	.2996	.3023	.3051	.3078	.3106	.3133
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1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.8729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4255	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.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	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4930	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4999	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993

End Semester Examination, Dec. 2023

B. Tech. (BT only) – Second Semester

MATHEMATICS FOR BIO-TECHNOLOGY - 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**. Marks are indicated against each question.*

Q.1 Answer the following:

a) Solve: $\frac{dy}{dx} + P(x)y = Q(x)$

b) Solve: $\left(\sec x \tan x \tan y - e^x\right) dx + \sec x \sec^2 y \, dy = 0$

c) Find C. F. for the differential equation $y'' + a^2 y = 0$.

d) Find P.I. for the differential equation $\left(D^2 - 4D + 3\right) y = Sin 2x$.

e) Form the partial differential Equation $f(xy, x + y + z) = 0$

f) Solve $xp + yq = z$

g) Evaluate $\int_0^\infty t^3 e^{-2t} \sin t dt$

h) Find the Inverse Laplace transform $\frac{e^{-\pi s}}{s^2 + 1}$

i) In the Fourier series expansion of $f(x) = x^2$ in $(-\pi, \pi)$, what is the value of b_n?

j) Three unbiased coins are tossed. What is the probability of getting at most two heads? **2×10**

PART-A

Q.2 a) Solve the following differential equations:

$$\left(xy^2 \, Sin\, xy + yCos\, xy\right) dx + \left(x^2 y \, Sin\, xy - xCos\, xy\right) dy = 0$$

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

b) $\frac{dy}{dx} + x^2 y = Cos\, 3x$ [CO-1][L-2] **10**

Q.3 a) Solve $\frac{d^2 y}{dx^2} + a^2 y = \tan ax$. [CO-2][L-3] **10**

b) Solve $\frac{d^2 y}{dx^2} + \frac{dy}{dt} - 2y = \sin t, \; \frac{dx}{dt} + x - 3y = 0$ [CO-2][L-3] **10**

Q.4 a) Solve the following differential equations:

$$\left(\frac{1}{z} - \frac{1}{y}\right) p + \left(\frac{1}{x} - \frac{1}{z}\right) q = \left(\frac{1}{y} - \frac{1}{x}\right)$$

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

P. T. O.

b) Solve completely the equation $\frac{\partial^2 y}{\partial t^2}=c^2\frac{\partial^2 y}{\partial x^2}$, representing the vibration of a string of length l, fixed at the both ends, given that $y(0,t)=0, y(l,t)=0; y(x,0)=f(x)$ and $\frac{\partial}{\partial x}y(x,0)=0, 0<x<l$. [CO-3][L-3] **10**

PART-B

Q.5 a) State and prove convolution theorem for Laplace transform. [CO-4][L-2] **10**

b) Solve the following differential equation by Laplace transform.

$\frac{d^2y}{dx^2}+9y=Cos\,2x$; 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 $f(x)=|\cos x|, -\pi<x<\pi$.

[CO-5][L-3] **15**

b) Find the Fourier series expansion for $f(x)=2\pi x, \quad 0\le x\le 1$. [CO-5][L-3] **5**

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? [CO-6][L-3] **15**

b) One card is drawn at random from a pack of 52 cards. What is the probability that the card drawn is a face card (Jack, Queen and King only)? [CO-6][L-3] **5**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 a) Give an examples of monotonic increasing convergent sequence. [CO-1][L-2]

b) Expand cos *x* in powers of *x.* [CO-1][L-2]

c) Show that the series: $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}$ is conditionally convergent. [CO-1][L-2]

d) Find $\nabla\phi$, if $\phi = e^{-2(x^2+y^2+z^2)}$. [CO-2][L-2]

e) $\lim_{(x,y)\to(0,1)} \tan^{-1}\frac{x}{y}$ [CO-2][L-2]

f) Find the order and degree of $\left(\frac{dy}{dx}\right)^3 + \left(\frac{d^2y}{dx^2}\right)^2 = 7x$ [CO-3][L-2]

g) State clairaut's equation. [CO-3][L-1]

h) Write Bessel's function of first kind. [CO-4][L-1]

i) Solve: $ydx + xdy + 3x^2e^{x^3}dx = 0$ [CO-4][L-2]

j) Find the Complementary function of $(D^2 - 2D + 1)\,y = e^x$. [CO-4][L-3] **2×10**

PART-A

Q.2 a) Discuss the convergence of the series: $\sum_{n=1}^{\infty} \frac{(n+1)^n x^n}{n^{n+1}}$ [CO-1][L-3] **10**

b) Calculate the approximate value of $\sqrt{26}$ to four decimal places by the application of Taylor's series. [CO-1][L-2] **10**

Q.3 a) If $f(xy^2, z-2x) = 0$, prove that $x\frac{\partial z}{\partial x} - \frac{1}{2}y\frac{\partial z}{\partial y} = 2x.$ [CO-2][L-2] **10**

b) Find the minimum distance of the point *(3,4,1)* from the unit sphere. [CO-2][L-3] **10**

Q.4 a) Find the directional derivative of the function $f(x,y,z) = xy^3 + yz^2$ at the point $(-2,1,-1)$ in the direction of the vector $\hat{i} - 2\hat{j} + 2\hat{k}$ [CO-2][L-2] **10**

b) Find the Maclaurin series for $x\sin x$. [CO-1][L-3] **10**

P. T. O.

PART-B

Q.5 a) Solve: $\left(xy^3 + y \right) dx + 2\left(x^2 y^2 + x + y^4 \right) dy = 0$. [CO-3][L-3] **10**

b) Solve: $y \log y dx + (x - \log y)\, dy = 0$ [CO-3][L-3] **10**

Q.6 a) Solve: $(2x+3)^2 \frac{d^2y}{dx^2} + (2x+3)\frac{dy}{dx} + y = \sin 2\left[\log(2x+3)\right]$. [CO-4][L-3] **10**

b) Solve: $x^2 \frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = (\log x)\sin(\log x)$ [CO-4][L-3] **10**

Q.7 a) Solve $y\frac{dy}{dx} + y\log y = xye^x$ [CO-3][L-3] **10**

b) Solve by method of variation of parameters: $\frac{d^2y}{dx^2} + 4y = \tan 2x$ [CO-4][L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

MATHEMATICS - III (BMA-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 a) Give an examples of monotonic increasing convergent sequence. [CO-1; L- 2]

b) Show that the series: $\sum_{n=1}^{\infty}\frac{(-1)^n}{\sqrt{n}}$ is conditionally convergent. [CO-1; L-2]

c) Examine the convergence of the series: $\sum_{n=1}^{\infty}\left(\frac{1}{n}\sin\left(\frac{1}{n}\right)\right)$ [CO-1; L-2]

d) If $\phi = 3x^2y - y^2z^2$, find $grad\phi$ at the point $(1,2,-1)$ [CO-3; L-3]

e) If $u = \log\left(x^2+y^2+z^2\right)$, find $\frac{\partial u}{\partial x}$ and $\frac{\partial u}{\partial y}$ [CO- 3; L- 3]

f) Find the order and degree of $\left(\frac{dy}{dx}\right)^2 + \frac{d^2y}{dx^2} = 2x$ [CO-2; L-1]

g) Solve: $p = \log(px - y)$ [CO-2; L- 3]

h) Find the complimentary function: $\frac{d^2y}{dx^2} - 4y = x\sinh x$ [CO-2; L- 3]

i) Solve: $ydx + xdy + 3x^2e^{x^3}dx = 0$ [CO- 2; L-4]

j) Find the particular integral of $\left(D^2+2D+1\right)y = e^{-x}$. [CO- 2; L-4] **2×10**

PART-A

Q.2 a) Test the series for convergence $\frac{x}{1} + \frac{1}{2}\cdot\frac{x^3}{3} + \frac{1.3}{2.4}\cdot\frac{x^5}{5} + \frac{1.3.5}{2.4.6}\cdot\frac{x^7}{7} + \ldots\ldots\ldots$ [CO-1; L-3] **10**

b) Test the series for convergence $1 + \frac{x}{2} + \frac{2!}{3^2}x^2 + \frac{3!}{4^3}x^3 + \ldots\ldots\ldots$ [CO-1; L-3] **10**

P. T. O.

Q.3 a) If $u = \log(x^3 + y^3 + z^3 - 3xyz)$, show that $\left(\frac{\partial}{\partial x}+\frac{\partial}{\partial y}+\frac{\partial}{\partial z}\right)^2 u = -\frac{9}{(x+y+z)^2}$ [CO- 3; L-4] **10**

b) Find the extreme values of the function: $f(x,y) = x^3 + y^3 - 3axy$ [CO-3; L-4] **10**

Q.4 a) 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 $\hat{i} + 2\hat{j} + 2\hat{k}$ [CO-3; L-4] **10**

b) Test for conditional and absolute convergence of the series: $\sum_{n=2}^{\infty}(-1)^{n-1}\frac{n+2}{2^n+5}$ [CO-1; L-3] **10**

PART-B

Q.5 a) Solve: $\left(xy^2 \, Sin\, xy + yCos\, xy\right)dx + \left(x^2 y \, Sin\, xy - xCos\, xy\right)dy = 0$ [CO-2; L-4] **10**

b) Solve: $(xy^3 + y)\,dx + 2(x^2y^2 + x + y^4)\,dy = 0$ [CO-2; L-4] **10**

Q.6 a) Solve: $(1+x)^2\frac{d^2y}{dx^2}+(1+x)\frac{dy}{dx}+y = 4\cos\log(1+x)$. [CO-2; L- 4] **10**

b) Solve: $\frac{d^2y}{dx^2} + 4y = \tan 2x$ [CO-2; L- 4] **10**

Q.7 a) Solve $(xy^2 - e^{\frac{1}{x^3}})\,dx - x^2 y\,dy = 0$ [CO-2; L-4] **10**

b) Solve: $(D^4 + 2D^2 + 1)y = x^2\cos x$ [CO-2; L-4] **10**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 a) Find the Z- transform of $\{5^{|k|}\}$. (CO-1: L-2) **2**

b) Find the Laplace transform of $t^2 \cos 2t$. (CO-3: L-3) **2**

c) Write the normal equations for the least square second degree polynomial. (CO-2: L-1) **2**

d) Find the Inverse Laplace transform of $s \log \frac{(s+1)}{s^2+2}$ (CO: 3; L-3) **3**

e) Find the Z- transform of $\left\{\left(\frac{1}{7}\right)^k\right\}$ (CO: 1; 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; L-3) **1**

g) For normal curve, prove that the maximum value of the ordinate is $\frac{1}{\sigma\sqrt{2\pi}}$. (CO-2: L-2) **2**

h) Evaluate: $\int_0^\infty t^3 e^{-2t} \cos t \, dt$ (CO-3: L-1) **2**

i) A manufacturer knows that the electrical gadget he makes, contains an average 0.25% of defectives. He packs them in packets of 10. What is the probability that a packet picked at random will contain 4 or more faulty electrical gadget? (CO:2;L-3) **3**

PART A

Q.2 a) Solve the following equation by using laplace transform:

$x''(t) + 9x(t) = \cos 2t$ with $x(0) = 1, x\left(\frac{\pi}{2}\right) = -1$ (CO-3: L-4) **10**

b) Find the inverse laplace transform of $\frac{s}{s^4+s^2+1}$ (CO-3: L-4) **10**

Q.3 Solve the difference equation:

$y_{k+2} + 4y_{k+1} + 3y_k = 2^k$ with $y_o = 0$ and $y_1 = 1$ (CO: 1; L- 5) **20**

Q.4 a) Solve the integral equation $\int_0^\infty f(x) \sin \alpha x \, dx = e^{-\alpha}$ (CO: 3; L- 4) **10**

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

PART B

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

$\bar{x} = 12$ hours, $\sigma = 3$ hours

Assuming that the data is normally distributed, what percentage of the battery cells are expected to have life i) more than 15 hours ii) between 10 and 14 hours ?

(CO: 2; L-3) **10**

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

x	1	1.5	2	2.5	3	3.5	4
y(x)	1.1	1.3	1.6	2.0	2.7	3.4	4.1

(CO-2: L-2) **10**

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

Days	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
No. of Accidents	8	12	14	16	14	9	11

Find whether the accidents are uniformly distributed over the week. (CO-2: 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, 14and Sample 2: 10, 12, 10, 14, 9, 8, 10.
Is the difference between the means of the samples significant? (CO-2: L-5) **10**

Q.7 a) Using the principle of least squares, find an equation of the form $y = a\,b^x$ that fits the following data:

x	1	2	3	4	5
y(x)	0.5	2.0	4.5	8.0	12.5

(CO-2: L-4) **10**

b) Intelligence test of two groups of boys and girls gives the following results:

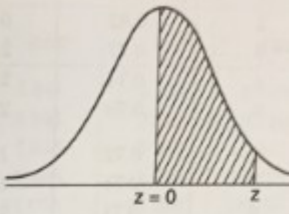
	Mean	Standard Deviation	Sample Size
Girls	84	10	121
Boys	81	12	81

i) Is the difference in mean scores significant?
ii) Is the difference between the standard deviations significant? (CO-2: L-4) **10**

Tables are attached:

Table 1 : NORMAL TABLE
AREAS UNDER THE STANDARD NORMAL

$$\text{CURVE} = \frac{1}{\sqrt{2\pi}} \int_0^z e^{\frac{z^2}{2}} dz$$



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0754
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	.1591	.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	.2485	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.8729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4255	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.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	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4930	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4999	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993

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

d.f.	Probability (Level of Significance)					
(ν)	0.50	0.10	0.05	0.02	0.01	0.001
1	1.00	6.31	12.71	31.82	63.66	636.62
2	0.82	0.92	4.30	6.97	6.93	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	1.70	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 Areas for Given Probability α,

$$P = P_r(\chi^2 > \chi^2(\alpha)) = \alpha$$

And is Degrees of Freedom (d.f.)

Degree of freedom (v)	Probability (Level of Significance)						
	0 = .99	0.95	0.50	0.10	0.05	0.02	0.01
1	.000157	.00393	.455	2.706	3.841	5.214	6.635
2	.0201	.103	1.386	4.605	5.991	7.824	9.210
3	.115	.352	2.366	6.251	7.815	9.837	11.341
4	.297	.711	3.357	7.779	9.488	11.668	13.277
5	.554	1.145	4.351	9.236	11.070	13.388	15.086
6	.872	2.635	5.348	10.645	12.592	15.033	16.812
7	1.239	2.167	6.346	12.017	14.067	16.622	18.475
8	1.646	2.733	7.344	13.362	15.507	18.168	20.090
9	2.088	3.325	8.343	14.684	16.919	19.679	21.669
10	2.558	3.940	9.340	15.987	18.307	21.161	23.209
11	3.053	4.575	10.341	17.275	19.675	22.618	24.725
12	3.571	5.226	11.340	18.549	21.026	24.054	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	10.856	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	42.557	46.693	49.588
30	14.933	18.493	29.336	40.256	43.773	47.962	50.892

Note. For degrees of freedom (v) greater than 30, the quantity $\sqrt{2\chi^2} - \sqrt{2v-1}$ may be used as a norma variate with unit variance

End Semester Examination, Dec. 2023

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 in brief:

a) What are phytoplanktons? [CO-3][L-1]
b) Name any two microbial culture collection centers in India. [CO-1][L-1]
c) Mention the name of diseases caused by microbes in plant and animals. [CO-3][L-1]
d) Name methods to preserve industrial important microbes. [CO-4][L-1]
e) Describe structural characteristics of actinomycetes. [CO-2][L-1]
f) How Richard Petri revolutionized the culture techniques? [CO-1][L-1]
g) Why protozoa are important microorganisms? [CO-3][L-1]
h) Describe molecular characterization methods used in identification. [CO-4][L-1]
i) Discuss different methods of sterilization. [CO-4][L-1]
j) Define differential media with an example. [CO-2][L-1] **2×10**

PART-A

Q.2 Who is known as "Father of Bacteriology"? Explain his major inventions and achievements in the field of bacteriology. [CO-1][L-2] **20**

Q.3 Explain how viruses are placed in manual of taxonomy. [CO-2][L-5] **20**

Q.4 a) Analyse the role of Spallanzani's experiment to resolve the conflicts over spontaneous generation theory. [CO-1][L-4] **10**
b) What are wall less microorganims. Define the structure, characteristics and economic importance of Mycoplasma. [CO-3][L-2] **10**

PART-B

Q.5 Classify algae and how these are important for industry and medicinal point of view? [CO-3][L-5] **20**

Q.6 Apply the staining techniques in order to identify microbes. [CO- 2][L-3] **20**

Q.7 a) What are pure culture isolation techniques? Explain. [CO- 2][L-2] **10**
b) Microorganisms are present in almost every habitat. Analyze how they are beneficial to us? [CO- 4][L-4] **10**

End Semester Examination, Dec. 2023

B. Sc. (Microbiology) – First Semester

BACTERIOLOGY AND SYSTEMATICS (BMB-DS-102)

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

No. of pages: 1

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

Q.1
a) Define 'inclusion bodies'. [CO-1][L-1]
b) Classify the bacteria on the basis of the position of flagella. [CO-1][L-2]
c) Summarize the significance of classification in microbiology. [CO-3][L-2]
d) Differentiate between a species and a strain. [CO-3][L-2]
e) Compare the photosystem I and photosystem II. [CO-4][L-2]
f) Illustrate the role of periplasmic space in microbes. [CO-1][L-4]
g) Differentiate between exotoxins and endotoxins. [CO-4][L-2]
h) Classify the archaea in major lineages. [CO-4][L-4]
i) Relate selective and differential media.Give an example of each. [CO-2][L-3]
j) What is the significance of the stationary phase in bacterial growth? [CO-2][L-1] **2×10**

PART-A

Q.2 Discuss various chemical methods of microbial control used in the microbiology lab. [CO-2] [L-2]**20**

Q.3 Illustrate the ultra structure and mechanism of generation of movement in flagella. [CO-1] [L-3] **20**

Q.4 a) Illustrate the characteristics of nucleoid with respect to its structure and function. [CO-1][L-3] **10**

b) The doubling time of a bacterial population is also the mean generation time of the population. Justify the statement with the help of derivation. [CO-2][L-5] **10**

PART-B

Q.5 a) List down the 12 major lineages of bacteria with 2 characteristics of each. [CO-3][L-1] **10**

b) Differentiate eubacteria and archaea. [CO-3][L-2] **10**

Q.6 Write notes on:
a) Halophiles.
b) Rickettsia. [CO-4][L-2] **10×2**

Q.7 a) Cite the general characteristics of thermophiles and discuss its industrial importance. [CO-4] [L-2] **10**

b) Discuss the aim and principle of classification and identification of microbes. [CO-3][L-2] **10**

End Semester Examination, Dec. 2023

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 in brief:

a) List the proteins involved in cell-cell interactions. [CO1][L1]
b) What are microtubules and microfilaments? [CO2][L1]
c) Define 'cell junctions'. [CO3][L1]
d) Illustrate the GPCR signaling pathway. [CO3][L2]
e) Explain the functions of nucleus. [CO2][L1]
f) Write a short note on the 'lysosomes'. [CO2][L1]
g) List the cell membrane proteins. [CO1][L1]
h) Compare convergence and divergence mode of cell signaling. [CO4][L5]
i) Explain the neurotransmitters. [CO4][L5]
j) Define 'Extracellular matrix'. [CO4][L1] **2×10**

PART-A

Q.2 Describe the fluid mosaic model of cell membrane with diagram. [CO1][L2] **20**

Q.3 Explain the structure and functions of the cell organelles involved in protein synthesis, sorting and trafficking. [CO2][L1] **20**

Q.4 a) Describe the how the phospholipids mobility are maintained in cell membrane. [CO2][L2] **10**

b) Think and describe what happens if lipid raft is not in the cell membrane. [CO1][L4] **10**

PART-B

Q.5 Explain the mechanisms of action of specialized cells. [CO4][L2] **20**

Q.6 Describe the cell junctions and adhesion. [CO3][L2] **20**

Q.7 a) Illustrate the structure and function of neurons. [CO4][L2] **10**
b) Discuss the structural proteins of the muscles. [CO4][L4] **10**

End Semester Examination, Dec. 2023

B. Sc. (Microbiology) – First Semester

HEREDITARY AND EVOLUTION (BMB-DS-121)

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 brief:

a) Are all the genes of the same linkage group linked? (CO3,L3)

b) Allelic dominance and dominant epistasis are the same! Comment. (CO2,L2)

c) Are sister chromatids same as the paired homologous chromosomes? (CO2,L2)

d) The A locus and the D locus are so tightly linked that no recombination is ever observed between them. If A d/A d is crossed to a D/a D, and the F1 is intercrossed, what phenotypes will be seen in the F2 and in what proportions? (CO4,L3)

e) The genes on fourth chromosome of Drosophila show complete linkage. Why? (CO6,L2)

f) Mutations belonging to the same complementation group do not show complementation! Is the statement correct? (CO6,L2)

g) Dominant mutant alleles may produce mutant phenotypes because of gain-of-function mutations. Why? (CO2,L2)

h) Four of the following events are part of both meiosis and mitosis, but one is only meiotic. Which one? i) Chromatid formation, ii) spindle formation, iii) chromosome condensation, iv) chromosome movement to poles, v) synapsis. (CO1,L3)

i) How are the two X chromosomes in females transcriptionally different? (CO5,L2)

j) If the two genes are not linked, what can be the possible locations of these genes? (CO6,L2) **2×10**

PART A

Q.2 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) Mention the phenotypes, and proportions that would be expected from a mating of a normal man and a woman who has hemophilia.

ii) Mention the phenotypes, proportions that would be expected from a mating of a heterozygous woman and a man who has hemophilia. (CO5,L4) **10**

b) A particular kind of color blindness in humans is due to a recessive gene located on the X chromosome:

i.) Can a normal son have a color-blind mother? [CO5] [L5]

ii.) Can a normal son have a color-blind father? [CO5] [L5]

iii.) Can a colorblind son have a normal mother? [CO5] [L5]

iv.) Can a color-blind son have a normal father? [CO5] [L5] **2½ ×4**

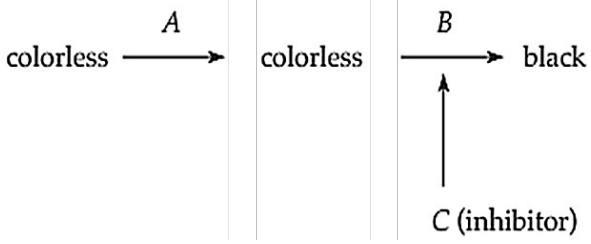
Q.3 Three genes on different chromosomes are responsible for three enzymes that catalyze the same reaction in corn:

$$\text{colorless compound} \xrightarrow{a^+,\ b^+,\ c^+} \text{red compound}$$

The normal functioning of any one of these genes is sufficient to convert the colorless compound to the red compound. The abnormal functioning of these genes

is designated by a, b, and c, respectively. A red a+/a+ b+/b+ c+/c+ is crossed with a colorless a/a b/b c/c to give a red F1 a+/a b+/b c+/c . The F1 is selfed. What proportion of the F2 progeny is colorless? (CO6,L3) **20**

Q.4 Genes A, B, and C are independently assorting and control the production of a black pigment. Suppose that A, B, and C act in the following pathway:



The alternative alleles that give abnormal functioning of these genes are designated a, b, and c, respectively. A colorless A/A B/B C/C individual is crossed with a colorless a/a b/b c/c, giving a colorless F1. The F1 is selfed to give an F2. What is the ratio of colorless to black in the F2 individuals? (CO6,L6) **20**

PART B

Q.5 In four-o'clock plants, two genes, Y and R, affect flower color. Neither is completely dominant, and the two interact with each other to produce seven different flower colors:

Y/Y R/R = crimson	*Y/y R/R* = magenta
Y/Y R/r = orange-red	*Y/y R/r* = magenta-rose
Y/Y r/r = yellow	*Y/y r/r* = pale yellow
y/y R/R, y/y R/r, and y/y r/r = white	

a) In a cross of a crimson-flowered plant with a white one (y/y r/r), what will be the appearances of the F1 plants, the F2 plants, and the offspring of the F1 plants backcrossed to their crimson parent?
b) What will be the flower colors in the offspring of a cross of orange-red x pale yellow?
c) What will be the flower colors in the offspring of a cross of a yellow with a y/y R/r white? (CO3,L6) **20**

Q.6 In the Chinese primrose, slate-colored flower (s) is recessive to blue flower (S), red stigma (r) is recessive to green stigma (R), and long style (l) is recessive to short style (L). All three genes involved are on the same chromosome. The F1 of a cross between two true-breeding strains, when testcrossed (backcross with recessive parent), gave the following progeny:

Phenotype	Number of Progeny
slate flower, green stigma, short style	27
slate flower, red stigma, short style	85
blue flower, red stigma, short style	402
slate flower, red stigma, long style	977
slate flower, green stigma, long style	427
blue flower, green stigma, long style	95
blue flower, green stigma, short style	960
blue flower, red stigma, long style	27
Total	3,000

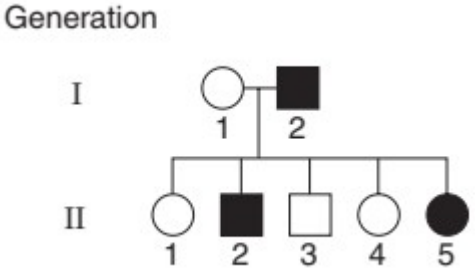
a) What were the genotypes of the parents in the cross of the two true-breeding strains?
b) Make a map of these genes, showing their order and the distances between them. (CO6,L6) **20**

Q.7 a) 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:

i) The F1 generation;
ii) The F2 generation;
iii) The progeny of a cross of the F1 plants back to the white, spiny parent; and
iv) The progeny of a cross of the F1 back to the purple, smooth parent.

(CO3,L3) **10**

b) Consider the following pedigree, in which the allele responsible for the trait (a) is recessive to the normal allele (A):



i) What is the genotype of the mother?
ii) What is the genotype of the father?
iii) What are the genotypes of the children?
iv) Given the mechanism of inheritance involved, does the ratio of children with the trait to children without the trait match what would be expected?

(CO4,L4) **10**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Define 'viruses and virology'. [CO-1][L-1]
b) Mention five major properties of viruses. [CO-1][L-2]
c) What are the important features of Baltimore classification system? [CO-1][L-1]
d) Why bacteria and viruses have different growth curves? [CO-2][L-3]
e) Bacteriophages have various applications. Mention some of them. [CO-2][L-2]
f) Which all types of eggs are used for viral cultivation? [CO-2][L-2]
g) Differentiate between 'persistent and non-persistent transmission'. [CO-3][L-3]
h) Which immunity is raised by vaccines and how? [CO-3][L-4]
i) Name various antivirals. [CO-4][L-1]
j) Which parameters decide the strategic design of antivirals? [CO-4][L-3] **2×10**

PART-A

Q.2 Replication mechanisms are dependent on classification system. Explain and illustrate taking example from retroviruses. [CO-2][L-4] **20**

Q.3 Depict the way to calculate the burst size from given data. Draw a well labelled growth curve

0.1 Sec – 0.5556pfu/ml
0.2 Sec -0.5558 pfu/ml
0.3 Sec-0.6661 pfu/ml
0.4 Sec-0.7774 pfu/ml
0.5 Sec- 0.6665 pfu/ml
0.6 Sec- 0.5552 pfu/ml

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

Q.4 Draw and explain the two types of life cycles followed by phages. Elaborate on the regulatory mechanism of switch between the two cycles. [CO-2][L-4] **20**

PART-B

Q.5 Enlist and discuss on the important parameters and features of viral pathogenesis. [CO-3][L-1] **20**

Q.6 Explain various salient features, unusual methods, transmission, therapy and replication mechanism of Hepatitis B virus. [CO-3][L-2] **20**

Q.7 How do we strategize the designing and discovery of new antivirals to combat emerging viruses? [CO-4][L-4] **20**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) List four salient features of fungi. [CO1][L1]
b) Names the various modes of nutrition in fungi. [CO3][L1]
c) What are plastids? [CO2][L1]
d) Write any two symptoms of rust disease. [CO3][L1]
e) Draw the labeled diagram of Chlamydomonas. [CO3][L3]
f) List four salient features of Algae. [CO1][L1]
g) What is archaea bacteria? [CO3][L1]
h) Draw the diagram of sporangiospores. [CO2][L1]
i) What are mycotoxins? [CO3][L1]
j) Draw the labeled diagram of spirulina. [CO3][L3] **2×10**

PART-A

Q.2 Describe general features, structure, nutrition and reproduction in Basidiomycetes. [CO1][L2] **20**

Q.3 Describe the life cycle of smut fungi. [CO3][L2] **20**

Q.4 Explain the diversity of thallus organization in fungi. [CO4][L4] **20**

PART-B

Q.5 Explain the application of algae in biofeul production. [CO1][L2] **20**

Q.6 Describe the various modes of sexual reproduction in fungi. [CO4][L2] **20**

Q.7 Describe the diversity of the habitat in algae. [CO3][L2] **20**

End Semester Examination, Dec. 2023

B. Sc. – 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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) How pure cultures can be obtained? [CO1][L1]
b) Elaborate IMViC reactions. [CO2][L1]
c) Define COD. [CO2][L1]
d) Differentiate between species abundance and species richness? [CO2][L1]
e) What are the types of bioremediation? [CO2][L1]
f) What are the different zones of a lake horizontally? [CO3][L1]
g) Discuss the environmental factors affecting growth of good bacteria. [CO4][L1]
h) Discuss various types of interactions among microbes. [CO3][L1]
i) Name flora of a healthy body. [CO2][L1]
j) What is algal bloom? [CO2][L1] **2×10**

PART-A

Q.2 Summarize methods of microbial detection and characterization. [CO-3] [L-2] **20**

Q.3 Analyze how microorganisms adapt themselves in extreme habitats. Explain in detail. [CO- 1][L-4] **20**

Q.4 a) Determine the factors influencing the biofilm formations. [CO-2][L-5] **10**
b) Illustrate sampling of microbial population on culture basis. [CO- 4][L-2] **10**

PART-B

Q.5 Discuss the steps of treatment of wastewater at sewage treatment plant. [CO-2][L-3] **20**

Q.6 Analyze bioremediation of common pesticides and discuss the factors affecting the process of bioremediation. [CO- 4][L-4] **20**

Q.7 a) Choose the methods to make water drinkable. [CO- 2][L-1] **10**
b) What are biosurfactants and how microbes can synthesize it? [CO- 4][L-1] **10**

End Semester Examination, Dec. 2023

B. Sc. (Microbiology) – 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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Define 'disease triangle'. [CO-1][L-1]
b) How is Plant disease different from plant injury? [CO-1][L-3]
c) What are the two most common plant diseases caused by bacteria? [CO-3][L-1]
d) Illustrate the vertical and horizontal resistance. [CO-1][L-2]
e) Explain the concept of monocyclic and polycyclic pathogens. [CO-1][L-1]
f) Differentiate between susceptible and resistant plants. [CO-4][L-3]
g) Explain the role of Avirulence (Avr) genes. [CO-1][L-1]
h) What do you mean by collateral hosts? [CO-2][L-1]
i) Discuss the two ways of dispersal of infectious plant pathogens. [CO-2][L-2]
j) Compare traditional and advanced molecular methods of plant disease detection. [CO-1][L-4] **2×10**

PART-A

Q.2 a) What is the difference between local and systemic resistance? Explain. [CO-1][L-1] **10**

b) Describe the important events in history of plant pathology. [CO-1][L-2] **10**

Q.3 a) Describe the process of pathogenesis in detail. [CO-4][L-1] **10**

b) Illustrate the role of enzymes in plant defense. [CO-3][L-2] **10**

Q.4 a) What are the sources of survival of pathogens and renewal of infection chain? [CO-1][L-1] **10**

b) Give a comprehensive account of host pathogen interaction. [CO-4][L-1] **10**

PART-B

Q.5 a) Explain the term biological control. Write a detailed account of the mechanism of biocontrol. [CO-3][L-2] **10**

b) Write a short note on integrated pest management. [CO-2][L-1] **10**

Q.6 Explain the role of:

a) Phytoalexins. [CO-3][L-2] **10**
b) Systemic acquired resistance. [CO-3][L-2] **10**

Q.7 a) How is crop rotation different from Crop diversification? [CO-3][L-3] **5**

b) Give the causal organism, host and symptoms of Early and Late blight of potato disease causing substantial losses to crops. [CO-2][L-1] **15**

End Semester Examination, Dec. 2023

B. Sc. (Microbiology) – Third Semester

MICROBIAL PHYSIOLOGY AND METABOLISM (BMB-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
a) What is microbial stress? [CO-1][L-1]
b) List any two key features of stress genes. [CO-3][L-1]
c) What are sigma factors? [CO-2][L-1]
d) Write full form of RUBISCO. [CO-3][L-1]
e) What are extremophiles? [CO-3][L-3]
f) What is the site of bacterial photosynthesis? [CO-1][L-1]
g) Explain significance of ETC in bacteria. [CO-3][L-1]
h) Explain fermentation. [CO-2][L-1]
i) What are the silent features of anaerobic respiration? [CO-3][L-1]
j) Draw the diagram of PS-1 & PS-2. [CO-3][L-3] **2×10**

PART-A

Q.2 Describe the osmotic stress mechanisms. Support your answer with suitable diagram. [CO-1][L-2] **20**

Q.3 Give detail account of lactic acid fermentation. [CO-3][L-2] **20**

Q.4 Explain the bacterial photosynthesis in details. Also, list how it is different from plant photosynthesis. [CO-4][L-4] **20**

PART-B

Q.5 Explain chemoautotrophs. Give detail account of green sulfur bacteria and iron bacteria. [CO-1][L-2] **20**

Q.6 Describe Methylotrophs and Methanogens. [CO-4][L-2] **20**

Q.7 Describe the symbiotic and asymbiotic biological nitrogen fixation. [CO-3][L-2] **20**

End Semester Examination, Dec. 2023

B. Sc. – Fifth Semester

MEDICAL MICROBIOLOGY AND IMMUNOLOGY (BMB 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 a) List any two bacterial species of resident microflora of human skin and gut. [CO-1][L-1]

b) Define 'metagenomics'. [CO-1][L-2]

c) What are prions? Name any two diseases caused by prions. [CO-2][L-1]

d) Differentiate between endotoxins and exotoxins. Give example of each. [CO-2][L-2]

e) What is symptomatic microbemia? Name any two species causing them. [CO-5][L-2]

f) What is natural passive immunity? Give an example. [CO-3][L-2]

g) Solution containing antibody was treated with dithiotritol (DTT). Represent the structure of the antibody in this solution. [CO-3][L-1]

h) If you are given an antigen X and multiple antibodies which may or may not react with X. How would you check their reactivity? [CO-4][L-2]

i) What are adjuvants? Give an example. [CO-4][L-1]

j) What are hybridoma cells? [CO-4][L-1] **2×10**

PART-A

Q.2 a) How did we know about the presence of the human microbiome? Mention method(s) to identify the microbiome. [CO-1][L-2] **10**

b) Human body is residence to a number of microbes. Classify the species based on their evolutionary origin and relationship with the host. Give example to each of the category. [CO-1][L-2] **10**

Q.3 What are opportunistic pathogens? Mention any two opportunists affecting two different organ systems. Discuss the disease pathogenesis, diagnosis, prevention and therapy. [CO-2][L-2] **20**

Q.4 Pathogen X causes secondary immune deficiency disorder, making the host vulnerable to secondary infections. What could be the pathogen? Discuss the pathogenesis, preventive and treatment of the disease and any one secondary infection caused by it. [CO-2][L-3] **20**

PART-B

Q.5 a) Compare the classical and alternate pathways of complement mediated lysis. [CO-3][L-2] **10**

b) Discuss briefly the four types of hypersensitivity reactions. [CO-3][L-2] **10**

Q.6 Cowpox had a huge role in revolutionizing the field of immunology. Discuss the significance of this disease and the development of preventives till CoVID 19. [CO-4][L-3] **20**

Q.7 A novel infection has been on the rise in a community, transmission is through respiratory route. If you are given the task to identify the pathogen and develop preventives, how would youdo it? Explain the process from sampling. [CO-4][L-3] **20**

End Semester Examination, Dec. 2023

B. Sc. (Microbiology) – Fifth Semester

MICROBIAL DIAGNOSTICS AND PUBLIC HEALTH

(BMB-DS-504)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a) Define 'MIC'. [CO-3][L-1]
b) What do you mean by antibiotic sensitivity? [CO-4][L-1]
c) Explain the importance of disease diagnosis. [CO-1][L-2]
d) Differentiate between diagnosis and prognosis. [CO-1][L-2]
e) Compare the sample collection tubes. [CO-2][L-2]
f) Compare natural and artificial media of microbial culture. [CO-2][L-2]
g) What are the peculiar characteristics of the Swine flu virus? [CO-3][L-2]
h) Discuss the composition of chocolate agar. [CO-2][L-2]
i) Name any two microbes that can be grown of blood agar and haemolysis can be seen. [CO-2][L-1]
j) Discuss the Lateral flow assay technique. [CO-4][L-1] **2×10**

PART-A

Q.2 List the importance of disease diagnosis and compare diagnostic techniques on the basis of various pathogens. [CO-1][L-1] **20**

Q.3 a) Discuss and assess various methods of sample collection on the basis of sample source. [CO-2][L-4] **10**

b) Elaborate the precautions taken while transporting clinical samples keeping the type of sample in mind. [CO-2][L-4] **10**

Q.4 Write short notes on:

a) Superficial fungi diagnosis.
b) Protozoan infection.
c) Herpes simplex virus.
d) Wood lamp test. [CO-1,2][L-2] **4×5**

PART-B

Q.5 Outline the mechanism of PCR. List its applications. [CO-4][L-3,1] **20**

Q.6 Elaborate the role of the following in diagnostic microbiology:

a) Ziehl-Neelson staining.
b) Giemsa- staining.
c) Mac Conkey agar.
d) Lowenstein-Jensen medium. [CO-3][L-2] **5×4**

Q.7 a) Summarize the procedure of synthesis of polyclonal and monoclonal antibodies. Illustrate their uses in microbial diagnostics. [CO-4][L-4] **10**

b) Discuss and elaborate on the principle, steps, uses, and limitations of RFLP and ELISA in molecular diagnostic approach. [CO-4][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

ENGINEERING MECHANICS (BME-DS-301)

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

No. of pages: 3

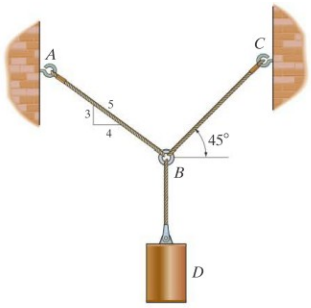
Note: *Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) State principle of moments with example. [CO-1][L-1]
b) Define general plane motion with example. [CO-1][L-1]
c) State the purpose of zero force members in case of truss. [CO-1][L-1]
d) Differentiate deficient truss and redundant truss. [CO-1][L-2]
e) What is rigid body and particle? [CO-1][L-1]
f) What is the difference between absolute motion and relative motion? [CO-1][L-1]
g) Classify truss with examples. [CO-1][L-2]
h) Why I section is more preferred in structure? [CO-1][L-2]
i) Define kinematics and kinetics? [CO-1][L-1]
j) What is D'Alembert's principle? [CO-1][L-1] **2×10**

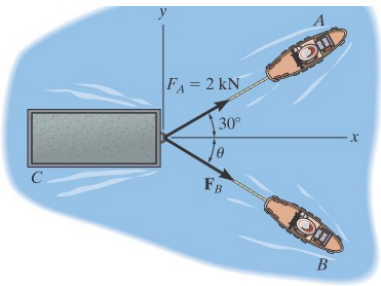
PART-A

Q.2 a) Determine the tension in cables BA and BC necessary to support the 60-kg cylinder in figure.



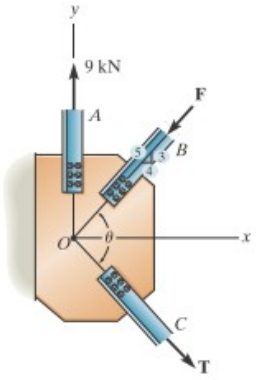
[CO-1][L-4] **10**

b) If the resultant force of the two tugboats is required to be directed towards the positive x axis and F_B is to be a minimum, determine the magnitude of F_R and F_B and the angle θ.



[CO-1][L-5] **10**

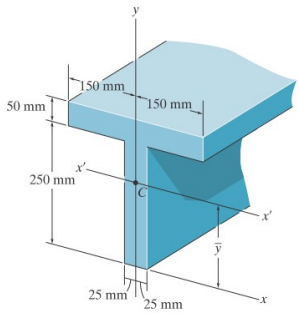
Q.3 a) The gusset plate is subjected to the forces of three members. Determine the tension force in member C and its angle θ for equilibrium. The forces are concurrent at point O. Take F = 8 kN. [CO-2][L- 3] **12**



b) State the following terms:
a) Law of friction b) Static indeterminacy c) Equilibrium d) Free body diagram.
[CO-2] [L- 2] **8**

Q.4 a) Determine y bar, which locates the centroidal axis x' for the cross-sectional area of the T-beam, and also find the moment of inertia about the x' axis.

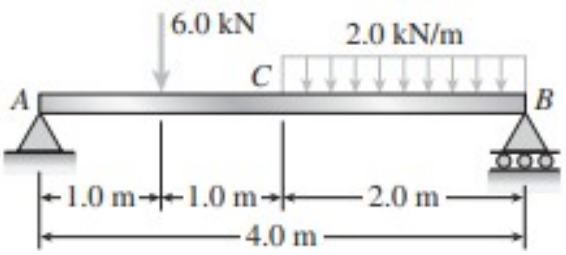
[CO-3] (L-3) **15**



b) Write a short note on Pappus and Guldinus theorem. [CO-3] [L-2] **5**

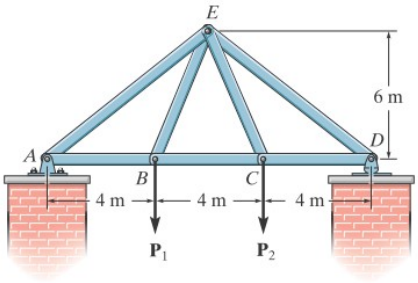
PART-B

Q.5 a) Draw shear force and bending moment diagram for a simply supported beam subjected to external loads as shown in figure.



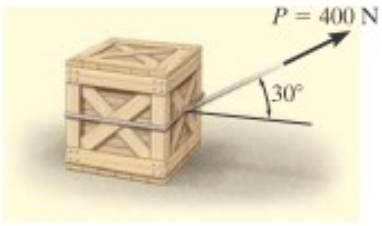
[CO-3][L-3] **10**

b) Determine the force in each member of the truss and state if the members are in tension or compression. Set P_1 = 3 kN, P_2 = 6 kN. [CO-3][L-4, L-5] **10**



Q.6 a) A stone is thrown vertically upward with a velocity of 20 m/s from 25 m high tower top. Determine the i) time required for stone to reach the ground. ii) velocity of stone during downward movement at the level of point of projection, and iii) maximum height attained during flight. [CO-4][L-3] **10**

b) The 50-kg crate shown in Fig. rests on a horizontal surface for which the coefficient of kinetic friction is $\mu_k = 0.3$. If the crate is subjected to a 400-N towing force as shown, determine the velocity of the crate in 3 s starting from rest. [CO-4][L-3] **10**



Q.7 a) 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. [CO-4][L-2] **12**

b) Write a brief note on energy method for a rigid body. [CO-4][L-2] **8**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

ENGINEERING MECHANICS (BME-DS-301A)

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

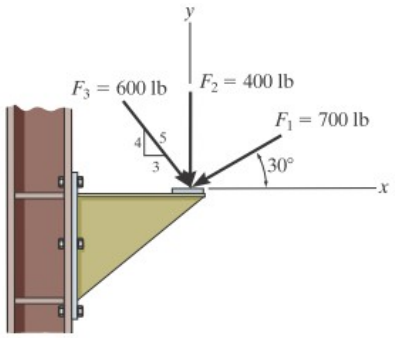
No. of pages: 3

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
a) State Varignon's theorem with example. [CO-1][L-1]
b) Define term "principle of transmissibility of a force." [CO-1][L-1]
c) State Principle of Angular Impulse and Momentum. [CO-1][L-1]
d) Differentiate perfect truss and imperfect truss. [CO-1][L-2]
e) Why I section is more efficient than other section? [CO-1][L-2]
f) Differentiate absolute motion and relative motion. [CO-1][L-2]
g) Mention all assumption considered in the analysis of planar truss. [CO-1][L-2]
h) Discuss all static equilibrium equation. [CO-1][L-2]
i) What is angle of repose? [CO-1][L-1]
j) What is D'Alembert's principle? [CO-1][L-1] **2×10**

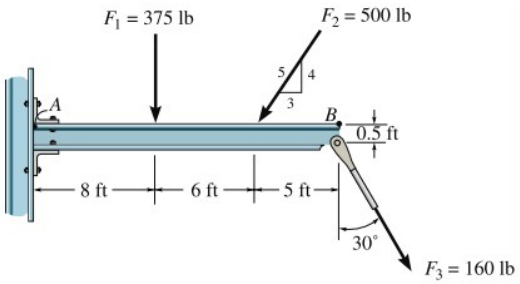
PART-A

Q.2 a) Determine the magnitude of the resultant force acting on the corbel and its direction θ measured counter clockwise from the x axis.



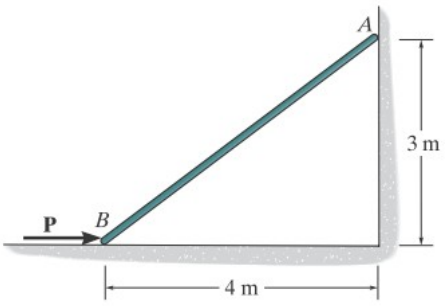
[CO-1,2][L-4] **10**

b) Determine the moment about point A of each of the three forces acting on the beam.



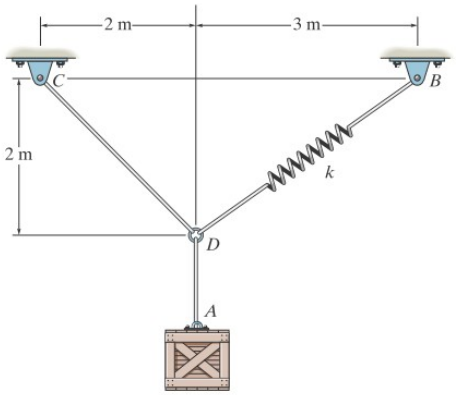
[CO-1,2][L-3] **10**

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 $\mu_s = 0.2$.



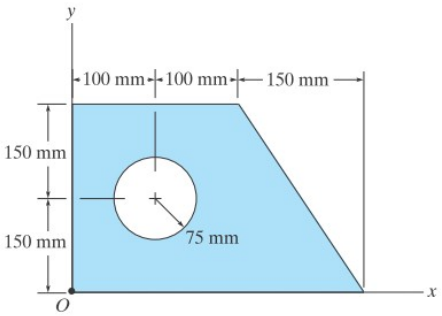
[CO-2][L-5] **10**

b) Determine the unstretched length of DB to hold the 40-kg crate in the position shown. Take k = 180 N/m.



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

Q.4 a) Locate the centroid of the plate area shown in the figure:

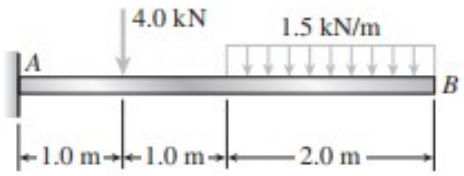


[CO-3][L-3] **12**

b) Explain principle axis theorem with example. [CO-3][L-2] **8**

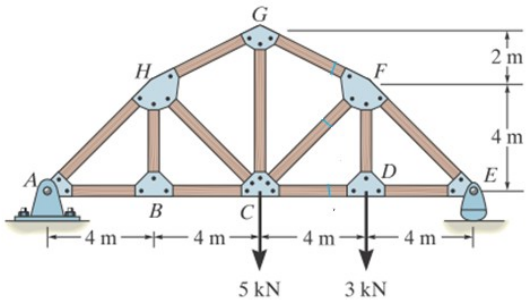
PART-B

Q.5 a) Draw shear force and bending moment diagram for a cantilever beam subjected to external loads as shown in the figure.



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

b) Determine the force in members AH, AB, BH, EF, ED, FD of the truss shown in Figure. Indicate whether the member is in tension or compression. Assume each member is pin connected.

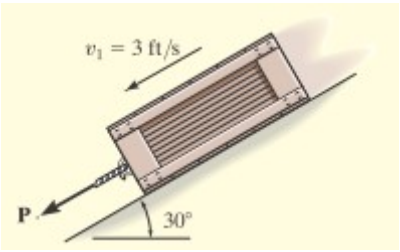


[CO-3][L-4] **10**

Q.6 a) A particle moves along a horizontal path with a velocity of $V=(3t^2 - 6t)$ m/s, where 't' is the time in seconds. If it is initially located at the origin O, determine the distance travelled in 3.5 s, and the particle's average velocity and average speed during the time interval. [CO-4][L-3] **10**

b) The 50-lb crate shown in the figure is acted upon by a force having a variable magnitude P = (20t) lb, where t is in seconds. Determine the crate's velocity 2 s after P has been applied. The initial velocity is v1 = 3 ft /s down the plane, and the coefficient of kinetic friction between the crate and the plane is μ_k=0.3.

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



Q.7 a) Write a brief note on momentum method for a rigid body. [CO-4][L-2] **8**

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.

[CO-4][L-2] **12**

End Semester Examination, Dec. 2023

B. Tech. – Fourth 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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Sate Zeroth law of thermodynamics. [CO-1][L-1]

b) Why carnot cycle is used as a comparison basis for different power cycles? [CO-1][L-1]

c) What do you understand by open and closed system? [CO-1][L-1]

d) What is the significance of enthalpy? [CO-1][L-1]

e) State the meaning of available and unavailable energy. [CO-1][L-1]

f) What do you understand by entropy? [CO-1][L-1]

g) State the working of an isothermal process. [CO-1][L-1]

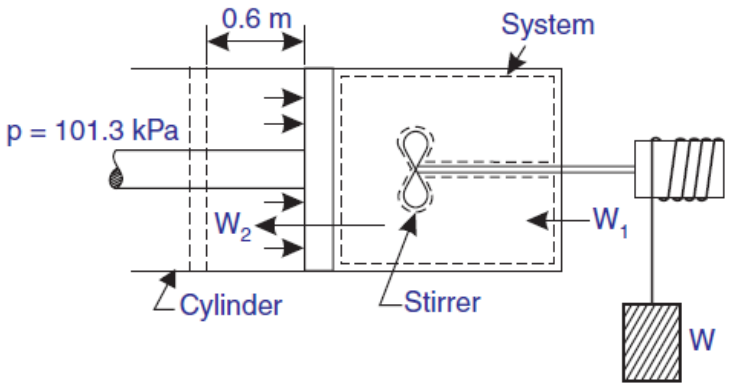
h) What is the meaning of free expansion in terms of thermodynamics? [CO-1][L-1]

i) State the characteristics of ideal gas. [CO-1][L-1]

j) Is steam a pure substance? Give reason in support of your answer. [CO-1][L-1] **2×10**

PART-A

Q.2 a) A piston and cylinder machine containing a fluid system has a stirring device as shown in Figure. The piston is frictionless, and it is held down against the fluid due to atmospheric pressure of 101.3 KPa. The stirring device is turned 9500 revolutions with an average torque against the fluid of 1.25 Nm. Meanwhile the piston of 0.65 m diameter moves out 0.6 m. Find the net work transfer for the system.



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

b) Explain the following:

i) System and control volume.

ii) Thermal equilibrium.

iii) Temperature scales.

iv) Path dependence of displacement work. [CO-2] [L-2] **10**

P. T. O.

Q.3 a) A fluid at a pressure of 3 bar, and with specific volume of 0.18 m^3/kg, contained in a cylinder behind a piston expands reversibly to a pressure of 0.6 bar according to a law, $P=C/V^2$, where C is a constant. Calculate the work done by the fluid on the piston. [CO-3][L-4] **10**

b) Derive the steady flow energy equation. Also, give the examples of any three steady flow devices. [CO-3] [L-3] **10**

Q.4 a) Source 1 can supply energy at the rate of 12000 kJ/min at 320°C. A second source 2 can supply energy at the rate of 120000 kJ/min at 70°C. Which source (1 or 2) would you choose to supply energy to an ideal reversible heat engine that is to produce large amount of power if the temperature of the surroundings is 35°C? [CO-3][L-5] **10**

b) Define "*external and internal irreversibility*". Also, explain the Clausius inequality and write its significance. [CO-2] [L-2] **10**

PART-B

Q.5 8 kg of air at 650 K and 5.5 bar pressure is enclosed in a closed system. If the atmosphere temperature and pressure are 300 K and 1 bar respectively, determine:

a) The availability if the system goes through the ideal work producing process.

b) The availability and effectiveness if the air is cooled at constant pressure to atmospheric temperature without bringing it to complete dead state. Take C_v = 0.718 kJ/kg K ; C_p= 1.005 kJ/kg K. [CO-2][L-5] **20**

Q.6 A vessel having a capacity of 0.05 m^3 contains a mixture of saturated water and saturated steam at a temperature of 245°C. The mass of the liquid present is 10 kg. Find the following:

a) The pressure,
b) The mass,
c) The specific volume,
d) The specific enthalpy,
e) The specific entropy, and
f) The specific internal energy. [CO-2][L-3] **20**

Q.7 a) Describe the working of an ideal vapour compression cycle with suitable diagrams [CO-4] [L-2] **10**

b) In a steam turbine steam at 20 bar, 360°C is expanded to 0.08 bar. It then enters a condenser, where it is condensed to saturated liquid water. The pump feeds back the water into the boiler. Assume ideal processes; find per kg of steam the net work and the cycle efficiency. [CO-4] [L-5] **10**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Explain the phenomenon of buoyancy and stability of floating bodies.
b) What do you understand by equipotential lines and stream lines? Also prove that both the lines are perpendicular to each other.
c) Explain the concepts of Eulerian approach and lagrangian approach.
d) Write the expression of bernoulli's theorem and state the different types of energy heads available to a fluid.
e) Differentiate between impulse and reaction turbine.
f) In the velocity triangles of turbines, mark the guide blade angle and vane width angles at inlet and outlet.
g) State the concept of working of centrifugal pump in brief.
h) What is the significance of dimensional analysis?
i) Differentiate between Newtonian and non Newtonian fluids.
j) Briefly explain the concept of hydrodynamic boundary layer. **2×10**

PART-A

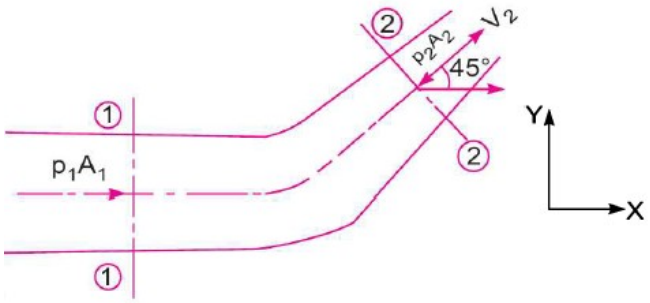
Q.2 a) A plate 0.025 mm distant from a fixed plate, moves at 60 cm/s and requires a force of 2N per unit area ($2N/m^2$) to maintain this speed. Determine the fluid viscosity between the plates [CO-1][L-3] **10**

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 a) The velocity components in a 2D flow are:
$u = y^3/3 + 2x - x^2y$
$v = xy^2 - 2y - x^3/3$
Show these components represents a possible cause if irrotational flow.
[CO-2][L-3] **10**

b) Describe the types of basic motion (displacement) of a fluid particle.
[CO-2][L-2] **10**

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/cm^2 and the rate if flow of water is 600 liters/s. Refer the figure shown below:



P. T. O.

[CO-4][L-5] **20**

PART-B

Q.5 A 137 mm diameter jet of water issuing from a nozzle impinges from the buckets of a pelton wheel and the jet is deflected through an angle of 165° 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-5][L-5] **20**

Q.6 Explain the working of centrifugal pump with a neat diagram indicating all the components and their functionality. [CO-5][L-1] **20**

Q.7 Explain the need and utility of dimensional analysis in detail. Also, give an example of dimensional analysis through Buckingham-π theorem. [CO-6][L-2] **20**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

MANUFCTURING 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**. Marks are indicated against each question. Draw neat sketches.*

Q.1 Answer the following in brief:

a) Differentiate between primary and secondary manufacturing process. [CO1][L2]
b) Define manufacturing processes. [CO1][L1]
c) Differentiate between hot working and cold working processes. [CO2][L2]
d) Enlist the names of various joining processes. [CO3][L1]
e) What is significance of Additive manufacturing? [CO4][L1]
f) Classify various welding processes. [CO1][L4]
g) Describe the use of pattern used in casting processes. [CO1][L1]
h) Enlist forging processes. [CO2][L2]
i) Define welding processes. [CO1][L1]
j) Explain spring back in sheet metal processes. [CO4][L2] **2×10**

PART-A

Q.2 Discuss in detail the various step required to complete casting process with the help of a product example. [CO-1,2][L-2] **20**

Q.3 Discuss the advantages and limitation of hot working and discuss in detail two hot working process with help of sketch. [CO-3, 4][L-2] **20**

Q.4 Discuss in detail the significance of sheet metal processes. In addition, discuss any five significant sheet metal process with the help of sketches. [CO-4][L-2] **20**

PART-B

Q.5 Discuss the term rapid prototyping and its application in detail along with its relevance in today's manufacturing scenario. In addition, classify the rapid manufacturing Techniques. [CO-4][L-1] **20**

Q.6 Classify various welding processes in detail a discuss in details the types of electric arc welding and Electric resistance welding processes with respect to the principle, power source, electrodes. [CO-3][L-4] **20**

Q.7 Write short notes on:

a) Advantages and limitation of powder metallurgy processes. [CO-1,4][L-1] **10**
b) The sequence of processes in Powder metallurgy processes. [CO-3,4] [L-2] **10**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer in brief:

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 CRDI technology?
e) Calculate air resistance at 30Kmph if the air resistance at 10kmph is W.
f) What is the importance of tread in a tyre?
g) What is the purpose of bleeding of hydraulic brakes?
h) The front axle of a car has pivot centers 1.3 m apart. The angle of inside lock is 40° C and the angle of the outside lock is 35° C. What is the wheelbase of the car?
i) Why skidding take place in a vehicle? How it can be prevented.
j) Why clutch should have less size and weight? **2×10**

PART-A

Q.2 a) Name the different parameters used for specifying a vehicle and explain the importance of each with suitable example? [CO-2][L-2] **10**

b) With the help of neat and labeled sketch explain how the power from the engine is transmitted to the wheels? [CO-2][L-2] **10**

Q.3 a) Justify the necessity of VVT System for engine with the help of neat sketch? [CO-5][L-5] **10**

b) Justify the necessity of cooling system for engine with the help of neat sketch? [CO-2][L-2] **10**

Q.4 a) Justify the necessity of a transmission in a vehicle? Explain with the help of total resistance – tractive effort curve? [CO-5][L-5] **10**

b) Explain the principle of working of diaphragm spring clutch with the help of neat sketch? [CO-2][L-2] **10**

PART-B

Q.5 Explain with sketches the following terms and their effects:
a) Castor b) Camber c)Toe in d) Toe out [CO-2][L-2] **20**

Q.6 A four wheeler having a weight of 1100 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. 2023

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 Briefly explain the following:

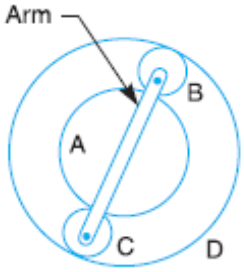
a) Pressure angle of cam.
b) Dynamic balancing.
c) Active and reactive gyroscopic couple.
d) Path generation.
e) Body guidance.
f) Grashof's Law.
g) Gyroscopic couple.
h) Module.
i) Sensitivity of governor.
j) Isochronism. **2×10**

PART-A

Q.2 a) Explain with the help of figure of inversions of double slider crank chain. [CO-1,2][L-1] **5**

b) Determine the three precision points of input and output angles for a mechanism to generate a function $y=x^{1.8}$ when x varies from 1 to 5, using Chebyshev's spacing. Assume that that initial values for the input and output cranks are 30^0 and 90^0 respectively and the difference between the final and initial values for the input and output cranks are each equal to 90^0. [CO-1][L-5] **15**

Q.3 a) An epicyclic train of gears is arranged as shown in the figure. How many revolutions does the arm, to which the pinions B and C are attached, make: 1. when A makes one revolution clockwise and D makes half a revolution anticlockwise, and 2. when A makes one revolution clockwise and D is stationary? The number of teeth on the gears A and D are 40 and 90 respectively.



[CO.2,3] [L-4] **15**

b) State and prove law of Gearing. [CO-1,2] [L-5] **5**

Q.4 A cam is to give the following motion to a knife-edged follower:

a) Outstroke during 90° of cam rotation;
b) Dwell for the next 60° of cam rotation;
c) Return stroke during next 60° of cam rotation,

P. T. O.

d) Dwell for the remaining 150° of cam rotation. The stroke of the follower is 50 mm and the minimum radius of the cam is 70 mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when i) the axis of the follower passes through the axis of the cam shaft, and ii) the axis of the follower is offset by 30 mm from the axis of the cam shaft.

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

PART-B

Q.5 Briefly explain the following:

a) Secondary unbalanced force.
b) Hammer blow.
c) Swaying couple.
d) Variation of tractive forces. [CO-1,4][L-2] **5×4**

Q.6 a) 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.

[CO-5,6][L-4] **10**

b) Derive an expression for the equilibrium speed of a Proell governor in terms of governor height and other relevant parameters. [CO-5][L-4] **10**

Q.7 a) Determine the stability of four wheeler while taking a turn. [CO-4,6][L-5] **15**

b) Derive expression for gyroscopic couple. [CO-6][L-2] **5**

End Semester Examination, Dec. 2023

B. Tech. - Fifth Semester

THEORY OF MACHINES (BME-DS-501A)

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. Scientific Calculators are allowed.*

Q.1 a) In a four bar mechanism, following Grashof's Law, shortest link is kept opposite to the fixed link. Describe the motion of input and the output link. [CO-1 L2]

b) In the context of engineering design, which category of problem-solving does the task of designing a mechanism to generate a function y = f(x) fall into? [CO-1L 2]

c) Two gears (Gear A and Gear B) are in mesh with each other maintaining a velocity ratio of 3:10. However, after some time, interference is observed between the gears and tooth of Gear A undercuts the tooth of Gear B. Suggest the ways in which the interference can be avoided between these gears. [CO-2 L3]

d) A simple gear train consists of a driver gear, driven gear, with two idlers having a gear ratio of 3.5. Determine the number of teeths on the driven gear if the driver gear has 30 teeth. [CO-2 L3]

e) Differentiate between off-set follower and radial follower. [CO-1 L2]

f) Aircraft traveling at a constant speed of 2000 km/hr in a straight line alters its course and its nose rises. In light of gyroscopic principles, indicate the pilot's intended direction for the turn, assuming the propeller spins counter-clockwise when observed from the rear of the plane. [CO-1L3]

g) A 4 wheeled automobile is travelling in a straight line at 125 km/h. Suddenly; it takes a turn with a radius of 80m. With the help of a neat sketch, indicate the reactions on the inner and outer wheels of the automobile when it takes right turn and its engine rotates in anticlockwise seen from left. [CO-1L3]

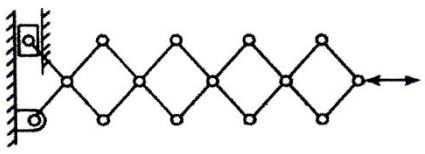
h) Explain the term "Sensitivity of a Governor." [CO-2L1]

i) Describe the term "Hammer Blow." [CO-3L1]

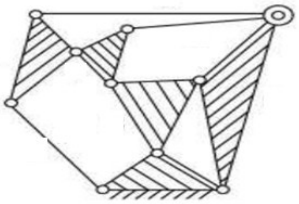
j) Differentiate between Static and Dynamic Balancing. [CO-3L2] **2×10**

PART A

Q.2 a) For the given mechanism, determine the no. of links, no. of binary joints, no. of higher pairs and degree of freedom for the given mechanisms. What do you infer from the obtained degree of freedom?



i)

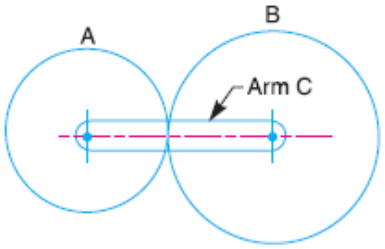


ii) [CO-1][L3] **10**

b) Synthesize a slider crank mechanism so that the displacement of the slider is proportional to the square of the crank rotation in the interval $45^0 \leq \theta \leq 135^0$. Use three precision points with Chebychev's spacing. [CO-1][L5] **10**

Q.3 a) Two in volute gears of 20° pressure angle are in mesh. The number of teeth on pinion is 20 and the gear ratio is 2. If the pitch expressed in module is 5mm and the pitch line speed is 1.2m/s, assuming addendum as standard and equal to one module. Design the gear system and determine the angle turned through by pinion when one pair of teeth is in mesh; and the maximum velocity of sliding. [CO-2][L6] **10**

b) In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 r.p.m. in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed, makes 300 r.p.m. in the clockwise direction, what will be the speed of gear B?



[CO-2][L6] **10**

Q.4 A cam is to be designed to give the following motion to a knife-edged follower:

- Outstroke during 60° of cam rotation;
- Dwell for the next 30° of cam rotation;
- Return stroke during next 120° of cam rotation, and
- Dwell for the remaining 150° of cam rotation.

The stroke of the follower is 60 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return strokes.

Generate the Cam profile when the axis of the follower passes through the axis of the cam shaft. [CO-2][L5] **20**

PART B

Q.5 a) A shaft carries four masses A,B,C and D of magnitude 200kg, 300kg 240kg and 260 kgs respectively. The corresponding radii of rotation are 0.2m, 0.15m, 0.25m and 0.3m respectively and the angles between successive masses are at 45, 75 and 135 degrees. Analyze the given system using graphical or analytical method and identify whether the system is balanced or not. If the system is unbalanced, determine the position and magnitude of the balance mass required, if its radius of rotation is 0.2m. [CO-3][L4] **10**

b) A single cylinder reciprocating engine has a reciprocating mass of 60kg. the crank rotates at 60rpm and the stroke is 320mm. the mass of the revolving part at 160 mm radius is 40kg. if two-third of reciprocating parts and the whole of the revolving parts are to be balanced, determine the

i) Balance mass required at a radius of 350 mm.
ii) Unbalanced force when the crank has turned 50 ^{0} from top dead centre.

[CO-3][L3] **10**

Q.6 Each arm of a Proell governor is 240 mm long and each ball has a mass of 3 kg. The central load acting on the sleeve is 30 kg. The pivots of all the arms are 30 mm from the axis of rotation. The vertical height of the governor is 190 mm. The extension links of the lower arms are vertical and the governor speed is 180 rpm when the sleeve is in the mid-position. Determine the lengths of the extension links and the tension in the upper arms. [CO-2][L3] **20**

Q.7 a) An aeroplane runs at 600 Km/h. The rotor of the engine weighs 4000 N with radius of gyration of 1 meter. The speed of the rotor is 3000 rpm in anticlockwise direction when seen from the rear side of the plane. If the plane takes a left turn in a curve of 100 meters radius, determine:

i) Gyroscopic couple developed.

ii) Effect of reaction gyroscopic couple on the body of the plane. [CO-1][L3] **10**

b) The turbine rotor of a ship has a mass of 8 tonnes and a radius of gyration 0.6m. It rotates at 1800 r.p.m clockwise, when viewed from stern. Determine the gyroscopic couple, if the ship travels at 100 km/h and steer to port side in a curve of 75 m radius. [CO-1][L5] **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

MECHATRONICS SYSTEMS CONTROL (BME-DS-522A)

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

No. of pages: 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) State the function of SCADA system. [CO-1][L-1]
b) Differentiate between sensors and transducer. [CO-2][L-2]
c) Name the sensors based on "electrooptic principle" [CO-2][L-1]
d) Define "precision and accuracy" of a sensor. [CO-2][L-1]
e) Sketch a "double acting cylinder" and label it parts. [CO-2][L-2]
f) Show with a diagram how "digital to analog convertor" works. [CO-2][L-2]
g) Classify the digital display technologies. [CO-3][L-2]
h) Express "Isolation and Excitation" in signal conditioning. [CO-3][L-2]
i) Comment on "mechatronics design approach" of products. [CO-3][L-1]
j) List the various elements of "pick and place robot" [CO-3][L-1] **2×10**

PART-A

Q.2 Illustrates with the help of schematic diagram how the hardware and software integration takes place in a mechatronics system. Explain each component of the system. [CO-1][L-3] **20**

Q.3 Identify a transducer's variant and state the working principle and functionality of the following:

a) Temperature Transducer.
b) Pressure Transducers.
c) Displacement Transducers.
d) Force Transducers. [CO-2][L-4] **5×4**

Q.4 a) Describe with neat and labeled diagram of a "Pressure Control Valve" and Directional Control valve. [CO-2][L-2] **10**

b) Explain "Hydraulic and pneumatic systems" with their advantages and disadvantages. [CO-2][L-2] **10**

PART-B

Q.5 Derive the Mathematical Model of the following:

a) Rotational motion of a mechanical system.
b) Fluid system. [CO-2][L-3] **10×2**

Q.6 Sketch a neat labeled diagram of a generalized "Data Acquisitions System (DAQ)" Describe each component. Also construct a block diagram showing how sensors and actuators of a mechanical system are interfaced to a DAQ. [CO-3][L-5] **20**

Q.7 Design a mechatronics system for an "Engine Management Systems" with a neat sketch? Discuss the various types of sensors used in an "Engine Management System". [CO-3][L-6] **20**

End Semester Examination, Dec. 2023

B. Tech. - Fifth Semester

TOOL ENGINEERING AND DESIGN (BME-DS-529)

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) Draw the common insert shapes with their strength and weakness? [CO-1][L-1]

b) Name the various grades (ISO specifications) representing the work piece materials with the corresponding carbides insert grades used for machining? [CO-1][L-1]

c) State the effect of tool geometry. [CO-2][L-1]

d) What do coatings do for cutting tools? [CO-1][L-1]

e) Name the common materials for milling cutter. [CO-1][L-1]

f) What is milling cutter? What factors decide the cutting speed of a milling cutter? [CO-3][L-1]

g) State the purpose of gullet space provided on broach. [CO-3][L-1]

h) How the pitch of teeth of a broach is selected? [CO-3][L-2]

i) What role do gauges play in the mass production system? [CO-4][L-1]

j) Where plug gauge are used? [CO-2][L-1] **2×10**

PART-A

Q.2 Discuss types of tool steel with their basic composition and AISI nomenclature:

a) Water hardening steel
b) Air hardening steel
c) Oil hardening steel
d) High carbon high chromium steel
e) Chrome-steel
f) Tungsten steel
g) Molybdenum Steel [CO-1][L-2] **20**

Q.3 Design a single point cutting tool based on strength and rigidity also analyze and calculate the forces. Discuss the selection of the tool material and shank size dimensions. [CO-2][L-5] **20**

Q.4 Sketch a twist drill and dicsuss the salient features of the following elements:

a) Lip angle
b) Helix angle
c) Chisel angle
d) Point angle
e) Land width
f) Margin
g) Back taper [CO-3][L-5] **20**

PART-B

Q.5 a) How the milling cutters are classified? How are milling process classified? Explain up and down milling with the help of neat sketches. [CO-3][L-2] **10**

b) Discuss the design features of a milling cutter:
   i) Size of cutter.
   ii) Number of teeth.

P.T.O.

iii) Power requirement for milling. [CO-2][L-2] **10**

Q.6 a) The bore of an alloy steel component prior to broaching is 32.25 (0.05 and minus 0.00). The bore is to be finished broached to 32.75(0.01 and minus 0.00). If the length of the bore is 35mm. Design the broach. [CO-4][L-6] **10**

b) Sketch a typical internal broach. Discuss the design considerations for broaching allowances, pitch, width of land, gullet depth, rise per tooth and total broach length. [CO-3][L-5] **10**

Q.7 a) Explain the term 'Gauge'. Differentiate between standard (non- limit gauge) and a limit gauge. [CO-2][L-2] **10**

b) State and explain Taylor's principle of limit gauging. Discuss the various materials used for gauge manufacture. [CO-2][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

REFRIGERATION SYSTEMS & BASICS OF AIR CONDITIONING (BME-DS-532)

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. PSYCHROMETRIC CHART ATTACHED PAGE 3.*

Q.1 Answer the following in brief:

a) Define specific humidity and relative humidity. [CO-2][L-1]
b) What do you understand by air-conditioning? [CO-2][L-2]
c) Define 'sensible heat factor'. [CO-2][L-1]
d) What is sensible heat load and latent heat load? [CO-3][L-2]
e) What is apparatus dew point? [CO-2][L-2]
f) Explain the term "tone of refrigeration". [CO-1][L-1]
g) If the refrigerant is designated as R-11 and R-718 find the chemical formula. [CO-3][L-2]
h) Explain difference between VCRS and VARS. [CO-1][L-1]
i) Plot a graph of VCRS on p-h and T-s diagrams considering following processes:
   i) Sub-cooling.
   ii) Superheating. [CO-1][L-2]
j) What is difference between a refrigerator and heat pump? [CO-1][L-1] **2×10**

PART-A

Q.2 A simple evaporative air refrigeration system is used for an aeroplane to take 20 tonnes of refrigerating load. The ambient air conditions are 20°C and 0.9 bar. The ambient air is rammed is entropically to a pressure of 1 bar. The air leaving the main compressor at pressure 3.5 bar is cooled in the heat exchanger having effectiveness of 0.6 and then in the evaporator where its temperature is reduced by 5°C. The air from the evaporator is passed through the cooling turbine and then it is supplied to the cabin which is to be maintained at a temperature of 25°C and at a pressure of 1.05 bar. If the internal efficiency of the compressor is 80% and that of cooling turbine 75%,
Determine:

a) Mass of air bled off the main compressor.
b) Power required for the refrigerating system.
c) COP of the refrigerating system. [CO-1][L-5] **20**

Q.3 Explain with reference to P-H and T-S diagram, the stages involve in the vapour compression refrigeration system. [CO-1][L-3] **20**

Q.4 a) Draw the neat diagram of practical vapour absorption refrigeration system and explain its working. [CO-3][L-3] **10**
b) Draw the neat diagram of electrolux refrigeration system and explain its working. [CO-3][L-3] **10**

PART-B

Q.5 a) The atmospheric conditions are 20°C and specific humidity of 0.0095 kg/kg of dry air. Calculate the following:
   i) Partial pressure of vapour.
   ii) Relative humidity.
   iii) Dew point temperature. [CO-2][L-4] **15**

b) Derive an expression for relation between Relative Humidity and Degree of saturation. [CO-2][L-3] **5**

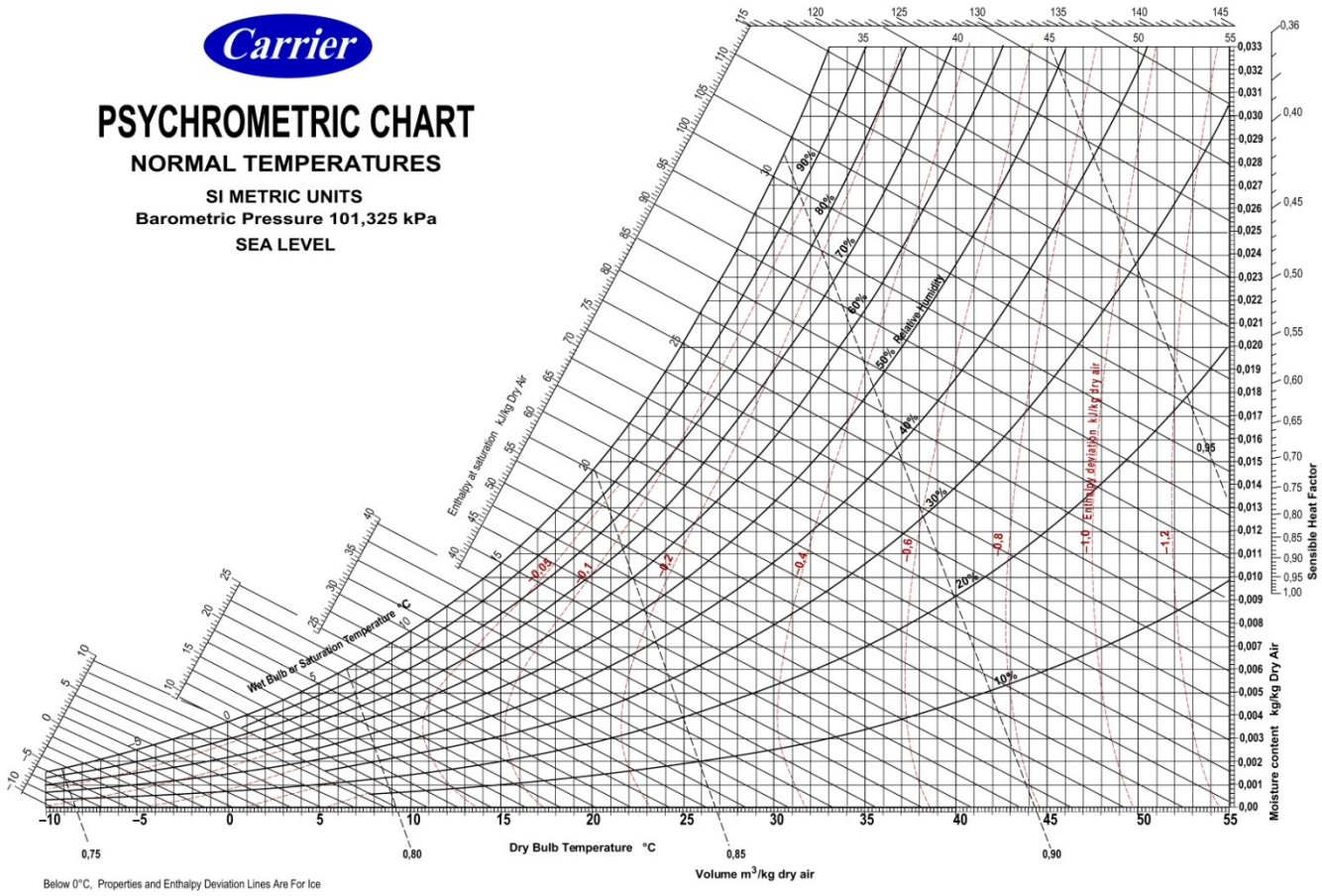
Q.6 An office for seating 30 occupants is to be maintained at 22°C DBT and 55% RH. The outdoor conditions are 36°C DBT and 27°C WBT. The various loads In the office are:

a) Solar heat gain 8500W,
b) Sensible heat gain per occupant 83W,
c) Latent heat gain per occupant 100W,
d) Lighting load 2500W,
e) Sensible heat load from other sources 12000W,
f) Infiltration load 15 cubic meter/minute.
g) Assuming 40% fresh air and 60% of re-circulated air passing through the evaporator coil
h) ADP of the coil is 8°C.

Find capacity of the plant and mass flow rate of air. [CO-3][L-6] **20**

Q.7 Explain briefly ***any two*** of the following:

a) Flooded type evaporator.
b) Shell and tube condenser.
c) Thermostatic expansion valve. [CO-2][L-3] **10×2**


Carrier
PSYCHROMETRIC CHART
NORMAL TEMPERATURES
SI METRIC UNITS
Barometric Pressure 101,325 kPa
SEA LEVEL
Enthalpy at saturation kJ/kg Dry Air
Wet Bulb or Saturation Temperature °C
Relative Humidity
Enthalpy deviation kJ/kg dry air
Sensible Heat Factor
Moisture content kg/kg Dry Air
Dry Bulb Temperature °C
Volume m³/kg dry air
Below 0°C, Properties and Enthalpy Deviation Lines Are For Ice

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

FUNDAMENTAL OF ROBOT (BME-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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Define the term "Robot" based on your understanding.
b) Discuss the role of Robots in Automation.
c) Explain half degree of freedom mean for robot joints.
d) Define Robot workspace.
e) Compare hydraulic actuators to electric actuators.
f) List the various applications where tools are used as end effectors.
g) Explain tool center point of end effector.
h) Differentiate between external and internal sensors.
i) Classify the various robot work cell layouts.
j) Summarize the sensor system to detect intruders around a robot.

[CO-1-6][l-1,2,4] **2×10**

PART-A

Q.2 a) Explain the basic parts of a robot with a neat diagram. [CO-1][L-2] **14**

b) Discuss the various characteristics which are necessary for a robot. [CO-1][L-2] **6**

Q.3 a) Explain the working and components of Pneumatic actuators in robots with a neat diagram. [CO-2] [L-2] **10**

b) A double acting single ended hydraulic actuator has a piston diameter 12 cm and diameter of rod as 6 cm. The pump supplies hydraulic oil at a rate of 40cm^3/sec with a pressure of 50 N/cm^2. Calculate:

i) Force applied by Piston in Retraction stroke.
ii) Maximum Velocity with which rod can operate in Retraction stroke.
iii) The power of the actuator in KWs. [CO-2][L- 4] **10**

Q.4 a) Classify and discuss the various proximity sensors used in robotics with neat diagrams. [CO-3][L-4] **12**

b) Explain the working of triangulation method of range sensor with a neat sketch, also mention its limitations. [CO-3][L-2] **8**

PART-B

Q.5 a) Illustrate the working of in line robot work cell and transfer systems used with neat diagrams. [CO-4][L-3] **10**

b) Analyze the various accidents that happen with robots and suggest some guidelines to be followed to avoid such accidents. [CO-4][L-3] **10**

Q.6 a) Discuss the various applications of robots in industries for welding. [CO-5][L-3] **10**

b) Explain offline programming of robots and how the commands for interlocked robot work cells are used? [CO-5][L-4] **10**

Q.7 Write a program for a palletizing process to be done by a robot with 2 finger grippers for a 2 x 3 slot, consuming minimum time. Assume all the points in motion.

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

End Semester Examination, Dec. 2023

B. Tech. — Seventh Semester

OPERATION RESEARCH (BME-DS-701)

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) Discuss the alternate optimum in operation Research. [CO-1 (L-2]
b) Point out the limitations of simulation method. [CO-3 (L-1]
c) Differentiate between PERT and CPM in Network planning. [CO-4 (L-3]
d) List the types of Floats in Network. [CO-5 (L-2]
e) Discuss on certain environment consideration in decision making. [CO-1 (L-2]
f) Summarize Critical Path in Network Planning. [CO-2 (L-2]
g) List any four areas where operation research is applied. [CO-2 (L-2]
h) Distinguish between linear programming and non-linear programming. [CO-2 (L-2]
i) Interpret the Balking behaviour of the customer consider in queue model. [CO-6 (L-1]
j) Demonstrate the Gauss-Jordan reduction process in Simplex Method. [CO6 (L2) **2×10**

PART-A

Q.2 The following is the payoff (in Rupees) table for three strategies and two state of nature:

Strategy	State of Nature	
	N_1	N_2
S_1	40	60
S_2	10	-20
S_3	-40	150

Select a strategy using following decision criteria:

a) Optimistic Criterion

b) Regret Criterion

c) Pessimistic Criterion. [CO1][L4] **20**

d) Laplace Criterion

[20] CO-1,5 (L-4)

Q.3 Use the Simplex method to solve the following problem:
Maximize $Z = 16X_1 + 17X_2 + 10X_3$
Subject to the constraints:

$X_1 + 2X_2 + 4X_3 \leq 2000$

$2X_1 + X_2 + X_3 \leq 3600$
$X_1 + 2X_2 + 2X_3 \leq 2400$
$X_1 \leq 30 X_1, X_2, X_3, \geq 0$ [CO-2 (L-4] **20**

Q.4 Production department in M/s Arora metals have 5 employees with five jobs to be performed. The time (in hours) that each man takes to perform each given job is given in effectiveness matrix.

		Employees				
		I	*II*	*III*	*IV*	*V*
JOBS	A	10	5	13	15	16
	B	3	9	18	13	6
	C	10	7	2	2	2
	D	7	11	9	7	12
	E	7	9	10	4	12

How should the jobs be allocated, one per employee, so as to minimize the total-hours?
[CO-5 (L-3] **20**

PART B

Q.5 a) Determine the queue discipline. Also explain in detail various queue disciplines consider under queue model. [CO-3,6 (L-2] **7**

b) In a car 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-6 (L-4] **13**

Q.6 The following table gives a list of various activities and their immediate predecessors involved in installation of CAT scanner in Hospital:

Activity	Description	Immediate Predecessor	Estimated Duration (days)
A	Finalization of the layout plans	-----	2

B	Demolition of structure	A	6
C	Walls Erection	B	12
D	Flooring	B	8
E	Electrical wiring	C	6
F	Air-conditioning ducting	C	4
G	Fire alarm installation	C	3
H	False ceiling and light fittings	E,F,G	10
I	Wall plastering and painting	H	9
J	Equipment installing	D,I	6
K	Calibration and testing	J	3
L	Final finishing	K	2
M	Handling over	L	1

a) Develop the network diagram for the project.
b) Calculate the critical path and floats in network. [CO-6 (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	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-3 (L-4] **20**

End Semester Examination, Dec. 2023

B. Tech. - Seventh Semester

INDUSTRY AUTOMATION (BME-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 in brief:

a) List the properties of a stepper motor. [CO-2][L-1]
b) Name the control components in a hydraulic actuation system. [CO-5][L-1]
c) How the capacitance in a capacitive position sensor is altered? [CO-5][L-2]
d) Which type of position can be measured by using position sensors? [CO-2][L-1]
e) Differentiate DCV based on construction? [CO-3][L-2]
f) Show different pneumatic valve symbols. [CO-1][L-1]
g) What is the difference between a PLC and a ladder diagram? [CO-4][L-1]
h) Write the similarities of AS/RS and AGVs. [CO-4][L-2]
i) Draw a symbol of ON delay timer instruction [CO-3][L-2]
j) Which principles can be applied in product design to facilitate automated assembly systems? [CO-4][L-2] **2×10**

PART-A

Q.2 a) Illustrate electric linear actuators and electric rotary actuators. [CO-5][L-3] **10**

b) Explain how the conversion of rotary motion to linear motion with the help of a power lead screw in actuators takes place. [CO-2][L-4] **10**

Q.3 a) Categorized the advantages and disadvantages of Binary (on-off) versus Analog (Proportional) sensors. [CO-1][L-4] **10**

b) Explain pneumatic limit valves, back pressure sensors and coiled-spring sensors. [CO-4][L-2] **10**

Q.4 a) Differentiate common valve actuation and simple cylinder actuating methods. [CO-3][L-4] **10**

b) Discuss different switching elements and compare them. [CO-4][L-2] **10**

PART-B

Q.5 a) Design a pneumatic 2-Cylinder circuit for speed control of bidirectional motor. [CO-3][L-5] **10**

b) Construct a ladder diagram for the sequence: START, A+, B+, B-, A-, Using a 5/2 valve with double solenoids and show the sequence chart. Assume that the operator might keep pressing down the start button the whole time and design according to that assuming both cylinders are in the fully retracted positions. Indicate NO, and NC on the ladder diagram. [CO-5][L-5] **10**

Q.6 a) Describe the generalized architecture of an industrial automation system. [CO-1][L-2] **10**

b) Select the device that can be used with PLC to control the speed of AC motor and analyze. [CO-3][L-4] **10**

Q.7 a) Explain vibratory bowl feeders and non-vibratory feeders with diagrams. [CO-4][L-2] **10**

b) Distinguish part orienting and feed track system. [CO-3][L-4] **10**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

MODERN MACHINING METHODS (BME-DS-722)

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

No. of pages: 1

Note: *Attempt any **FIVE** questions in all; **Q.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) State the function of acoustic head system in USM. [CO1, L2]
b) Why do we need modern machining methods? [CO1, L1]
c) Write the differences between WJM and AJM process. [CO2, L4]
d) What are the various methods of preparing the mask for CHM? [CO3, L1]
e) What is the function of electrolyte in ECM? [CO3, L1]
f) Define 'duty factor'. [CO4, L1]
g) What are the reasons for the use of deionized water as dielectric system in wire EDM? [CO4, L1]
h) What are thermal and non-thermal types of EBM? [CO5, L1]
i) State the applications of PAM. [CO6, L2]
j) Distinguish between transferred type and non-transferred type PAM. [CO6,L4]

2×10

PART-A

Q.2 a) Derive an equation of MRR in USM. Sketch any two types of feeding systems used in USM. [CO2, L6] **10**

b) Classify different types of Modern Machining Methods. Briefly explain the modern machining methods on the basis of physical parameters and capability to shape. [CO1, 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 (cmm^3/s) of the carrier gas and abrasive mixture. [CO2, L3] **10**

8

b) Sketch and discuss the principle of WJM process. Explain the effect of WJM parameters on the removed depth from the work piece. [CO2, L2] **10**

12

Q.4 a) Write a short note on electrochemical grinding. Derive a theoretical relationship for the determination of the metal removal rate in ECM. [CO3, L6] **10**

b) Explain in brief the chemical milling. What are the applications of chemical milling? [CO3, L2] **10**

PART-B

Q.5 a) Explain the working principle of electrochemical spark machining with a neat sketch. What are the advantages of ECSM process? [CO4, L2] **10**

b) Explain the flushing techniques used in EDM giving their relative merits and applications. [CO4, L2] **10**

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. [CO5, L2] **10**

b) Explain the working principle of LBM with a neat sketch. State the applications, advantages and limitations of LBM. [CO5, L2] **10**

Q.7 Explain in brief the working principle of plasma arc machining with a neat sketch. Discuss the factors that influence the quality of the cut in PAM. [CO6, L2] **20**

End Semester Examination, Dec. 2023

B. Tech. – SeventhSemester

DESIGN OF MACHINE TOOL (BME-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) List the properties which should be possessed by machine tool parts for their proper performance. [CO-1][L-1]

b) Define Kinematics of a machine tool. [CO-3][L-1]

c) State the purpose of incorporating automation in machine tool. [CO-1][L-3]

d) Name the various gearing devices used for transmitting power in machines. [CO-2][L-1]

e) Explain the term machine tool. [CO-1][L-1]

f) Enumerate the function of machine tool. [CO-3][L-2]

g) List the various elements of machine tools. [CO-3][L-1]

h) Discuss ray diagram. [CO-5][L-1]

i) What are reversing mechanisms? What is the requirement of reversingmechanisms? [CO-6][L-4]

j) List the merits of V-belts over flat belts. [CO-1][L-5] **2×10**

PART-A

Q.2 List the various mechanisms that are used to convert rotary motion into linear or translatory motion and give examples of application of those different mechanisms in machine tools. Explain general requirements of machine tools. [CO-2][L-2] **20**

Q.3 a) Design the schematically the kinematic diagram of a drilling machine and briefly state the working principle of the machine tool. [CO-5][L-5] **15**

b) Differentiate between Ray diagram and structure diagram. [CO-4][L- 2] **5**

Q.4 a) Discuss the different method to determine the transmission ratio for drives. [CO-4][L-2] **10**

b) A machine tool spindle is to have six speeds and is to run at a maximum speed of 768 RPM and a minimum speed of 24 RPM. Calculate the spindle speeds. [CO-4][L- 4] **10**

PART-B

Q.5 Describe the following methods of obtaining different speed of machine tool spindle:

a) Cone and pulley arrangement.

b) Speed gear box. [CO-5][L-2] **10×2**

Q.6 a) Discuss the principle requirement for machine tool spindles. [CO-2][L-5] **10**

b) Discuss different types of bearing and what main factors governs the selection of a proper bearing for a machine tool. [CO-6][L-2] **10**

Q.7 a) Discuss the effect of chatter during machining. [CO-3][L-2] **10**

b) List the different source of vibration in machine tool? How that can be eliminated.

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

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

ADDITIVE MANUFACTURING (BME-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 in brief:

a) List of few applications in industry. [CO1][L2]
b) Evolution of additive manufacturing. [CO1][L2]
c) Drop on demand technique. [CO4][L1]
d) Powder fusion mechanism. [CO6][L2]
e) Bio-extrusion. [CO6][L1]
f) Sintering. [CO2][L1]
g) Composite and alloy material. [CO2][L1]
h) AM machine and CNC machine. [CO2][L2]
i) DFAM. [CO2][L1]
j) 4D manufacturing. [CO6][L1] **2×10**

PART-A

Q.2 a) Justify the statement: Material relationship affects the selected Additive ManufacturingProcess. [CO-1,2] [L-2] **10**

b) Mention at least two applications where AM can be used produce parts that are otherwisenot feasible with conventional machining processes. [CO-1,2] [L-1] **10**

Q.3 a) Discuss the variation from one AM Machine to another. [CO-2] [L-2] **10**

b) What is .stl format? Explain with diagram. [CO-1,2] [L-5] **10**

Q.4 a) Elaborate in detail the friction additive stir casting process. [CO-2,3][L-4] **10**

b) Elucidate the scope and possible limitations of additive manufacturing. [CO-1,3] [L-3] **10**

PART-B

Q.5 Differentiate between material jetting and binder jetting techniques using a case study of pen stand [CO-1,4] [L-4] **20**

Q.6 Discuss the directed energy deposition process in detail. [CO-2,5] [L-4] **20**

Q.7 a) Interpret the term extrusion process using additive manufacturing.[CO-5,6] [L-5] **5**

b) Discuss the variety of materials being used for Vat Photo-polymerization Process with a suitable case study. [CO-6] [L-2] **15**

End Semester Examination, Dec. 2023

OPEN ELECTIVE – COMMON FOR ALL BRANCHES

MAINTENANCE MANAGEMENT (BME-OE-002)

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

No. of pages: 1

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

Q.1
a) List the impact of machine's breakdown on production activities. [CO-5][L-1]
b) Enumerate the intangible benefits to an organization by implementing TPM. [CO-3][L-2]
c) List the importance of spare parts inventory in maintenance management. [CO-6][L-1]
d) Categorize the strategies comes under preventive maintenance. [CO-2][L-4]
e) Recall the activities performed under routine maintenance. [CO-1][L-2]
f) Interpret the importance of manpower management in maintenance control. [CO-2][L-3]
g) List the factors that are considered for maintenance planning. [CO-3][L-1]
h) Connect the technological advancement with maintenance operations. [CO-6][L-3]
i) Appraise the maintenance functions that helps in optimizing the running cost of an equipment. [CO-4][L-4]
j) Recite any four roles of a maintenance manager in planning and executing the various activities associated with maintenance operations. [CO-1][L-2] **2×10**

PART-A

Q.2 Explain in brief the various factors considered for formulating and designing the maintenance strategies in a cost-effective manner for an organization. [CO-1][L-4] **20**

Q.3 Report and validates the various challenges associated with maintenance functions in an organization related to your domain. [CO-2][L-5] **20**

Q.4 Summarize the Failure Mode and Effect Analysis (FMEA) Method for analysing failures and prioritizing the maintenance action [CO-5][L-3] **20**

PART-B

Q.5 List the various strategies of maintenance activity. Also explain any two in brief. [CO-4][L-3] **20**

Q.6
a) Compare the planned v/s unplanned maintenance strategy. [CO-6][L-5] **10**
b) Summarize the concept of overall equipment effectiveness. [CO-2][L-2] **10**

Q.7 Brief the pillars of TPM. Also, list the benefits to an industry after successful implementation of TPM. [CO-3][L-3] **20**

End Semester Examination, Dec. 2023

OPEN ELECTIVE – COMMON FOR ALL BRANCHES

QUALITY CONTROL (BME-OE-003)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a) What is variation? [CO-1][L-1]
b) Distinguish between variable and attribute in charts. [CO-3][L-2]
c) Interpret the customer importance in TQM. [CO-1][L-3]
d) Comment on sustainability. [CO-4][L-2]
e) Examine the factors responsible for affecting quality in industries. [CO-2][L-3]
f) Interpret the term quality circle. [CO-3][L-2]
g) Distinguish between variables and attributes. [CO-1][L-2]
h) Discuss benchmarking. [CO-4][L-2]
i) Appraise the term total participation in quality management. [CO-2][L-2]
j) Name the various types of sampling used in SQC. [CO-3][L-2] **2×10**

PART-A

Q.2 Summarize the concept of quality in relation to its dimensions. [CO-2][L-3] **20**

Q.3 Write short notes on following QC tools.

a) Cause-and-effect diagram. [CO-3][L-4]
b) Pareto chart. [CO-3][L-4] **10×2**

Q.4 Articulate the important facts for necessity of quality control. Also, list the benefits for having in-house QC department in an organization. [CO-2][L-3] **20**

PART-B

Q.5 Appraise the term Total Quality Management. Also, articulate the new concept emerged in the last two decades resulting the continuous improvement in industrial performances. [CO-2,4][L-3] **20**

Q.6 Calculate and draw the X and R chart for the following data:

Observations

A	B	C	D	E	F
Number	Obs 1	Obs 2	Obs 3	Obs 4	Obs 5
S1	74.03	74.002	74.019	73.992	74.008
S2	73.995	73.992	74.001	74.011	74.004
S3	73.988	74.024	74.021	74.005	74.002
S4	74.002	73.996	73.993	74.015	74.009
S5	73.992	74.007	74.015	73.989	74.014

Note: Relative Data

Control Chart Factors			
Size of Sample (n)	Factor for UCL and LCL for x-Charts (A_2)	Factor for LCL for R-Charts (D_3)	Factor UCL for R-Charts (D_4)
2	1.880	0	3.267
3	1.023	0	2.575
4	0.729	0	2.282
5	0.577	0	2.115
6	0.483	0	2.004
7	0.419	0.076	1.924

[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. 2023

B. Tech. — First / Second Semester

MECHANICS (BPH-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) Write the expressions for velocity and acceleration in cylindrical polar coordinates. [CO-3][L-2]

b) How will you apply the third law of motion in the case of horse pulling a cart? [CO-3][L-2]

c) What are central forces? [CO-1][L-1]

d) If no torque acts on a body will its angular velocity remain conserved? [CO-6][L-2]

e) How the winds in hurricane/cyclone move around their centre, known as the eye. [CO-6][L-2]

f) What is resonance? [CO-1][L-1]

g) What is the damping force? [CO-1][L-1]

h) Define the rigid body motion? [CO-5][L-1]

i) Is the velocity of a particle under uniform rotational motion constant? [CO-5][L-1]

j) Give two examples of three dimensional rotational motions. [CO-2][L-1] **2×10**

PART-A

Q.2 a) Evaluate the transformation of vector components under rotation. [CO-1][L-5] **8**

b) Discuss the fundamental forces of nature [CO-1][L-2] **7**

c) Write short note on friction. [CO-3][L-2] **5**

Q.3 a) Show that in the case of a conservative force, the work done around a closed path is zero. [CO-6][L-3] **8**

b) Write a short note on the law of conservation of angular momentum and its importance in Physics. [CO-1,6][L-2] **7**

c) Write a short note on 'Satellite manoeuvres'. [CO-6][L-2] **5**

Q.4 a) What is Foucault pendulum? How does it enable us to demonstrate the rotation of the earth about its own axis? [CO-1,6][L-3] **10**

b) Explain the fictitious forces. [CO-1,6][L-2] **5**

c) Discuss in detail about weather systems. [CO-1,6][L-2] **5**

PART-B

Q.5 a) Solve the differential equation of a simple harmonic oscillator and find the expressions for its time period, velocity and acceleration. [CO-1,6][L-3] **14**

b) What is forced oscillations. Write differential equation for forced oscillations. [CO-1,6][L-2] **6**

Q.6 a) Prove that torque acting on a rigid body about a fixed axis is equal to the product of angular acceleration and moment of inertia about the same axis. [CO-2,5][L-3] **10**

b) Discuss the Euler's laws of motion. [CO-2,5][L-2] **6**

c) Differentiate between rectilinear and rotational motion? [CO-2,5][L-2] **4**

Q.7 a) Evaluate the expression for rate of change of a vector rotating with angular velocity. [CO-2,5][L-5] **10**

b) Obtain the relationship between the angular momentum of a rigid body rotating in space with angular velocity. [CO-2,5][L-4] **10**

End Semester Examination, Dec. 2023

B. Tech. – First / Second Semester

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

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

No. of pages: 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 metals, semiconductor and insulators on the basis of band gap.
b) Show the relation between charge density and drift velocity?
c) Describe the location of Fermi level in p-type semiconductor at 0° K.
d) Draw the energy band diagram for a pn-junction diode in an unbiased condition.
e) Write the expression for effective mass of an electron.
f) Differentiate between Photon and Phonon.
g) Explain radiative recombination.
h) Distinguish between photoemissive and photoconductive type photodetectors.
i) Define quantum efficiency of a photodetector.
j) What is the use of Hot-point probe measurement? **2×10**

PART-A

Q.2 a) Discuss the Kronig-Penny model. Explain the formation of energy bands separated by forbidden energy gap in solids using this model. [CO-1][L-3] **15**

b) Write short note on occupation probability. [CO-1][L-2] **5**

Q.3 a) Derive an expression for the intrinsic carrier concentration in an intrinsic semi-conductor. Under what conditions will Fermi level be in the middle of the forbidden gap. [CO-2][L-3] **12**

b) Differentiate between direct band semiconductor and indirect band gap semiconductors. [CO-2][L-2] **8**

Q.4 a) Explain spontaneous emission and stimulated emission and find the relation between Einstein's coefficients. [CO-3][L-3] **15**

b) Write short note on photovoltaic effect. [CO-3][L-2] **5**

PART-B

Q.5 a) Discuss the working of a double heterojunction LED and explain how the extraction efficiency is improved. [CO-4][L-3] **14**

b) Write short note on the device characteristics of LED. [CO-4][L-2] **6**

Q.6 a) Using a labeled diagram discuss the principle, construction and working of avalanche photo-detector. [CO-5][L-3] **10**

b) Discuss the principle, construction and working of a solar cell. Draw its characteristics and find out the fill factor. [CO-5][L-3] **10**

Q.7 a) What is DLTS? How we get the information of deep level impurities using this technique? [CO-6][L-3] **8**

b) Explain in detail the capacitance voltage measurement method. [CO-6][L-3] **8**

c) Find out the value of resistivity in Si chip having thickness 0.80 cm and probe distance (s) 0.20 cm. The mean value of V/I ratio is 57.33 experimentally
. [CO-6][L-4] **4**

End Semester Examination, Dec. 2023

B. Tech. — First / Second 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**. Marks are indicated against each question.*

Q.1
a) Give two examples each of direct and indirect band gap semiconductor. [CO-2][L-1]
b) Where is the Fermi level located in p-type semiconductors at 0K? [CO-2][L-1]
c) Explain the concept of Wave packet. [CO-1][L-2]
d) Why GaAs is used for semiconductor laser? [CO-1][L-1]
e) Explain the importance of meta-stable states in laser. [CO-1][L-2]
f) Give two reasons why the properties of a materials change at nanoscale? [CO-3][L-2]
g) Why X-rays are used to detect crystal structure? [CO-3][L-1]
h) What is the principle of AFM? [CO-3][L-2]
i) Write any two Maxwell's equations. [CO-4][L-1]
j) Differentiate between free charges and bound charges. [CO-4] [L-2] **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) 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) Determine the energy Eigen states and the Eigen values using Schrodinger wave equation for a free particle in a one dimensional box. [CO-1][L-4] **12**
b) Differentiate between Bose-Einstein and Fermi-Dirac statistic. [CO-1][L-2] **4**
c) X- Rays of wavelength 1.60 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. [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) Classify optical fibres on the basis of modes of propagation and index profile. [CO1][L3] **7**
c) Summarize the characteristics of a laser beam. [CO-1][L-2] **3**

PART-B

Q.5
a) Discuss the Quantum dot and Graphene. [CO-3][L-2] **4**
b) What are nanomaterials? Discuss the different approaches in building nanomaterials. [CO-3][L-2] **6**
c) How carbon nanotubes can be synthesized? Write any five applications of carbon nanotubes. [CO-3][L-3] **10**

Q.6
a) What is Hall Effect? Derive an expression for Hall coefficient (Hall resistance). Discuss some important applications of Hall Effect. [CO-3][L-3] **10**
b) Write a short note on Rutherford Back Scattering Spectroscopy. [CO-3][L-2] **6**
c) Calculate the glancing angle at which the first and second order diffraction maxima will be observed, when X-rays of wavelength 2 Å are reflected from a cleavage of calcite with interplanar distance (d) of 3.2 Å. [CO-3][L-4] **4**

Q.7
a) Establish the expression for divergence of electric field. [CO-4][L-3] **6**
b) Determine the capacitance of a parallel plate of a capacitor using Laplace equation. [CO-4][L-3] **10**
c) Write any four applications of piezoelectric materials. [CO-4][L-2] **4**

End Semester Examination, Dec. 2023

B. Tech. – First / Second Semester

CHEMISTRY-I (BSC-CH-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 in brief:

a) Find out the lowest possible energy for a particle in box. [CO-1][L-1]
b) Discuss enantiomers and diastereomers with suitable examples. [CO-3][L-1]
c) State the method to calculate the number of nodes in nth quantum state. [CO-2][L-2]
d) Discuss the significance of Van der Waal's constants. [CO-5][L-1]
e) Explain Zeometrical isomerism with suitable examples. [CO-4][L-4]
f) Differentiate between Cis and Trans Isomerism. [CO-6][L-1]
g) Comments on physical significance of Ψ&Ψ2. [CO-3][L-2]
h) Differentiate between dry and wet corrosion. [CO-5][L-2]
i) Calculate no of radial and angular nodes in 2s orbital. [CO-1][L-3]
j) Differentiate between N doping and P doping. [CO-2][L-3] **2×10**

PART-A

Q.2 a) Derive energy expression for particle in 1-Dimensional box in terms of particle's mass m, the length of the box L, and Planck's constant h. [CO-1][L-3] **10**

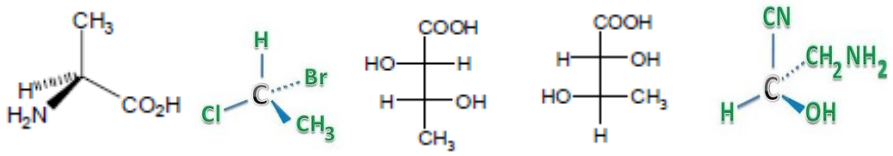
b) Compare the bond order of N_2 and O_2 with the help of molecular orbital diagram and write their electronic configuration. [CO-1][L3,4] **10**

Q.3 a) Differentiate between ideal and real gas. Explain Vander wall's equation for real gas in details. [CO-2][L-2] **10**

b) Calculate the effective nuclear charge (Zeff) experienced by valence shell electron 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. [CO-3][L-2] **10**

b) Label each stereogenic centers as *R* or *S* as per CIP rule. [CO-3][L- 3] **10**



PART-B

Q.5 a) Explain electrochemical theory of corrosion. [CO-5][L-3] **10**

b) Compare Bi-metallic corrosion and differential aeration corrosion with reactions, diagrams and examples and discuss four factors affect the corrosion rates with brief description of any four. [CO-5][L-2] **10**

Q.6 a) Discuss the principle and applications of AFM technique with suitable block diagram and write the advantages and disadvantages of SEM over AFM. [CO-4][L-2] **10**

b) State the Beer lambert law and discuss the application of UV visible spectroscopy. [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 reaction and examples? [CO-6][L-3] **10**

End Semester Examination, Dec. 2023

B. Tech. – First Semester

APPLIED PHYSICS (BSC-PH-103/BPH-103)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a) Discuss important applications of LASER. [CO-1][L-3]
b) Give the principle of holography. [CO-1][L-3]
c) Draw a labeled diagram of an optical fibre. [CO-2][L-3]
d) Why optical fibre communications are important? [CO-2][L-1]
e) Explain how traps affect the conductivity of the sample? [CO-3][L-2]
f) What is fill factor of a solar cell? [CO-3][L-1]
g) Explain centre of symmetry and plane of symmetry. [CO-4][L-2]
h) What is Mosley's law? Give its significance. [CO-5][L-1]
i) Give two reasons, why the properties of a materials change at nanoscale? [CO5][L2]
j) Discuss two applications of carbon nanotubes. [CO-6][L-1] **2×10**

PART-A

Q.2 a) Discuss Einstein's coefficients. Derive the relations between them. [CO-1][L-3] **10**
b) Discuss the construction and reconstruction of image on a hologram. Also give important applicationsof holography. [CO-1][L-2] **10**

Q.3 a) Derive the expression for the Numerical Aperture of an optical fibre. [CO-2][L-5] **10**
b) A glass clad fibre is made with the core glass of refractive index 1.5 and the cladding is doped togive a fractional index difference of 0.0005. Determine the cladding refractive index and numerical aperture. [CO-2][L-5] **5**
c) Discuss different types of losses in an optical fibre. [CO-2][L-2] **5**

Q.4 a) Describe the construction, working, characteristics and applications of photovoltaic cell. [CO-3][L-2] **10**
b) What is photoconductivity? Discuss simple model of a photoconductor. [CO3][L4] **10**

PART-B

Q.5 a) What are Miller indices? Derive an expression for inter planer spacing between two parallelplanes in a simple cubic crystal. [CO-4][L-3] **10**
b) What is hexagonal close packed (HCP) structure? Show that c/a ratio for HCP crystal structure is $(8/3)^{1/2}$. [CO-4][L-4] **10**

Q.6 a) Write a short note on Rutherford Back Scattering Spectroscopy. [CO-5][L-4] **10**
b) Derive Bragg's law for diffraction of X-rays. Describe Bragg's x-ray spectrometer and explain how it is used to analyze the crystal structure. [CO-5][L-4] **10**

Q.7 a) What are nano materials? Discuss the different approaches in building nano materials. Describe two methods to produce carbon nano tubes. [CO-6][L-2] **10**
b) Discuss the electrical, mechanical and vibrational properties of carbon nanotubes.

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

End Semester Examination, Dec. 2023

B. Sc. (Microbiology) / B. Tech. – First Semester

PROFESSIONAL COMMUNICATION – I (CDC-PC-101)

Time: 1½ hrs. Max Marks: **50**

No. of pages: 4

Note: *All questions are **compulsory**. Each question has **FOUR** options with **ONE** correct answer. Select the correct answer. All questions are of **ONE** mark each. There is no **NEGATIVE** marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.*

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

Directions: In the question a part of the sentence has been highlighted in bold. Alternatives of the highlighted part are given which may improve the construction of the sentence. Select the correct alternative.

Q.1 Which option describes a negative attitude? [CO-1][L-1]

a) Optimism and perseverance
b) Anger and Resentment
c) Empathy
d) Patience

Q.2 Complete the sentence: Practicing self-compassion is an example of_____. [CO-1][L-1]

a) Positive attitude
b) Negative attitude
c) Cognition
d) Affection

Q.3 Choose the correct option for: In ABC model of attitude, B stands for [CO-1] [L-1]

a) behavioral b) belief c) balance d) bias

Q.4 Choose the correct answer for: Chivalry can be best defined as: [CO-1] [L-1]

a) Showing discrimination to certain individuals
b) Showing an aggression towards others
c) Enforcing strict rules and regulations
d) Showing generosity, and courtesy

Q.5 Choose the correct options for: Examples for Ethical Cyber Activity's is/are: [CO-1] [L-1]

a) Treat each other with dignity and respect on social media platform
b) Accept other's points of view that there may be disagreement
c) Keep discussion and comments on the topic, and off the people do not use inflammatory or offensivelanguage, sarcasm online
d) All of above

Q.6 Choose the correct answer for: On-line Civility is [CO-1] [L-1]

a) Superficially following social norms without genuine care for others
b) Putting one's own needs above the needs of others
c) Being sincere, considerate, and respectful towards others
d) Take responsibility for your own online content

Q.7 Choose the correct option for: Which one is NOT a components of Professional Attire. [CO-1] [L-1]

a) Pressed, collared, long-sleeved shirt with tie
b) Dress slacks, socks, belt, and shoes
c) Shirts should always be tucked in
d) Jeans for formal meeting

Q.8 Choose the correct answer for: Components of Professional Attire for Women [CO-1] [L-1]

a) Dress pants, skirt (at or below knee)
b) Formal shirts with scarves
c) Closed-toe shoes
d) All of above

Q.9 What is Gender Discrimination? [CO-1] [L-1]

a) is doing or saying something to hurt someone from a different culture.
b) someone whose gender identity differs from that typically associated with the sex they were assigned at birth
c) Gender discrimination refers to inequality between people of the opposite gender.
d) None of above

Q.10 What does "Q" stand for in LGBTQIA+? [CO-1] [L-1]

a) Question b) Queer c) Qualification d) Queen

Q.11 What does cultural diversity NOT refer to? [CO-1] [L-1]

a) The presence of various cultures within a society
b) The dominance of a single culture in a society
c) The presence of cultural sensitivity in a society
d) The inclusion of minority cultures from a society

Q.12 Choose the correct answer for: Code of Conduct for a student in University/College [CO-1] [L-1]

a) Say 'Good morning to the teaching fraternity when you enter college.
b) Say 'thank you when someone offers help or does something for you
c) Listen patiently while others are speaking instead of interrupting them.
d) All of above

Q.13 Complete this sentence: Attitude changes can take place by……. [CO-1] [L-1]

a) Self-Perception: change to be helpful
b) Only observing your behavior but not changing it
c) Fixed mindset
d) None of above

Directions for the questions from Q.14 to Q.17: Choose the correct verb tenses for fill in the gap.

Q.14 By the end of tomorrow, Dortmund __ Chelsea Champions League Cup. [CO-2] [L-3]

a) is eliminating b) will have been eliminating
c) has been eliminated d) will have eliminated

Q.15 These days, people who _____ manual work, often receive far more money than clerks who _____ in offices. [CO-2] [L-3]

a) are doing / are working b) were doing / were working
c) have done / have worked d) do / work

Q.16 The theatre company __ a grant of £6.000 and it __ a further £2.000 from elsewhere now. [CO-2] [L-3]

a) will be given / seeks b) has been given / is seeking
c) is given / has been seeking d) was given / has sought

Q.17 She ___ me at the meetings only on Sundays as a child. [CO-2] [L-3]

a) was seeing b) has seen c) saw d) had seen

Directions for the questions from 18 to 23: Choose the correct part of speech for <u>underlined</u> word.

Q.18 <u>Take</u> your first left then go over the bridge. [CO-2] [L-3]

a) Noun b) Preposition c) Verb d) Adverb

Q.19 There is a party next week <u>though</u> I don't think I can go. [CO-2] [L-3]

a) Preposition b) Conjunction c) Adverb d) Adjective

Q.20 He goes to Spain often <u>not only</u> for the sun but also for the food. [CO-2] [L-3]

a) Conjunction b) Adverb c) Preposition d) Adjective

Q.21 I want to go to a <u>university</u> in the United States. [CO-2] [L-3]

a) adjective b) preposition c) noun d) Verb

Q.22 Andy knocked on the door <u>but</u> nobody answered. [CO-2] [L-3]
a) adverb b) adjective c) conjunction d) Verb

Q.23 I <u>really</u> don't understand. [CO-2] [L-3]
a) Adjective b) Adverb c) Noun d) Conjunction

Q.24 Which part of the following sentence contains a grammatical error? [CO-2] [L-3]
It (a)/ can take hundreds (b)/ of different experiments to achieve (c)/ a ultimate solution. (d)
a) It b) can take hundreds
c) of different experiments to achieve d) a ultimate solution

Q.25 Which part of the following sentence contains a grammatical error? [CO-2] [L-3]
Both (a)/ personality and external looking (b)/ vary greatly even among (c)/ brothers and sisters. (d)
a) Both b) personality and external looking
c) vary greatly even among d) brothers and sisters.

Q.26 Which part of the following sentence contains a grammatical error?
River water pollution (a)/ is often indicate (b)/ by algae (c)/ distribution (d). [CO-2] [L-3]
a) River water pollution b) is often indicate
c) by algae d) distribution.

Q.27 For each of the following, choose the sentence in which the subject and verb agree. [CO-2] [L-3]
a) Each one of the shirts has a green collar.
b) Each one of the shirts have a green collar.
c) Each one of the shirts had a green collar.
d) Both A & C

Q.28 For each of the following, choose the sentence in which the subject and verb agree. [CO-2] [L-3]
a) This singer, along with a few others, play the harmonica on stage.
b) This singer, along with a few others, plays the harmonica on stage.
c) Both A & B
d) None of above

Q.29 For each of the following, choose the sentence in which the subject and verb agree. [CO-2] [L-3]
a) The president or the vice president are speaking today.
b) The president or the vice president is speaking today.
c) Both A & B
d) None of above

Q.30 For each of the following, choose the sentence in which the subject and verb agree. [CO-2] [L-3]
a) Either Cassie or Marie pays the employees this afternoon.
b) Either Cassie or Marie pay the employees this afternoon.
c) Both A & B
d) None of above

Q.31 Choose the word whose "C" part is pronounced differently from the others. [CO-3] [L-2]
a) receives b) score c) scout d) comics

Q.32 Choose the word whose "E" part is pronounced differently from that of the others. [CO-3] [L-2]
a) predict b) report c) erupt d) get

Q.33 Choose the word whose "I" part is pronounced differently from that of the others. [CO-3] [L-2]
a) mind b) thing c) kind d) tidy

Q.34 How many syllables does <u>basketball</u> have? [CO-3] [L-2]
a) 1 b) 2 c) 3 d) 4

Q.35 How many syllables does <u>bedroom</u> have? [CO-3] [L-2]
a) 1 b) 2 c) 3 d) 4

Q.36 How many syllables does broccoli have? [CO-3] [L-2]
a) 1 b) 2 c) 3 d) 4

Q.37 Match a word with White that rhymes (sounds the same) [CO-3] [L-2]
a) Night b) Plant c) Taught d) Turn

Q.38 Match a word with SAIL that rhymes (sounds the same) [CO-3] [L-2]
a) Guy b) Pale c) May d) Tell

Q.39 Match a word with Thought that rhymes (sounds the same) [CO-3] [L-2]
a) Through b) Route c) Taught d) Mount

Q.40 A meaningless unit of pronunciation having one vowel sound with or without surrounding consonant sounds is [CO-3] [L-2]
a) a syllable b) a word c) a letter d) None of above

Q.41 What is a situation that calls for using your active listening skills? [CO-3] [L-2]
a) During arguments
b) Watching Big Boss
c) Listening to New songs
d) When a teacher explains the homework assignment

Q.42 Which one is NOT a characteristic of active listening? [CO-3] [L-2]
a) Listening is the most important of communication skill
b) A natural ability we are all born with.
c) Listening requires attention
d) Listen more than speaking

Q.43 Which work situation would require active listening? [CO-3] [L-2]
a) Your boss tells you to check the new schedule on your way out.
b) You are assigned to work in the customer service department.
c) While stocking shelves, you hear Austin and Nate talking about their weekend.
d) You are assigned to bag groceries for the shift.

Q.44 Why do you need to use your eyes when actively listening? [CO-3] [L-2]
a) you don't use your eyes when actively listening
b) helps both of you to focus on the conversation better
c) It's easy to have misunderstandings
d) none of these

Q.45 How can we improve writing skills? [CO-3] [L-2]
a) Make writing a daily exercise. b) Read daily
c) Develop a clear message d) All of above

Q.46 Which of the following most focused on the most by the reader? [CO-3] [L-2]
a) The handwriting b) Accuracy of content
c) Fluency of the content d) Both B & C

Q.47 The Tone and purpose of the invitation letter is to: [CO-3] [L-2]
a) to scold b) to invite c) to praise d) to inquiry

Q.48 What is the mistake to be avoided in writing skills? [CO-3] [L-2]
a) Using wrong word
b) Missing comma after an Introductory Element
c) Vague pronoun reference
d) All of above

Q.49 What is body language? [CO-3] [L-2]
a) Tone of voice
b) Only staring at someone when communicating
c) Gestures and facial expressions
d) The strength of your voice when speaking

Q.50 What is public speaking? [CO-3] [L-2]
a) Speaking to a live audience b) he strength of your voice when speaking
c) Using your body to communicate d) None of above

End Semester Examination, Dec. 2023

COMMON FOR ALL BRANCHES – First/Second/Third 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.*

Q.1 Answer the following in brief:

a) Differentiate between biotic and a biotic components of ecosystem with examples? [CO-1][L-1]
b) List two effects of air pollution. [CO-3][L-1]
c) Enlist the role of "Wildlife (Protection) Act, 1972". [CO-5][L-3]
d) Define the multidisciplinary nature of environmental studies. [CO-1][L-1]
e) What do you mean by disarmament? [CO-6][L-1]
f) What are the disadvantages of resettlement and rehabilitation?
g) Justify roles and responsibility of CPCB in environmental protection. [CO-5][L-3]
h) Appraise the 10% rule of energy flow in an ecosystem. [CO-1][L-2]
i) What are endangered and endemic species? [CO-2][L-3]
j) Write any four technologies which can be used for environmental protection. [CO-6][L-2] **2×10**

PART-A

Q.2 a) How environmental studies are useful for sustainable development? Support your answer with some facts. [CO-1][L-4] **10**

b) Write a note on:
i) Grassland ecosystem. ii) Aquatic ecosystem. [CO-1][L-3] **10**

Q.3 a) What are the major types of floods? Discuss their consequences and measures to control. [CO-2][L-4] **10**

b) Differentiate between renewable and non-renewable resources present in environment. Explain all alternate energy resources in detail. [CO-2][L-3] **10**

Q.4 a) What do you mean by various levels of biodiversity. Explain the social, aesthetic and ethical values of biodiversity with examples. [CO-2][L-4] **10**

b) Compare in-situ and ex-situ conservation of biodiversity. List out the any four national parks and two hotspots in India. [CO-2][L-3] **10**

PART-B

Q.5 a) Demonstrate following with causes effects and controls: [CO-3][L-3] **10**
i) Water pollution ii) Nuclear hazardous

b) Differentiate between primary and secondary pollutants with examples. Explain the causes, effects and control of soil pollution. [CO-3][L-4] **10**

Q.6 a) Explain following with examples:
i) Acid rain and ozone layer depletion
ii) Forest (Prevention and control of pollution) Act. [CO-4][L-3] **10**

b) Discuss the salient features of air protection and wildlife conservation Acts. [CO-4][L-4] **10**

Q.7 a) Categorize various chemical weapons on the basis of their functions. Discuss the function of chemical weapon convention (CWC). [CO-5][L-4] **10**

b) Write short notes on following:
a) Silent valley and Chipko movements.
b) Cyclones and landslides. [CO-5][L-3] **5×2**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

DISCRETE STRUCTURES (CS-301A)

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

No. of pages: 2

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

Q.1 Answer the following:

a) What is Demorgan's Law? [CO-1][L-1]

b) Explain existential quantifier with an example. [CO-2][L-2]

c) Solve the differential equation- $a_r-4a_{r-1}+a_{r-2}=0$. [CO-3][L-3]

d) Determine the value of n if: ${}^{n}c_4={}^{n}c_3$ [CO-4][L-2]

e) Define cutedge, cutset, cutvertices in a graph with examples. [CO-5][L-1] **4×5**

PART-A

Q.2 a) Among the 1000 positive integers:

i) Determine the integers which are not divisible by 5, nor by 7, nor by 9.

ii) Determine the integers divisible by 5, but not by 7, not by 9. [CO-1][L-2] **10**

b) Let A = {1, 2, 3,4}. Determine whether the following relations arereflexive, symmetric, transitive or anti symmetric:

i) {(2, 2), (2, 3), (2, 4), (3, 2), (3, 3), (3, 4)}

ii) {(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (4, 4)}

iii) {(2, 4), (4, 2)}

iv) {(1, 2), (2, 3), (3, 4)} [CO-1][L-2] **10**

Q.3 a) Construct the truth table for:

i) ((P→q)→t)→ ((p^~q)→t)).

ii) (p→q) ^ (q→r) ^ p→r . [CO-2][L-3] **10**

b) From the following formulae, find tautology, contigency and contradiction:

i) $(H \to (I \wedge J)) \leftrightarrow \sim (H \to I)$.

ii) $A \vee (B \barwedge C) \cong (A \vee \bar{B}) \vee \bar{C}$.

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

Q.4 a) Explain extended Pigeonhole principle. [CO-3][L-2] **10**

b) Prove by mathematical induction:

$$\frac{1}{1\times 3}+\frac{1}{3\times 5}+\frac{1}{5\times 7}\cdots\cdots+\frac{1}{(2n-1)(2n+1)}=\frac{n}{2n+1}.$$

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

PART-B

Q.5 a) Solve the differential equation:

$a_r+6a_{r-1}+9a_{r-2}=3$ with initial condition $a_0=1$ and $a_1=1$. [CO-4][L-3] **10**

b) Solve the recurrence by the method of generating function withinitial conditions $a_0= 3$ and $a_1 =3$: $a_r-7a_{r-1}+10a_{r-2}=0$. [CO-4][L-3] **10**

Q.6 a) Write short notes on:

i) COSET.

ii) RINGS.

iii) Integral domain.

iv) FIELD. [CO-5][L-1] **10**

P. T. O

b) Consider an algebraic system (G,*), where G is the set of all non-zeroreal numbers and * is a binary operation defined by $a*b=\frac{ab}{4}$. Showthat (G, *) is an abelian group. [CO-5][L-3] **10**

Q.7 a) Prove Euler's theorem for planer graph. [CO-6][L-3] **10**

b) Explain homomorphic and isomorphic graphs. [CO-6][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

DATA STRUCTURES AND ALGORITHMS (CS-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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

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) Enlist applications of queue computers.
i) Explain minimum spanning tree.
j) Explain shell sort. **2×10**

PART-A

Q.2 a) Write an algorithm for Binary-search (non-recursive) and also drive its time complexity. [CO-4][L-6] **10**

b) Write a C program to insert an element to specific location in array of 10 integers. [CO-2][L-3] **10**

Q.3 a) Design an algorithm to reverse a singliy- linked list; take the necessary assumptions. [CO-2][L-6] **10**

b) Write a C program to demonstrate deletion operation in a doubly linked list. [CO-2][L-3] **10**

Q.4 a) What is pre-order, post-order and in-order traversal? Explain. [CO-3][L-3] **5**

b) Write down the properties of Binary tree and explain their implementation. [CO-3][L-3] **5**

c) What is AVL Tree? Explain the algorithm for LL, RR, LR, RL rotation with suitable example. [CO-3][L-3] **10**

PART-B

Q.5 a) Write a C program to demonstrate insertion in a BST with supporting diagram. [CO-4][L-3] **10**

b) Explain treaded binary tree with its node representation also draw the diagram for understanding. [CO-4][L-3] **10**

Q.6 a) Define following terms with respect to graph with supporting diagram:

i) Pendent node.
ii) Euler path.
iii) Planner graph.
iv) Degree of graph.
v) path matrix. [CO-5][L-2] **2×5**

b) Write the prim's algorithm to find minimum spanning tree. Apply same algorithm on following graph to find MST. [CO-5][L-2] **10**

Q.7 a) How binary search is better than linear search? Explain the algorithm of binary search and find its time complexity. [CO-6][L-2] **10**

b) What is hashing? Explain all hashing techniques with the help of suitable examples. [CO-6][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

INTRODUCTION TO IT INFRASTRUCTURE LANDSCAPE (CS-308)

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

No. of pages: 1

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

Q.1 Answer the following:

a) What is storage network technology? [CO1][L2]
b) Relate data mining with data warehouse. [CO3][L2]
c) Define 'virtual machine'. [CO3][L1]
d) Differentiate between data warehouse and data mart. [CO4][L1]
e) Explain the uses of 'firewalls'. [CO3][L3]
f) What is a directory server? [CO1][L1]
g) Explain the types of Database Management Systems (DBMS) and their respective use cases. [CO5][L1]
h) Introduce JDBC. [CO1][L2]
i) Which tool is used for the remote management of the server manager? [CO3][L3]
j) List and discuss the major components of a relational database schema. [CO1][L2] **2×10**

PART-A

Q.2 a) Define DBMS and explain its types with the help of diagrams. [CO4][L2] **10**

b) Explain the difference between an inner join and outer join using an example. [CO4][L2] **10**

Q.3 a) Discuss Storage Network technology. Differentiate between SAN and NAS. [CO1][L2] **10**

b) Explain storage virtualization and its types, along with its merits and demerits. [CO1][L2] **10**

Q.4 What do you mean by RAID technology? Explain RAID function and different RAID technologies. [CO5][L2] **20**

PART-B

Q.5 a) What is data warehouse? What do you mean by fact, measure and dimension in a multi-dimensional model? [CO4][L2] **10**

b) What is LDIF? Create directory entries using LDIF. [CO4][L2] **10**

Q.6 a) What is server deployment? Explain the various types of deployment in detail. [CO3][L2] **10**

b) Define the following terms:
   i) Loss of integrity.
   ii) Data security. [CO4][L1] **5×2**

Q.7 Define 'MQ SERIES' and its applications. Is this a Middleware? Discuss. What products do MQ SERIES contains. [CO4][L3] **20**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

DIGITAL ELECTRONICS (EC-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
a) Differentiate between digital signal and analog signal. [CO-1][L-2]
b) Why NAND and NOR gates are called as universal logic gates? [CO-1][L-2]
c) Why we use gray code for K-map? [CO-1][L-2]
d) Design 4:1 multiplexer using 2:1 multiplexer. [CO-2][L-5]
e) Draw truth table of half adder. [CO-2][L-3]
f) Differentiate between latch and flip-flop. [CO-4][L-4]
g) Give various applications of counters. [CO-5][L-1]
h) What are the advantages and disadvantages of digital signals over analog signals? [CO-1][L-1]
i) Define resolution (step size) & % resolution of a D/A converter. [CO-5][L-2]
j) What is pull up resistor? Why is it required? [CO-4][L-1] **2×10**

PART-A

Q.2
a) Prove that:
i) AB+ AB'+ A'B= A+B
ii) (A+B'+C') (A+B'C) = A'+BC [CO-1][L-4] **10**
b) Minimize the following function using K-map:
F(A,B,C,D)= ∑m(1,2,3,4,5,6,10,11,12,13,14) [CO-1][L-5] **10**

Q.3
a) Design and explain the 1:4 De-multiplexer circuit in detail. [CO-2][L-5] **10**
b) Design a full adder using ROM. [CO-2][L-5] **10**

Q.4
a) Explain the working of TTL as NOR gate. [CO-3][L-2] **10**
b) Explain Totem-Pole output configuration of TTL with its benefits and limitations. [CO-3][L-2] **10**

PART-B

Q.5
a) Explain the SR flip flop with the help of truth table and circuit diagram. [CO-4][L-2] **10**
b) Draw & explain the working of J-K Flip Flop. [CO-4][L-2] **10**

Q.6
a) Differentiate between synchronous and asynchronous counter. [CO-5][L-4] **5**
b) Design the MOD 10 counter. [CO-5][L-5] **15**

Q.7
a) Explain the R-2R A/D converter in brief. [CO-6][L-2] **10**
b) Explain the following: Accuracy, linearity, temperature sensitivity, and settling time. [CO-6][L-2] **10**

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

ANTENNA AND WAVE PROPAGATION (EC-501A)

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

No. of pages: 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) If the electric field strength of a plane wave is 1V/m, evaluate the strength of magnetic field in space. [CO-1][L-2]
b) Define directivity of an Isotropic antenna. [CO-2][L-2]
c) Describe vector potential and its need with a suitable flow diagram. [CO-1][L-1]
d) Identify characteristics of array. [CO-3][L-2]
e) Distinguish between the term "Isotropic", "directional" and "Omni directional". [CO-2][L-2]
f) Identify the needs of frequency independent Antenna. [CO-3][L-2]
g) Define binomial array principle. [CO-3][L-1]
h) Describe challenges in Antenna design. [CO-5][L-1]
i) State the terms which impact wave propagation. [CO-4][L-2]
j) If the critical frequency of ionized layer is 1.5MHz, calculate electron density of the layer. [CO-4][L-2] **2×10**

PART-A

Q.2
a) Derive mathematicalexpression for wave equation in terms of EM potential. [CO-1][L-3] **12**
b) Explain the method of measuring directivity of an antenna. [CO-2][L-5] **8**

Q.3
a) Calculate the power radiated by λ/16 dipole in free space if it carries a uniform current of I = 100 Cos wt Amperes. Also find its radiation resistance. [CO-][L-3] **10**
b) A thin dipole of λ/15 length has a loss resistance of 1.5 Ohm. Evaluate the directivity, gain, effective aperture, beam solid angle and terminal resistance for it. [CO-2][L-3] **10**

Q.4 State and prove reciprocity theorem of antenna. Show that power transfer ratio is independent of power flow. [CO-2][L-2] **20**

PART-B

Q.5
a) Design a three element Yagi-Uda antenna to operate at a frequency of 172 MHz. [CO-3][L-4] **10**
b) Explain the working principle of loop antenna. Explain advantages and disadvantage of loop antenna. [CO-3][L-2] **10**

Q.6
a) Develop and design equation for pyramidal horn antenna. Justify the need of flaring in horn antenna. [CO-4][L-5] **10**
b) Classify different modes of wave propagation. [CO-4][L-4] **10**

Q.7 Discuss methods used for calculating Antenna range in free space region. [CO-5][L-2] **20**

End Semester Examination, Dec. 2023

B. Tech. – FifthSemester

DIGITAL SYSTEM DESIGN (EC-503A)

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

No. of pages: 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) List all the CAD tools used for design of digital systems. [CO-1][L-1]
b) Differentiate between unary and binary operators. [CO-2][L-2]
c) Define instantiation in structural style of modeling. [CO-2][L-2]
d) How component can be declared in VHDL. [CO-3][L-1]
e) Design 4:1 multiplexer using 2:1 multiplexer. [CO-4][L-5]
f) Differentiate between combinational and sequential circuit. [CO-4][L-4]
g) Draw the universal shift register. [CO-4][L-4]
h) Write the specification of simple microcomputer system. [CO-5][L-1]
i) List all the programmable logic devices. [CO-5][L-1]
j) Define lookup table used in FPGA. [CO-5][L-2] **2×10**

PART-A

Q.2 a) Explain the evaluation of computer-aided digital design. [CO-1][L-2] **10**
b) Explain all the data types available in VHDL. [CO-2][L-2]**10**

Q.3 a) What is stimulus? Explain design block and stimulus block in detail. [CO-2][L-1] **10**
b) What are the components of Simulation? Explain in detail. [CO-3][L-2] **10**

Q.4 a) How can we define the port list for a module and declare it in VHDL for 4 bit full adder? [CO-3][L-3] **5**
b) Design a 2 bit comparator circuit using any style of modeling. [CO-4][L-5] **15**

PART-B

Q.5 a) Design SR flip flop using Gate level modeling. [CO-4][L-5] **10**
b) Design a 4 bit counter using structural style of modeling. [CO-4][L-5] **10**

Q.6 a) Draw the architecture of a simple microcomputer system. [CO5][L-4] **5**
b) Implement a simple microcomputer system using VHDL. [CO-5][L-6] **15**

Q.7 Write short notes on ***(any two):***

a) PLA
b) CPLD
c) FPGA [CO-5][L-2] **10×2**

End Semester Examination, Dec. 2023

OPEN ELECTIVE – COMMON FOR ALL BRANCHES

INSURANCE AND RISK MANAGEMENT (ECO-OE-004)

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

No. of pages: 1

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

Q.1 Write short notes on:

a) Differentiate between risk and uncertainity.
b) Define insurance contract.
c) Differentiate between life insurance and general insurance.
d) Explain the documents required to buy insurance policy.
e) Differentiate between insurer and insured.
f) Key man insurance.
g) Group insurance.
h) Underwriting.
i) Double insurance.
j) Differentiate between premium and dividend. [CO-1,2,3,4][L-2] **2×10**

PART-A

Q.2 Explain principles of Life Insurance. [CO-1][L-2] **20**

Q.3 Explain the settlement procedure in the case of surrender and death of insured in Life Insurance Policy. [CO-2][L-3] **20**

Q.4 Discuss various types of general insurance policies. [CO-2][L-4] **20**

PART-B

Q.5 Explain the various powers and functions of IRDA Act 1999. [CO-3][L-4] **20**

Q.6 Who are Insurance brokers? Discuss their functions. [CO-3][L-3] **20**

Q.7 Elaborate how Insurance sector is helping in the growth and development of the nation. [CO-4] [L-4] **20**

End Semester Examination, Dec. 2023

B. Tech. - Third Semester

NETWORK ANALYSIS AND SYNTHESIS (EE-301A)

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

No. of pages: 2

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

Q.1 Answer the following in brief:

a) Describe duality of the network. [CO-1][L-2]

b) List any two properties of Laplace transform. [CO-2][L-1]

c) Discuss steady state representation of inductor and capacitor. [CO-2][L-2]

d) Describe significance of poles and zeros. [CO-3][L-1]

e) Show equivalent circuit for Z parameter. [CO-3][L-3]

f) Explain the parameters used in parallel cascaded connection. [CO-3][L-1]

g) Determine the characteristic impedance of T-section low pass filter. [CO-4][L-3]

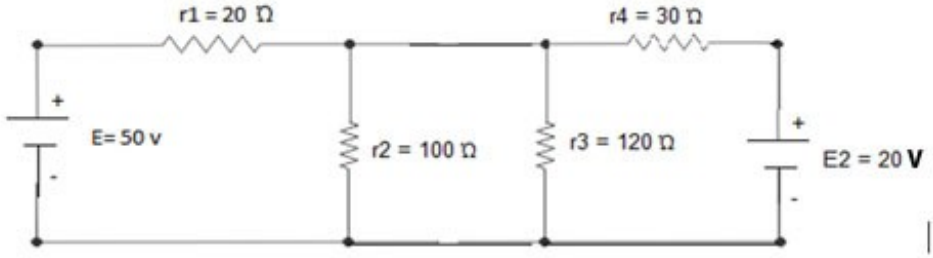
h) What is the m-derived filter and what are its advantages over constant k filters. [CO-4][L-3]

i) Define the terms 'link and loop'. [CO-5][L-1]

j) State properties of cut-set- matrix. [CO-5][L-1] **2×10**

PART-A

Q.2 a) Using nodal method, find the current through r2 in figure below:

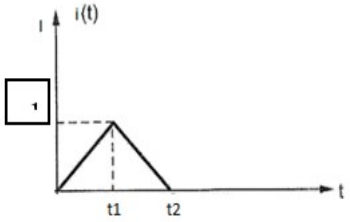


[CO-1][L-1] **10**

b) State and explain superposition theorem. [CO-1][L-1] **10**

Q.3 a) Derive an expression for transient response of series RL circuit with step input. [CO-2][L-2] **10**

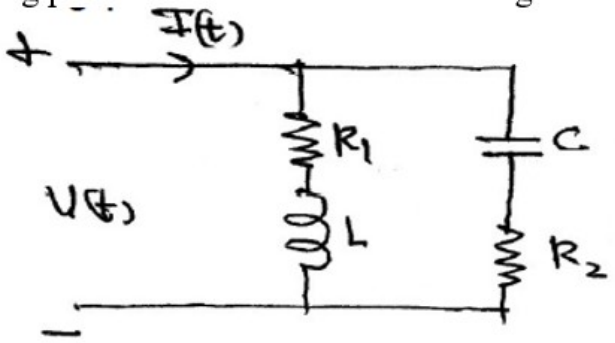
b) Using the concept of waveform analysis obtain the waveform components of given waveform also find its laplace transform.



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

P.T.O.

Q.4 a) Calculate the driving point admittance of the network shown in figure below:

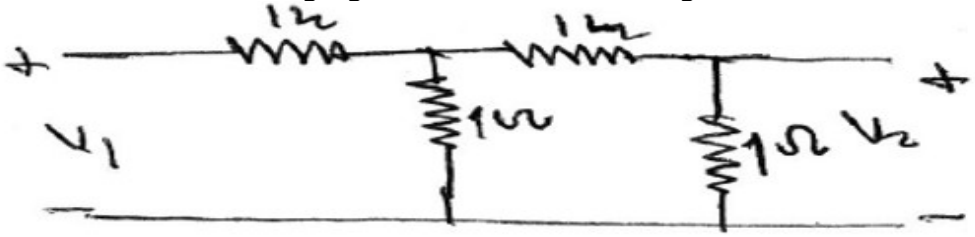


[CO-3][L-3] **10**

b) Draw Pole zero plot for Z(S) = $\frac{3s}{(s+1)(s+2).}$ [CO-3][L-4] **10**

PART-B

Q.5 a) Determine the Voltage gain $\frac{V_2}{V_1}$ in the network given below:



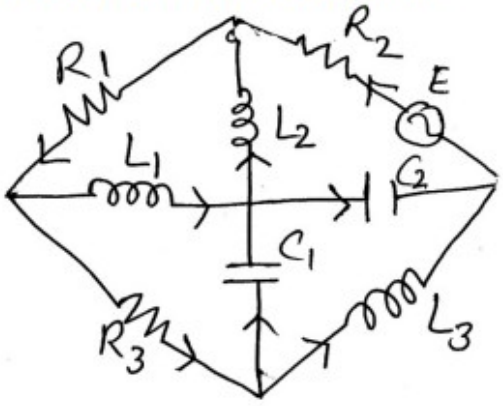
[CO-3][L-3] **10**

b) Explain the interconnection of 2 port networks for series and cascaded connection. [CO-3][L-2] **10**

Q.6 a) Design a T-section constant K-high pass filter having cut-off frequency of 10KHZ and design impedance Ro=600ohm. Find its characteristics impedance and phase constant at 25 KHz. [CO-4][L-6] **10**

b) Analyze m-derived low pass filter. [CO-4][L-4] **10**

Q.7 Figure below represents a graph of a network. Show the tree, twigs and links and hence obtain the incidence, tie-set and cut-set matrix.



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

End Semester Examination, Dec. 2023

B. Tech. – Fifth Semester

CONTROL SYSTEM ENGINEERING (EE-501A)

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

No. of pages: 2

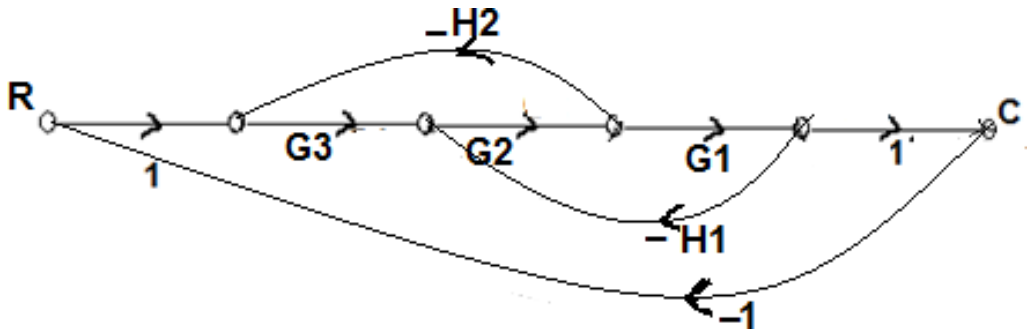
Note: *Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Differentiate between closed loop and open loop system.
b) What do you mean by type 0 systems?
c) What is the importance of corner frequency in Bode plot?
d) What are the common test signals used in control system?
e) Explain BIBO stability.
f) What is a PID controller?
g) Draw an electrical network for lead compensation.
h) Define 'gain margin'.
i) Draw the polar plot of transfer function $\frac{K}{S(1+ST_1)}$.
j) Define 'state of a system'. **2×10**

PART-A

Q.2 a) Obtain the overall transfer function $\frac{C(s)}{R(s)}$ of the signal flow graph shown below in fig. 1 using Mason's gain formula.



10

b) Find the transfer function of an armature controlled dc motor. **10**

Q.3 a) Derive an expression for c(t) of a second order system subjected to unit step input. **10**

b) Explain the different time domain specifications of a second order under damped system **10**

Q.4 a) Explain Routh Hurwitz criterion. Determine the stability of closed loop control system whose characteristic equation is $2s^5+s^4+2s^3+4s^2+s+6=0$ **10**

b) Explain the steps involved in drawing root locus. **10**

P. T. O

PART-B

Q.5 a) A unity feedback control system has $G(s)=\frac{50}{(s+2)(s+10)}$. Draw the Bode plot. **10**

b) Using Nyquist stability criterion, find the stability of closed loop system with $G(s)H(s)=\frac{10}{s(s+1)}$. **10**

Q.6 Write short notes on ***(any two):***

a) Stepper motor and its applications.

b) Ac servomotor.

c) Synchros. **10×2**

Q.7 a) Discuss a lag compensator using an electrical network. Obtain its transfer function and draw its Bode plot. **10**

b) Obtain the state space representation for a system characterized by the differential equation $\frac{d^3y}{dt^3}+8\frac{d^2y}{dt^2}+5\frac{dy}{dt}+3y=9u(t)$ .where *y* is the output and *u* is the input to the system. **10**

End Semester Examination, Dec. 2023

B. Tech. – First / Second Semester

BASIC ELECTRICAL ENGINEERING (ESC-EE-101/BEE-101/BEE-101A)

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

No*. of pages: 2*

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

Q.1 Answer the following:

a) The power dissipated in a pure capacitor is _____. [CO1] [L2]

b) At resonance for a series RLC network the power factor is _____. [CO2] [L2]

c) State Kirchoff's voltage Law. [CO 1][L1]

d) Write down the expression for slip of induction motor. [CO4] [L2]

e) Name two types of batteries. [CO1] [L1]

f) The line voltage of 3 phase star connected system is _____ times its phase voltage. [CO3] [L2]

g) List two difference between star and delta connected system. [CO3] [L2]

h) Write down the classification of magnetic materials. [CO4] [L2]

i) Draw the speed torque characteristic of dc shunt motor.

P.T.O.

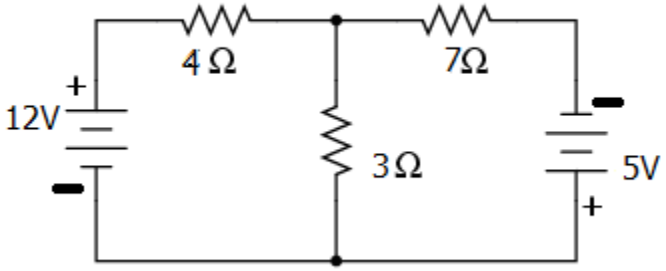
[CO4] [L2]

j) What is a commutator in dc machine? [CO4][L2] **2×10**

PART-A

Q.2 a) Explain superposition theorem. [CO1][L1] **10**

b) Evaluate the current in the 7 Ω resistor using superposition's theorem. [CO2][L3] **10**



Q.3 a) A coil of resistance 20 Ω and an inductance of 50 mH is connected in series with a capacitance of 45μF across 150V, 50Hz supply. Calculate (i) magnitude of current, (ii) power factor, (iii) voltage across coil (iv) voltage across the capacitance (v) power dissipated in the network. [CO2][L3] **10**

b) State the advantages of three phase system over single phase system. [CO3][L3] **5**

c) Derive the relation between line voltage and phase voltage of a star connected system. [CO3][L3] **5**

Q.4 a) Discuss the different losses in a transformer. [CO4][L2] **6**

b) Derive the condition of maximum efficiency in transformer. [CO4][L3] **6**

c) Differentiate shell type and core type transformer. [CO4][L2] **8**

PART-B

Q.5 a) Draw and explain the parts of dc machine. [CO5][L2] **10**

b) Explain the different methods of speed control of dc shunt motor. [CO5][L2] **10**

Q.6 a) Explain the working of a 3-Φ induction motor. [CO5][L2] **8**

b) Explain two types of single phase induction motor. [CO5][L2] **12**

Q.7 a) What is necessity of earthing? Explain plate earthing. [CO1][L2] **10**

b) Explain the working of lead acid battery with charging and discharging equations.

[CO1][L2] **10**

End Semester Examination, Dec. 2023

B. Tech. / B. Sc. (Hons.) Microbiology – Third / Fifth Semester

FRENCH-I (HM-506)

Time: 1½ hrs. Max Marks: **50**

No. of pages: 5

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

Section-A

Compréhension écrite

Q.1 **Lisez le passage et répondez aux questions** (CO5) (L5)
(Read the passage and answer to the questions)

Je m'appelle Kristine. Je suis une fille, je suis française et j'ai treize ans. Je vais à l'école à Nice, mais j'habite à Cagnes-Sur-Mer. J'ai deux frères. Mon papa est italien. Ma mère est allemande. Mes frères et moi parlons français, italien et allemand à la maison. Nous avons une grande maison avec un chien, un poisson et deux chats.

Aujourd'hui, c'est samedi, nous rendons visite à notre grand-mère. Elle a 84 ans et elle habite à Antilles. J'adore ma grand-mère, elle très gentille. Elle fait des bons gâteaux.

Lundi, je retourne à l'école. Je suis contente, je vais voir Riya. C'est ma meilleure amie. J'aime beaucoup l'école. Mes matières préférées sont le français et le sport. J'aime beaucoup lire et je nage très bien.

A. Dites Vrai ou Faux **2**

(Tell True or False)

a) Kristine a une petite maison. _____

b) La mère est italienne _____

c) Kristine aime beaucoup le sport _____

d) La Grande-mère fait des bons gâteaux. _____

B. Répondez aux questions: **4**
(Answer to the questions)

a) Décrivez la Grande-mère de Kristine.

_____

_____

b) Quelles sont les nationalités des parents de Kristine?

_____

_____.

Section B
Expression Écrite

Q.2 **Décrivez votre ami(e) en 8-10 lignes**
(Describe your friend in 8-10 lines) (CO3) (L6) **5**

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Q.3 **Tranduisez** (CO2) (L4) **4**

(Translate)

a) Il fait froid. _____.

b) It is freezing. _____.

c) It is hot. _____.

d) Il fait du vent _____.

Section - C
Grammaire

Q.4 **Conjuguez les verbes.** (CO3,4) (L2) **6**
(Conjugate the verbs)

a) Vous _____ (regarder) un film anglais.

b) Nous _____ (avoir) deux stylos?

c) Tu _____(être) indienne?

d) La fille _____ à l'école. (aller)

e) Elles _____ (rester) au bureau.

f) Il _____ (parler) espagnol.

Q.5 **Quelle heure est-il?** (CO3) (L1) **5**
(What time is it ?)

a) 11 : 40

_____.

b) 10 : 30

_____.

c) 01 : 45

_____.

d) 17 : 20

_____.

e) 04 : 55

_____.

Q.6 **Répondez aux questions :** (CO2) (L3) **5**
(Answer to the questions)

a) Quel est le jour avant Jeudi?
_____.

b) Quel est le sixième jour de la semaine?
_____.

c) Quel est le mois entre juillet et septembre ?
_____.

d) Où habites-tu?
_____.

e) Comment allez-vous?
_____.

Q.7 **Complétez avec les articles définis.** (CO4) (L4) **2½**
(Complete with definite articles-le,la,l',les)

a) C'est _____ craie de Christine

b) Ce sont _____ cahiers de Ryan.

c) Tu adores _____ chien indien ?

d) Je déteste _____ orange.

e) Nous regardons _____ télé.

Q.8 **Complétez avec les articles indéfinis.** (CO4) (L4) **2½**
(Complete with indefinite articles-un,une, des)

a) C'est _____ arbre.

b) C'est _____ drapeau.

c) Voilà _____ homme.

d) Ce sont_____ livres.

e) C'est _____ bureau.

Q.9 **Complétez avec les nombres ordinaux.** (CO2) (L3) **5**
(Complete with ordinal numbers)

a) Jeudi est le _____ jour de la semaine.

b) Septembre est le _____ mois de l'année.

c) Vendredi est le _____ jour de la semaine.

d) Lundi est le _____ jour de la semaine.

e) Novembre est le _____ mois de l'année.

Q.10 **Traduisez les mots en français.** (CO1) (L1) **5**
(Translate the words in French)

a) Happy Birthday _____

b) See you tomorrow _____

c) Delighted _____

d) I'm sorry _____

e) Please(formal) _____

Section-D
Culture and Civilisation

Q.11 **Complétez les phrases.** (CO6) (L1) **4**
(Complete the sentences)

a) _____ et _____ sont les journaux français.

b) _____ est un montagne français.

c) _____ symbolise la France.

d) _____ traverse la ville de Paris

e) _____ et _____ sont les vins français.

f) _____ est la fête nationale française.

End Semester Examination, Dec. 2023

B. Tech. / B. Sc. (Hons.) Microbiology – Third / Fifth Semester

GERMAN-I (HM-507)

Time: 1½ hrs. Max Marks: **50**

No. of pages: 6

Note: *All questions are **compulsory**. Marks are indicated against each question.*

Section A

Leseverstehen

Q.1 **Lesen Sie den Text und antworten Sie!** (CO2,3) (L4,2,5) **5**
(Read the text and answer the following questions)

I. Meine Familie

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 jährige Tochter.

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 halb tags. Eigentlich gehören 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.

Vielen Dank!
Eva

a) Wie viele Personen hat die Familie?

_____.

b) Wo wohnt die Familie?

_____.

c) Wie viele Kinder hat Eva?

_____.

d) Wann arbeitet die Mutter?

_____.

e) Was beduetet (meaning) diese Wörter auf English?

(i) Nachmittag- _____

(ii) Oft- _____

Section B

Schreiben

Q.2 **Was kann man machen oder kann nicht machen? Beschreiben Sie das Bild.** (CO5,6) (L6,1) **3**
(What a person can do or cannot do, specify as per the signs mentioned.)

a) _____.

b) _____.

c) _____.

Q.3 **Schreiben Sie über das Thema** 'Mein Freund/Meine Freundin'**,circa 60 Wörter.** (CO3) (L2,5) **6**

(Write on the topic given below.)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____.

Q.4 **Übersetzen Sie.**

i) auf Englisch. (CO3-6) (L2,5,3) **5**

(Translate into English)

a) Wo arbeitest du?

_____.

b) Eine Woche hat Sieben Tage

_____.

c) Die Sonne scheint in Sommer

_____.

ii) auf Deutsch

(in German)

a) My Birthday is on 16th September.

_____.

b) I study at Manav Rachna University.

_____.

Q.5 **Ergänzen Sie den Dialog.** (CO 1,2) (L2,6) **4**

(Complete the dialogue.)

Petra: Hallo! Guten Tag!

Martina: _____?

Petra: Mein Name ist Petra und _____?

Martina: Mein Vorname ist Martina.

Petra:_____?

Martina: Ich bin 12 Jahre alt und du?

Petra: Ich bin auch 12.

Martina: Freut mich!

Petra: _____!

Section C
Grammatik

Q.6 **Wer ist das? Schreiben Sie die Berufe.** (CO6) (L1) **3**
(Who is this?Write the appropriate profession.)

a) Sie gibt Medizin _____.
b) Er bringt essen und trinken _____.
c) Er backt Kuchen gern_____.

Q.7 **Ergänzen Sie die richtige verben.** (CO3) (L2) **5**
(Fill in the blanks with appropriate verb forms.)
(sein/kommen/bekommen/gehen/trinken)

a) Meine Mutter _____ eine Tasse Tee.
b) Vera _____ einen Hund zum Geburtstag.
c) Meine Schwester _____ aus Frankreich.
d) Mein Freund _____ 19 Jahre alt.
e) sie _____ in den Park am Jeden Abend.

Q.8 **Schreiben Sie den Artikel (der/die/das)?** (CO3) (L5) **3**
(Write the correct article.)

a) _____ Teppich
b) _____Heft
c) _____Tasse
d) _____ Brille
e) _____ Computer
f) _____Handy

Q.9 **Schreiben Sie Richtig.** (CO3) (L2) **4**
(Write the correct sentences.)

a) ist/er/bester/Freund/mein.
_____.

b) Wetter/heute/ist/wie/das?
_____.

c) wir/ nach/ Deutschland/ fahren
_____.

d) Meine Eltern/ sehr/ gut/ sind
_____.

Q.10 **Kennst du diese Wörter. Schreiben Sie richtig.** (CO4)(L1) **2**
(Do you know these words? Write correctly)

a) GATNOM- _____
b) ERHBTS- _____
c) ERMMOS- _____
d) IENSTAGD- _____

Q.11 **Rechnen Sie (Calculate)** (CO2) (L3) **2**
[mal= multiplication, plus= plus]

a) acht mal null ist _____.

b) zwei plus achtundfünfzig _____.

Q.12 **Schreiben Sie die datum auf Deutsch.**
(write the date in German.)

(CO2) (L4) **2**

a) Der Nationale Feiertage in Lettland ist der _____ (18.11)

b) Der Nationale Feiertage in Deutschland ist der _____(3.10)

Q.13 **Wie viel Uhr ist es? Schreiben Sie auf Deutsch.** (CO6) (L2) **2**
(What time is it? write in German.)

a) Um 11:35 Uhr-_____

b) Um 14:55 Uhr- _____

Section D
Kultur

Q.14 **Ergänzen Sie.** (CO5)(L1) **4**
(Fill in the blank with the appropriate information about Germany):

A. When does the Oktoberfest start? _____.
   i) early November
   ii) mid-September

B. Famous eatable in Oktoberfest is? _____.
   i) Wurstchen
   ii) Ginger Heart Bread
C. What colours are on the flag of Germany _____.
   i) Black, Red, Yellow
   ii) Red, Golden, Black
D. What currency is used in Germany _____.
   i) Euro
   ii) Dollar
E. Lara kommt aus _____. Sie spricht France.
   i) Polen
   ii) Französisch

F. Germany is the_____ largest country in Europe.
   i) 10^{th}
   ii) 7^{th}

G. Francesca kommt aus der _____. Sie spricht Türkisch.
   i) Türkei
   ii) Frankreich

H. Most Taxis in Germany are -_____.
   i) BMW
   ii) Mercedes Benz

I. Which tree tradition came from Germany? _____
   i) Christmas Tree
   ii) Pine Tree

End Semester Examination, Dec. 2023

B. Tech. / B. Sc. (Hons.) Microbiology — Third / Fifth Semester

SPANISH-I (HM-508)

Time: 1½ hrs. Max Marks: **50**

No. of pages: 3

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?]** (CO2)(L4) **2½**

a) Lunes _____
b) Dentista _____
c) Computadora_____
d) Hasta luego_____
e) Chico _____

Q.2 **Escribe los números en español. [Write the numbers in Spanish]** (CO1) (L3) **5**

Eg. Ques. 2 + 2= 4?

Ans. Dos + dos = cuatro

a) 12+14 = 26_____?
b) 21+ 8=29 _____?
c) 9 - 1 =8 _____?
d) 10 – 10 =0 _____?
e) 8 + 5 = 13_____?

Q.3 **Hace seis frases con el verbo 'ser'. [Make 6 sentences with the verb ser.]**(CO4)(L5) **6**

a) _____.
b) _____.
c) _____.
d) _____.
e) _____.
f) _____.

Q.4 **Describe tu familia/casa. [Describe your family/house.]** (CO2) (L6) **4**

a) _____.
b) _____.

c) _____.

d) _____.

Q.5 **Cambia las frases a plural. [Change the sentences to plural]** (CO5) (L4) **2½**

Eg. Mesa = <u>Mesas</u>

a) **La silla es grande.**_____
b) **Nuestra amiga es gorda.**_____
c) **Este niño es de esta clase.**_____
d) **Mi colegio es muy famoso.** _____
e) **La ventana es nueva.** _____

Q.6 **Contesta a las siguientes preguntas. [Answer the following questions in Spanish]** (CO6) (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 **Traduce las siguientes frases. [Translate the below lines.]** (CO3)(L1) **10**

a) Hola! Me llamo Juan._____
b) Soy de México. _____
c) Estudio en colegio MRU _____
d) Es un colegio muy famoso _____
e) Soy un estudiante serio _____
f) Yo tengo 20 años _____
g) Nombre de amigo es Navneet _____
h) Mi colegio es muy bonito _____
i) Susana habla español _____
j) Mi padre se llama Rohit _____

Q.8 **Relaciona los saludos y las despedidas de español con inglés. [Match salutations from Spanish to English.]** (CO2) (L1) **5**

a)	Buenas noches	Thank you
b)	Hasta pronto	Same here
c)	Bienvenidos	See you soon
d)	Gracias	Good night
e)	Igualmente	Welcome

Q.9 **Busca los errores en las siguientes frases. [Find the error in the below sentences.]** (CO6) (L4) **2½**

a) Tu hermanos es de India.
b) Mis amigo son inteligentes.
c) Vuestros madre es ama de casa.
d) Nuestros prima es amable.
e) Su coches es de color blanco.

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 **Busca los errores. [Look for the error and rewrite the sentence.]**. (CO2) (L6) **2½**

a) Este lápiz es de Juan. _____.
b) Aquella bolígrafo es Negro. _____.
c) Ese niña es mi amiga. _____.
d) Esta ventana es nueva. _____.
e) Ese mujer es mi esposa. _____.

Q.12 **Elige los interrogativos correctos y escribe en el espacio. [Choose the correct interrogative and fill in the blanks.]** (CO6) (L6) **2½**

Quién	Cómo	Cuántos	Dónde	Cuál

a) ¿_____ es tu hermano.
b) ¿_____ vives?
c) ¿_____ es tu número de teléfono?
d) ¿_____ estás?
e) ¿_____ alumnos hay?

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

MARKETING MANAGEMENT (HM-821)

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

No. of pages: 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) List the importance of Product mix strategies for FMCG goods. [CO-3][L-3]
b) Explain the importance of positioning of products in market penetration. [CO-6][L-2]
c) Is it essential to promote a product or service? Comment on it. [CO-1][L-2]
d) Explain the marketing communication. [CO-2][L-3]
e) Point out the various types of buying motives of the consumer's for buying a product/service. [CO-5][L-4]
f) Detail the Consumer psychology impacts on the buying behaviour of consumers? [CO-5][L-3]
g) Correlate the concept of branding with the marketing activity. [CO-3][L-3]
h) Distinguish the different types of distribution channel based on services offered by them. [CO-4][L-2]
i) List any four limitations of market research. [CO-5][L-3]
j) Differentiate between production concept and product concept. [CO-1][L-4] **2×10**

PART-A

Q.2 Demonstrate the term marketing. Explain in detail marketing concepts with help of relevant examples? [CO-2][L-2] **20**

Q.3 Comment on breaking down value chain and its support activities. Discuss Porter's generic value chain with help of examples. [CO-4][L-4] **20**

Q.4 Explain various stages product life cycle with neat sketches and relevant product examples. [CO-4][L-2] **20**

PART-B

Q.5 Discuss 4 Ps of marketing in detail. In addition. In addition, discuss communication system using a case study. [CO-3][L-4] **20**

Q.6 Discuss pricing strategies for goods. In addition, discuss various distribution channels including retail and wholesale distribution using neat sketches and case studies. [CO-6][L-4] **20**

Q.7 Explain with suitable examples various consumer behaviour models. In addition, discuss buyer's decision-making process. [CO-5][L-3] **20**

End Semester Examination, Dec. 2023

B. Tech. – Seventh Semester

MANAGEMENT INFORMATION SYSTEMS (IT-721)

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

No. of pages: 2

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

Q.1
a) Describe the requirement of MIS for any organization. [CO-1][L-2]
b) Provide an example of a functional model related to MIS in the production sector. [CO-1][L-2]
c) Explain the classification of information requirements at various levels in the organization. [CO-2][L-1]
d) How is information treated as a quality product in MIS? [CO-2][L-1]
e) Why staff training and functional manuals are important in the development and implementation of MIS? [CO-3][L-2]
f) What is the purpose of a long-range plan for MIS? [CO-4][L-2]
g) Describe the functions of decision support system. [CO-4][L-2]
h) What is a deterministic system in the context of DSS? [CO-5][L-2]
i) Illustrate the ethical challenges faced in maintaining the MIS. [CO-6][L-1]
j) How can organizations ensure the security of their information systems? [CO-6][L-1] **2×10**

PART-A

Q.2
a) Evaluate the relationships among the components of MIS, highlighting their respective roles and contributions. [CO-1][L-3] **10**
b) Analyze the trade-offs between the advantages and disadvantages of MIS. Also evaluate how the advantages outweigh or mitigate the impact of the identified disadvantages. [CO-1][L-2] **10**

Q.3
a) Explore various methods of collecting data and information in-depth, utilizing illustrative examples for clarification. [CO-2][L-3] **10**

b) Examine the interrelationships between modules, layouts, and inputs/outputs in the context of MIS as a system. Evaluate the factors that drive the customization of MIS software and how these adaptations align with organizational objectives. [CO-2] [L-3] **10**

Q.4
a) Examine the interplay between the detailed design of MIS and the diverse types of system controls. Evaluate how specific controls influence and shape the design aspects of MIS to ensure optimal functionality. [CO-3] [L-2] **10**

[CO-3] [L- 6]

b) Elaborate on the comprehensive process of developing, implementing, and testing Management Information Systems (MIS). Provide a detailed explanation of each phase. [CO-3][L-5] **10**

PART-B

P. T. O

Q.5 a) Explain the significance of Management Information Systems (MIS) in the decision-making process. Evaluate whether Decision Support Systems (DSS) function as deterministic systems. Justify your answer. [CO-4][L-6] **10**

b) Examine the various Decision Support System (DSS) models, scrutinizing their distinct characteristics and mechanisms of operation. [CO-4] [L-6] **10**

Q.6 a) Evaluate the objectives of Management Information Systems (MIS) in the service sector, particularly in establishing MIS as a distinctive service. Analyze the integration of various activities within the service sector into MIS and elucidate their strategic significance. [CO-5][L-3] **10**

b) Examine the general applications of Management Information Systems (MIS) in the context of Enterprise Business Systems by providing an overview of their role and impact. [CO-5][L-2] **10**

Q.7 a) Illustrate practical instances exemplifying the security and ethical challenges inherent in Information Technology (IT), shedding light on real-world scenarios and implications. [CO-6][L-2] **10**

b) Provide concrete examples and scenarios to exemplify the various privacy issues and security considerations associated with the Management of Information Systems. [CO-6][L-2] **10**

End Semester Examination, Dec. 2023

M. Tech. (Biotechnology) – First Semester

FOOD MICROBIOLOGY (M-BT-121)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a) Explain the primary sources of microorganisms found in food. [CO-1][L-2]
b) How can one classify the food borne infection? [CO-4][L-1]
c) Differentiate between the microbiology of fish and fruits. [CO-3][L-2]
d) List out factors affecting the growth of micro organisms in food. [CO-1][L-1]
e) What do you understand by starter culture? Explain with an example. [CO-2][L-1]
f) How does temperature affect food spoilage? [CO-2][L-2]
g) Compare contamination and adulteration. [CO-6][L-4]
h) Distinguish between Class-I and Class-II preservatives. [CO-3][L-2]
i) What do you mean by food poisoning? [CO-6][L-2]
j) Emulsifiers can be used as food additives. Explain. [CO-5][L-2] **2×10**

PART-A

Q.2 a) Illustrate intrinsic, extrinsic, and implicit factors affecting the growth of microorganisms with examples. [CO-1][L-4] **10**

b) Analyze SPC and DMC tests with the help of a flow chart. Illustrate the principles and applications of both. [CO-2][L-4] **10**

Q.3 a) Explain different rapid identification methods of food pathogens in detail with the help of diagrams. [CO-1][L-2] **10**

b) Define food spoilage and discuss major causes of food spoilage. Classify the food on the basis of ease of food spoilage. [CO-2][L-2] **10**

Q.4 a) Briefly discuss the microbiology of:

i) Meat.
ii) Vegetables. [CO-3][L-2] **10**

b) Discuss in detail the intrinsic and extrinsic barriers that help in avoiding spoilage. [CO-2][L-3] **10**

PART-B

Q.5 There are different types of food additives. Briefly explain. Describe different purposes and uses of food additives. [CO-4][L-2] **20**

Q.6 Summarize and discuss the critical utility of biotechnology in the food industry by giving suitable examples. [CO-5][L-2] **20**

Q.7 What methods of food adulteration are used these days? What are the strict rules and regulations required to stop this? Outline and describe the Adulteration Act. [CO-6][L-3] **20**

End Semester Examination, Dec. 2023

B. Tech. – Third Semester

MATERIALS AND HEAT TREATMENT (M-307)

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

No. of pages: 1

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

Q.1 Answer the following in brief:

a) Distinguish between ferrous and non-ferrous materials. [CO-1][L-2]
b) What are maraging steels? Give its composition [CO-1][L-1]
c) List the major limitations of ceramics. [CO-2][L-1]
d) Differentiate between the Brittleness and Ductility. [CO-2][L-2]
e) What is compressive testing? [CO-3][L-1]
f) In a Binary system of A and B a liquid of 20%A (80%B) is coexisting with a solid of 70%A (30%B). What will be the fraction of solid for an overall composition having 40%A? [CO-3][L-5]
g) What is meant by phase transformation? [CO-4][L-2]
h) What do you mean by TTT diagram? [CO-3][L-1]
i) Draw a labelled stress-strain diagram for mild steel specimen. [CO-4][L-1]
j) Why surface hardening is done on a material? [CO-3][L-1] **2×10**

PART-A

Q.2 a) Explain the composition, properties and uses of copper and copper alloys. [CO-1][L-2] **10**

b) Explain the composition, properties and uses of four types of cast iron. [CO-2][L-2] **10**

Q.3 a) How reinforced ceramics are classified? Write the properties and uses of each. [CO-2][L-3] **10**

b) Discuss the mechanical behavior of ceramic ball bearing. [CO-2][L-1] **10**

Q.4 Write the short notes on the following:

a) Impact Test.
b) Fatigue Test. [CO-2][L-2] **10×2**

PART-B

Q.5 a) A binary phase diagram has been drawn at constant one atmospheric pressure. What is the maximum number of phases that can co-exist for at least one degree of freedom? [CO-2][L-3] **5**

b) What do you mean by a phase diagram? Draw the Fe-C equilibrium diagram, showing all the reactions, temperatures, compositions, phases and microstructure occurs during the solidification processes. [CO-3][L-1] **15**

Q.6 a) Explain the process of overheating and burning of steel. [CO-3][L-2] **10**

b) Describe the Austempering process for plain carbon steel. Draw a cooling curve showing Austempering process of eutectoid plain carbon steel. [CO-3][L-2] **10**

Q.7 Explain the following processes with neat sketches

a) Flame hardening b) Induction hardening
c) Case hardening d) Nitriding [CO-3][L-2] **5×4**

End Semester Examination, Dec. 2023

B. Tech. – First Semester

APPLIED MATHEMATICS-I (MA-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) Test the convergence of the series: $1+\frac{1}{\sqrt{2}}+\frac{1}{\sqrt{3}}+\frac{1}{\sqrt{4}}+\ldots\infty$ [CO-1][L-2]

b) Check the convergence of the series: $\frac{1}{2}-\frac{2}{3}+\frac{3}{4}-\frac{4}{5}+\ldots\infty$. [CO-1][L-5]

c) If $u = \sin^{-1}(x-y)$, $x = 3t$, $y = 4t^3$, find $\frac{du}{dt}$. [CO-3][L-3]

d) Find the n^{th} derivative of $f(x) = \sin(2x+3)$ [CO-2][L-4]

e) State Taylor's theorem for a function of two independent variables. [CO-3][L-2]

f) If $x=r\cos\theta, y=r\sin\theta$. Show that $\frac{\partial(x,y)}{\partial(r,\theta)}=r$ [CO-4][L-3]

g) Solve: $\Gamma\left(\frac{5}{2}\right)$ [CO-5][L-4]

h) Express $\int_0^1 (1-x)^7\,dx$ is a Beta Function. [CO-5][L-2]

i) Solve: $ydx-xdy+3x^2y^2e^{x^3}dx=0$ [CO-6][L-4]

j) Find Particular solution of $\left(D^2+2D+1\right)y=e^{-x}$. [CO-6][L-2] **2×10**

PART-A

Q.2 a) Discuss the convergence of the series: $\sum_{n=1}^{\infty}\frac{n^{1/4}}{n^2-1}$ [CO-1][L-2] **10**

b) Discuss the convergence of the series: $\sum\frac{x^n}{(n+2)^n}$ [CO-1][L-2] **10**

Q.3 a) Calculate the approximate values of $\sqrt{27}$ to four decimal places by taking the first three terms of an appropriate Taylor's series. [CO-2][L-4] **10**

b) Prove that Expand cos x in the ascending power of ($x - \frac{\pi}{2}$). [CO-2][L-3] **10**

Q.4 a) If $u = x + y + z,\ uv = y + z,\ uvw = z$, show that $\frac{\partial(x,y,z)}{\partial(u,v,w)}=u^2v$ [CO-3][L-4] **10**

b) Find the maximum and minimum values of $f(x)=8x^5-15x^4+10x^2$ [CO-3][L-3] **10**

PART-B

Q.5 a) Evaluate by changing the order of integration: $\int_0^{2a}\int_{x^2/2a}^{\sqrt{ax}} dydx$. [CO- 4] [L-4] **10**

b) Establish relation between beta and gamma function. [CO-4][L-3] **10**

Q.6 a) Discuss the physical interpretation of gradient. [CO-5][L-3] **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 $2\hat{i}-\hat{j}+\hat{k}$ [CO-5][L-4] **10**

Q.7 a) Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = \sin x$ [CO-6][L-4] **10**

10

b) Using method of variation of parameters, solve:

$$\frac{d^2y}{dx^2} + 4y = \tan 2x$$

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

End Semester Examination, Dec. 2023

M. Tech. (Biotechnology) – 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 briefly:

a) Double-helical nucleic acid molecules contain two grooves, called the major groove and the minor groove. Explain the reason(s) for the formation of these grooves. [CO-1][L-2]

b) Illustrate the steps leading from gene to protein in a eukaryotic cell. [CO-1][L-3]

c) List five important features of a cloning vector. [CO-5][L-1]

d) Is it possible to clone a gene without a vector? Explain. [CO-3][L-5]

e) You need to convert a DNA with 3' overhangs to have blunt ends. Would you choose to use DNA polymerase I or the Klenow fragment. Explain. [CO-3][L-5]

f) List the various types of nucleases that are used for genetic engineering. [CO-3][L-1]

g) Suggest two methods to get rid of PCR primers after completion of the reaction. [CO-4][L-3]

h) Use of viral vectors is a suitable choice for transformation of mammalian cells. Discuss. [CO-6][L-2]

i) Why is Bovine Papilloma virus attractive as a vector? [CO-4][L-2]

j) When you want to purify mRNA for preparation of a cDNA library, how would you get rid of contaminating DNA from your mRNA? [CO-6][L-3] **2×10**

PART-A

Q.2 Give example of an inducible operon and explain how it works. [CO-1][L-2] **20**

Q.3 Write a long note on DNA conformations. [CO-2][L-2] **20**

Q.4 Describe the methodology for site-directed mutagenesis by PCR. [CO-5][L-3] **20**

PART-B

Q.5 Discuss the use of lacZ alpha complementation during gene cloning. [CO-5][L-2] **20**

Q.6 Propose a methodology for sequencing of a bacterial genome. [CO-6][L-6] **20**

Q.7 Elucidate the process for construction of cDNA libraries. [CO-3][L-4] **20**

End Semester Examination, Dec. 2023

M. Tech (Biotechnology) - First Semester

APPLIED BIOINFORMATICS (M-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 Briefly explain:

a) Compare global sequence alignment with local sequence alignment. [CO-2][L-2]
b) Enlist applications of gene ontology for biologists. [CO-4][L-1]
c) What do you mean by sequence repeats and inversion?[CO-3][L-1]
d) Classify basic Perl data types. [CO-2][L-1]
e) Recall conserved sequences observed during MSA. [CO-6][L-1]
f) Show applications of array data structure. [CO-1][L-1]
g) Summarize dot plot applied in pair wise sequence alignment. [CO-4][L-2]
h) Illustrate different operators used in perl programming. [CO-2][L-1]
i) Outline cladistics and ontology. [CO-5][L-2]
j) What are the basic operators used in perl programming? [CO-2][L-1] **2×10**

PART-A

Q.2 Apply algorithm of push and pop operation in stack data structure. [CO-1][L-3] **20**

Q.3 Explain the algorithm of Linked list and double linked list. [CO-1][L-2] **20**

Q.4 Using dynamic programming algorithm show partial sequence alignment where sequences are ATCGTT and AGCGAT and assumptions +2, 0 and 0 for match, mismatch and gap penalty respectively. [CO-3][L-4] **20**

PART-B

Q.5 a) Illustrate a subroutine with an example and show how it works. [CO-3][L-2] **10**
b) Using Perl programming show concatenation of two DNA fragments. [CO-4][L-2] **10**

Q.6 Estimate pair wise sequence alignment using Blast and Fasta algorithm. [CO-5][L-5] **20**

Q.7 Construct multiple sequence alignment using hidden Markov model using suitable genomic sequences. Show different transition states using well labeled diagram. [CO-5][L-6] **20**

End Semester Examination, Dec. 2023

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 any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.*

Q.1 Answer in brief:

a) Justify the possibility of sterilization in food preservation. [CO-1][L-1]

b) Substantiate the role of prevention of infestations of pest against grains spoilage. [CO-3][L-3]

c) What are the factors involved in curdling of milk during milk fermentation? [CO-4][L-1]

d) How are radiations useful in increasing the longevity of food? [CO-6][L-2]

e) Does fermentation contribute in changing the physical and chemical composition of food material? [CO-3][L-3]

f) Understanding of food composition content leads to preservation of food. Justify. [CO-2][L-2]

g) Why are insects a matter of concern in food process technology? [CO-3][L-2]

h) How are jams distinct from pickles? [CO-1][L-1]

i) What kind of spoilage of food occurs at high temperature? [CO-2][L-1]

j) Buttermilk is distinct from milk. Justify the statement with suitable explanation. [CO-4][L-2] **2×10**

PART-A

Q.2 a) Give a detailed account of various parameters of processing of food. [CO-1,2][L-2,3] **10**

b) Discuss the scope of food processing using radiation as a method. Support your answer using general principles of food preservation wherever necessary. [CO-1,2][L-2,3] **10**

Q.3 How is wheat processed through drying and milling procedures? Why is milling only used for dry grains and not for milk products? [CO-6] [L-3] **20**

Q.4 a) Fresh fruits and vegetables already have a protective natural coating, then why do an elaborate method is employed to process them? [CO-3,5][L-4,5] **5**

b) Elaborate various methods of processing of fresh vegetables. [CO-3,5][L-4,5] **15**

PART-B

Q.5 State the technical reasons justifying the milk being a single food product with a particular composition act as a starter material for several milk products such as curd, yogurt, paneer, cheese, butter. Justify this using suitable explanation. [CO-4][L-3] **20** marks)

Q.6 Discuss the role of microbes in preservation of fish and fish products. [CO-1][L-2] **20**

Q.7 Comment on the strategies adopted in processing technologies that extend the life of poultry products. [CO-3,4][L-3] **20**

End Semester Examination, Dec. 2023

M. Tech. (Biotechnology) - Third Semester

ENTREPRENEURSHIP OPPORTUNITIES IN FOOD INDUSTRY (M-BT-321)

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

No of Pages: 1

Note: *Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt atleast **ONE** question from each **UNIT**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Comment on the significance of communication in entrepreneurship. [CO-1][L-1]
b) Summarize Entrepreneur traits that are needed to become a successful Entrepreneur. [CO-1][L-2]
c) Illustrate food Business opportunities available in India. [CO-2] [L-3]
d) Contrast between trade mark and copyright. [CO-2][L-2]
e) State Project manager role in the management of a food business project. [CO-4][L-1]
f) Determine the significance of a market research to an entrepreneur? [CO-3][L-3]
g) Explain the ways by which one can protect own `s business ideas. [CO-4][L-2]
h) Evaluate the difference between the term unit price and unit sale. [CO-5][L-5]
i) Comment on role of Finance management in food business. [CO-2][L-2]
j) Elaborate how breakeven influences the business? [CO-6][L-2] **2×10**

UNIT-I

Q.2 a) Explain the essential traits needed for a successful entrepreneurship. [CO-1][L-2] **10**

b) Illustrate the case study of any successful entrepreneur consisting of the mindset and approach to get success. [CO-2][L-3] **10**

Q.3 a) Explain patent, patentable and non-patentable objects. Discuss the procedure of filing patent application. [CO-3][L-2] **10**

b) Illustrate the registration process for food business. Determine the License validity, its renewal and conditions that lead to cancellation of license. [CO-4][L-3] **10**

UNIT-II

Q.4 Elaborate different parts of project management that needs to be managed efficiently for completing a project. Prepare a project report for a food business of your choice. [CO-6][L-3] **20**

Q.5 a) Examine and explain the 5 Ps for marketing with examples? [CO-4][L-4] **10**

b) Illustrate the marketing core concept? Why marketing research is an essential requirement to run a business. [CO-3][L-3] **10**

UNIT-III

Q.6 a) Comment on finance management and discuss its different categories. [CO-5][L-5] **10**

b) Explain sole proprietorship and partnerships. Mention their advantages and disadvantages. [CO-4][L-5] **10**

Q.7 Design a business model to explain the concept of breakeven analysis and cash flow analysis. Explain the significance of budgeting to run a food business successfully. [CO-6][L-6] **20**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Explain the term "fineness of cement" and how it affects the properties of fresh and hardened concrete. [CO-1][L-1]

b) Explain the primary raw materials used in cement production and how they contribute to the final product's properties. [CO-1][L-1]

c) Justify sulphate resisting cement used contemporarily [CO-1][L-2]

d) Why steel embedded in uncontaminated concrete does not corrode? [CO-3][L-2]

e) How does the ratio of water to cement affect the strength development and durability of concrete during the hydration process? [CO-3][L-2]

f) Justify the use of air entraining admixtures in cold climate. [CO-5][L-5]

g) A concrete mix design requires a water-cement ratio (w/c) of 0.45. If you have 400 kg of cement, how much water is needed to achieve this ratio? [CO-2][L-3]

h) Briefly describe the harmful long term effects of bleeding, segregation and laitance. [CO-2][L-3]

i) What are the immediate and time dependent losses in prestressed concrete? [CO-5][L-2] 2

j) Classify aggregates on the basis of origin, texture and unit weight. [CO-5][L-5] **2×10**

PART-A

Q.2 a) Provide an overview of the hydration process of cement. What are the main chemical reactions involved, and how do they contribute to the hardening of concrete? [CO-1][L-1] **10**

b) Describe the industrial processes that produce artificial pozzolan as like fly ash, blast furnace slag, silica fume, and metakaolin. [CO-1][L-3] **10**

Q.3 a) "The quantity of water required for a given workability is higher if the aggregates are angular (compared to rounded)" How do we account for this in the mix design. Mention the clause also. [CO-2][L-4] **10**

b) Describe any two aggregate tests with reference to particular BIS codes and their acceptable test values for pavement aggregate. [CO-2][L-4] **10**

Q.4 a) Calculate the quantities of cement, water, fine aggregate and coarse aggregate per trial mix of 20 m^3 for the following specifications.

i) Characteristic compressive strength = 50 MPa at 28 days; Defective rate = 1%;

ii) Cement strength class 42.5; Slump required = 30-60 mm;

iii) Max. Aggregate size = 10 mm;

iv) Coarse aggregate (crushed) (10 mm),

v) Fine aggregate (crushed), FM= 2.5

vi) Maximum allowable free – water/cement ratio = 0.50; Maximum allowable cement content = 550 kg/m^3. [CO-3][L-4] **10**

P. T. O.

b) Design a concrete mix taking the following data:

i) Stipulation for proportioning concrete ingredients

- Characteristic compressive strength required in the field at 28 days grade: M 35
- Type of cement —OPC 43 Grade confirming to IS 12269
- Maximum nominal size of aggregate — 10 mm
- Shape of CA — Angular
- Workability required at site — 100 mm (slump)
- Type of exposure (as defined in IS: 456) — severe
- Method of concrete placing: pumpable concrete
- Chemical admixture — Super plasticizer confirming to IS 9103.

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

ii) Test data of material

The following materials were tested in the laboratory and results are to be ascertained for the design mix

- Specific Gravity of Cement — 3.15
- Specific gravity of Aggregates:
- Specific gravity of Fine Aggregate (sand) — 2.70
- Specific gravity of Coarse Aggregate — 2.80 SSD Condition
- Sieve Analysis
- Fine aggregates — confirming to Zone II of Table 4 IS – 383.

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

PART-B

Q.5 a) Describe the curing process for concrete and its role in enhancing compressive strength. What can happen if curing is inadequate? [CO-5][L-3] **10**

b) Discuss the potential effects of extreme temperatures on the compressive strength of concrete during mixing and curing processes. [CO-6][L-4] **10**

Q.6 a) A steel bar is subjected to a compressive load, resulting in an axial strain of 0.001. If the lateral strain is 0.0005, what is the poisson's ratio for steel?

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

b) Define poisson's ratio and discuss its importance in materials science.

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

Q.7 Write short notes on:

a) Fiber-reinforced concrete.
b) Lightweight concrete.
c) Chemical attack on concrete.
d) Corrosion of steel rebars. [CO-5][L-2] **5×4**

End Semester Examination, Dec. 2023

M. Tech. – First Semester

PROJECT PLANNING AND CONTROL (MCE-CM-101)

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

No. of pages: 2

Note: *Attempt any **FIVE** questions in all. Marks are indicated against each question.*

Q.1 Answer the following:

a) Describe "Project Management"? [CO-1][L-2]
b) List the 3M's essential for the completion of a construction project. [CO-4][L-1]
c) Summarize the limitations of Gantt Charts. [CO-3][L-2]
d) Distinguish between PERT and CPM. [CO-2][L-2]
e) Define an "Event" with reference to Project Management. [CO-2][L-1] **4×5**

Q.2 Answer the following:

a) Define "Dummy Activity". Support your answer by stating it's two properties. [CO-2][L-2]
b) List the various errors that can be encountered in a Network Diagram. [CO-3][L-2]
c) Evaluate the Expected Mean Time of a project if t_o, t_P = 12 Days & t_L = 15 Days. [CO-5][L-2]
d) Distinguish between EFT and EST. [CO-3][L-3]
e) Describe the importance of "Cost Slope" in Crash Model Study. [CO-6][L-1] **4×5**

Q.3 a) Plan a mechanism in which a construction project undergoes from the stage of inception to the stage of completion. [CO-1] [L-4] **10**
b) Explain in brief the various classifications of Construction Projects. [CO-1] [L-3] **10**

Q.4 a) Describe "Bar Charts". Write an explanatory note on "Limitations of Bar Charts". [CO-2] [L-2] **15**
b) Explain the concept of "Work Breakdown System" in detail. [CO-2] [L-5] **5**

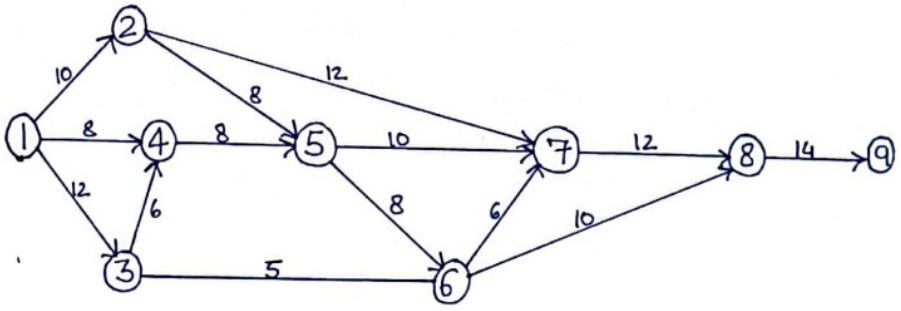
Q.5 a) Justify the significance of "Probability Curve" in PERT analysis. [CO-3] [L-3] **5**
b) Draw the Network Diagram for the following Time Estimates given in the table. Evaluate Project Completion Time, Standard Deviation and Probability of completion of the project in the scheduled time of 35 Days using PERT analysis. Show step – wise calculations.

Activity	t_o (Days)	t_L (Days)	t_P (Days)
1-2	1	2	3
1-3	4	6	1
1-4	3	4	3
2-5	6	7	9
3-5	2	5	7
5-6	6	5	8
4-7	6	4	8
6-7	2	6	9

[CO-3] [L-5] **15**

Q.6 Evaluate EST, EFT, LST, LFT, total float, interdependent float and free float for the following network diagram. The duration of the activities is mentioned (in days).

P. T. O.



[CO-4][L-5] **20**

Q.7 a) Justify the importance of "quality control" and "quality assurance" in quality management. [CO-5][L-2] **10**

b) What do you understand by "building information modelling"? Correlate the application of BIM in construction management. [CO-5][L-2] **10**

Q.8 a) Explain in detail the various types of "cost" considered in a construction project. [CO-6][L-3] **10**

b) What do you understand by "cost estimate"? Justify the importance of "cost estimate" in construction management by comparing its different types. [CO-6][L-3] **10**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) State the date when the Indian Contract Act came into force. [CO1, L1]
b) With the help of an example, differentiate between rights and obligations in context of a contract. [CO,L2]
c) Briefly explain executed contract with a relevant example. [CO2, L2]
d) Frame a typical clause granting extension in time limit of a contract. [CO3, L2]
e) State the purpose of issuance of expression of interest? [CO3, L2]
f) Justify the reason for providing draft concession agreement to a bidder? [CO4, L3]
g) List any two steps of process of arbitration proceedings. [CO6 L2]
h) Differentiate between minimum wage and fair wage. [CO5 L1]
i) State is the purpose of Minimum Wages Act. [CO5, L3]
j) State a few benefits of value engineering. [CO6, L2]

2×10

PART-A

Q.2 a) Explain the circumstances under which surety may be discharged from liability. [CO1, L3] **10**

b) Write short notes on:
   i) Mistake of law and mistake of fact.
   ii) Mutual mistakes. [CO1, L3] **10**

Q.3 Discuss the following contracts with their advantages, disadvantages and suitability:
a) Lumpsum contract.
b) Labour contract. [CO2, L2] **10×2**

Q.4 Discuss the prequalification process in detail. [CO3, L3] **20**

PART-B

Q.5 List and explain in detail the process of arbitration proceedings. [CO4, L3] **20**

Q.6 Discuss in detail the needs and objective for Minimum Wages Act of 1948. [CO5,L3] **20**

Q.7 With the help of flow chart explain the concept of value engineering. [CO6, L3]**20**

End Semester Examination, Dec. 2023

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 any **FIVE** questions in all. Marks are indicated against each question.*

Q.1
a) Distinguish between psychological and physiological factors affecting safety. [CO-4][L-2]
b) Briefly explain the concept of construction safety management. [CO-4][L-1]
c) Write short note on First Aid on site. [CO-5][L-1]
d) List two safety rules in construction. [CO-5][L-1]
e) Briefly explain about safety policies. [CO-6][L-1]
f) Describe the concept of quality in construction. [CO-1][L-1]
g) Distinguish between quality of design and quality of conformance. [CO-1][L-2]
h) Summarize on "in-process item control". [CO-2][L-1]
i) Explicit about evolution of quality in construction. [CO-1][L-1]
j) Explain the benefits of using "just in time in construction". [CO-3][L-2] **2×10**

PART-A

Q.2
a) Discuss element of quality in construction. [CO-1][L-1] **10**
b) Summarize quality characteristics of construction. [CO-1][L-1] **10**

Q.3
a) State five difference in quality assurance and quality control. [CO-2][L-2] **10**
b) Elaborate regulation and objective on environment and human safety. [CO-4][L-3] **10**

Q.4 Write short notes on:
a) Manufacturing variation control.
b) Quality documentation.
c) Deviation report system.
d) Raw materials-laboratory testing and documentation. [CO-2][L-2] **5×4**

PART-B

Q.5
a) What steps can be taken to effectively and efficiently eliminate unsafe work environments? Explain in detail. [CO-4][L-3] **10**
b) What do you understand by quality standards and what are the benefits of ISO 9000 series of standards? [CO-3] [L-2] **10**

Q.6
a) Describe the safety education and periodic training. [CO-5][L-4] **10**
b) Explain the importance of use of fire extinguishers. [CO-6][L-1] **10**

Q.7 Enlighten "safety and health audit recognition program (SHARP)" construction safety system. [CO-5][L-4] **20**

End Semester Examination, Dec. 2023

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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Explain the requirements of a good binder. [CO1, L2]

b) Explain desirable properties of cutback bitumen to be used in pavement construction. [CO1, L2]

c) Write down the name of various types of tests conducted on aggregate to check their quality. [CO6, L1]

d) Describe various types of natural aggregates. [CO2, L1]

e) Describe the requirements of joint filler and sealer. Also, discuss the desirable properties and various materials in use. [CO6, L2]

f) Explain the terms (i) VFB, (ii) VMA. [CO2, L2]

g) How transverse joints are classified? [CO6, L2]

h) Write a note on aggregate blending to meet the specified gradation. [CO3, L2]

i) Explain the advantages of water bound madam roads. [CO4, L2]

j) Enlist functions of surface dressing. [CO6, L1] **2×10**

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. [CO1,L2] **10**

b) Determine the desired gradation of following types of aggregates by trial-and-error method:

Sieve sizes	Aggregate 1	Aggregate 2	Target
	% passing	% passing	
10 mm	100	100	100
4.75 mm	90	100	80-100
2.36 mm	30	100	65-100
1.18 mm	7	88	40-80
600 mm	3	47	20-65
0.300 mm	1	32	7-40
0.150 mm	0	24	3-20
0.074 mm	0	10	2-10

[CO1, L3] **10**

Q.3 a) Explain various methods of bituminous mix design. Also explain the design steps of Marshall mix method. [CO2, L2] **10**

b) Explain the various tests performed on bitumen. Mention importance of each. [CO2, L2] **10**

P. T. O.

Q.4 a) For soft soil which type of stabilization would you recommend? Explain in detail. [CO3, L3] **10**

b) Explain the material specification, construction method and quality control checks for paved roads. [CO3, L2] **10**

PART-B

Q.5 a) Explain various types of emulsions used in bituminous pavement. Under which condition each one is used. [CO4, L2] **10**

b) Mention specification of material and quality control test for laying pre mixed carpet construction. [CO4, L2] **10**

Q.6 Discuss the applications of following:

a) Surface dressing.
b) Tack coat.
c) Prime coat.
d) Grouting. [CO5, L2] **5×4**

Q.7 a) Explain the requirements of materials, plants and equipment's for cement concrete road construction. [CO6, L2] **10**

b) Explain construction method of various types of joints in rigid pavement. [CO6, L2] **10**

End Semester Examination, Dec. 2023

M. Tech. – Third Semester

SUSTAINABLE BUILDING CONSTRUCTION (MCE-CM-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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) "The building and construction sector accounts for: 39% of energy and process-related carbon dioxide (CO2) emissions (As per global report)". Explain one solution to remedy this issue. [CO-5][L-1]

b) Explain how the GRIHA rating is calculated [CO-1][L-2]

c) Differentiate between recycled aggregate concrete (RAC) and recycled concrete aggregate (RCA). [CO-2][L-2]

d) Explain the steps of Quality Control Procedures in the Construction Industry [CO-2][L-2]

e) What do you understand by OTTV? [CO-2][L-2]

f) List the features of LEED. [CO-3][L-1]

g) Enunciate the 4C's of sustainability. [CO-3][L-1]

h) Write a short note on "Environmental Dimensions". [CO-4][L-2]

i) Highlight the difference between "cradle-to-gate" and "cradle-to-grave" in relation to Life Cycle Assessment. [CO-4][L-2]

j) Explain the regional impacts of temperature change. [CO-5][L-1] **2×10**

PART-A

Q.2 "Recent estimates show that urban areas consume more than 67% of global energy and release more than 70% of global CO2 emissions". Justify the above statement in relation to the role of construction materials in carbon cycle (Embodied Carbon). [CO-1][L-3] **20**

Q.3 "As per recent surveys (2023), Construction and Demolition Waste (CDW) accounts for approximately 36% of total waste produced on Earth". Refer the statement and highlight the sustainable achievements of incorporating recycled and manufactured aggregate in construction sector (with factual data). [CO-2][L-3] **20**

Q.4 Write a well detailed note on the concepts and components of Embodied Energy. [CO-3][L-3] **20**

PART-B

Q.5 "To improve the energy efficiency in the new commercial buildings, the Energy Conservation Building Code (ECBC) was created". Relating to the above statement, enumerate the primary provisions of ECBC in recent settings. [CO-4][L-3] **20**

Q.6 Enumerate the roles of Smart buildings in Smart cities development with specific relevance to recent developments made in the current scenario. [CO-5][L-3] **20**

Q.7 "The amount of materials used in production and consumption continues to rise at the global level and the rate at which materials are being extracted globally is outpacing both population and economic growth. It is estimated that global resource extraction will increase 110% by 2060 (As per 2023 data)". Refer the above statement and

explain the environmental and socio-economic impacts that arise due to this. How do you propose to remedy the impact? [CO-5][L-3] **20**

End Semester Examination, Dec. 2023

M. Tech. – First Semester

ADVANCED STRUCTURAL ANALYSIS (MCE-SE-101)

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

No. of pages: 2

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

Q.1 Answer the following in brief:

a) List the different methods for determination of bending moments under structural analysis. [CO-1][L-1]

b) With the help of neat sketch, illustrate the different cases of analysis of Symmetric Frames under Kani's Method. [CO-1][L-2]

c) Correlate the property of "Stiffness" with structural analysis. [CO-2][L-3]

d) With the help of neat sketch, explain the different types of flexibilities. [CO-3][L-2]

e) Frame a flexibility matrix for a Fixed Beam subjected to aUdl of 'w' kN/m. [CO-3][L-3]

f) State the necessity of application of "Compatibility Equations" in structural analysis. [CO-4][L-1]

g) List the software applications used for structural analysis. [CO-4] [L-1]

h) Evaluate the dead load of the beam of span 6 m, with Udlof 40 kN/m. [CO-5][L-4]

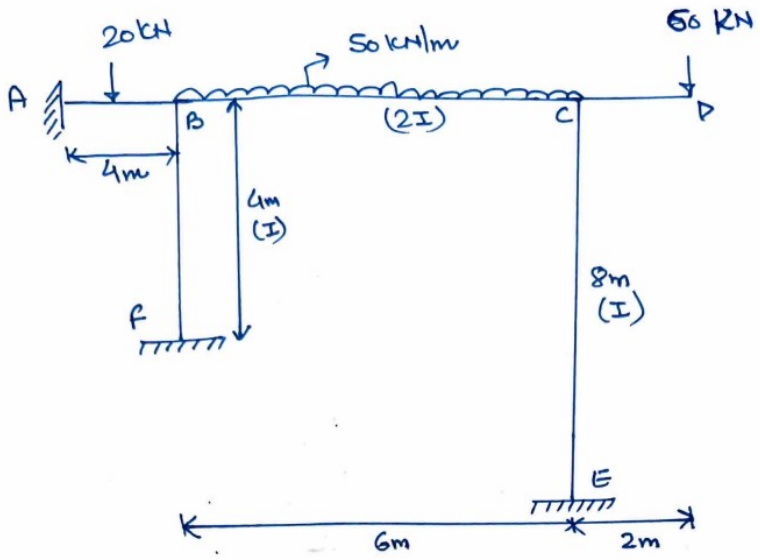
i) Define "shape functions". [CO-5][L-1]

j) State the relationship between "shape function" and "displacement". [CO-6][L-1]

2×10

PART-A

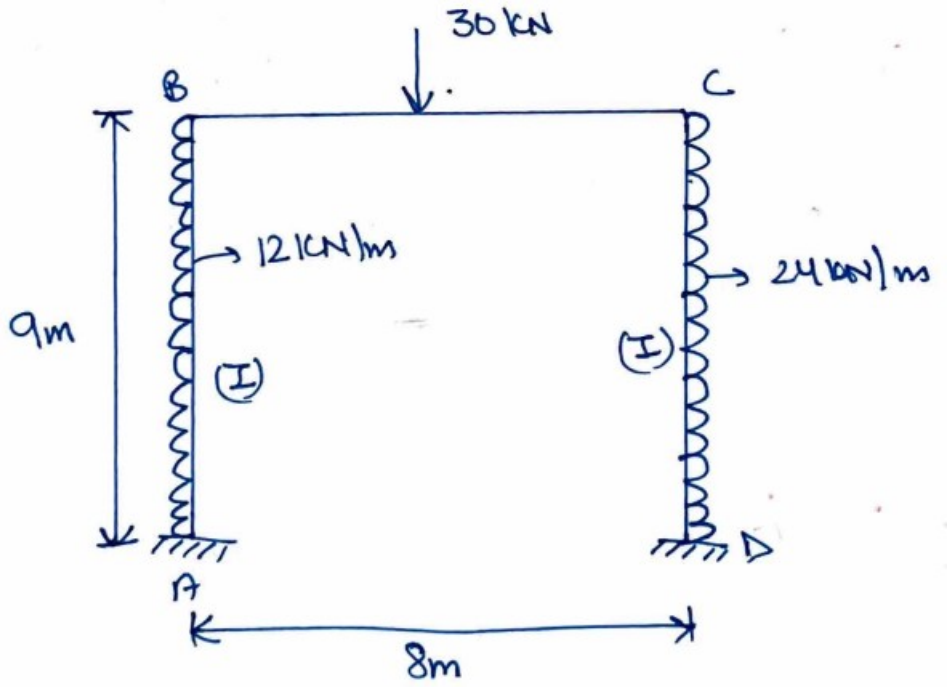
Q.2 Analyze the following frame with Kani's method:



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

P. T. O.

Q.3 Evaluate the moments developed under critical points of the following frame subjectedto different cases of loading:



[CO-2] [L-5] **20**

Q.4 Elaborate the following:

a) Displacement method of structural analysis.
b) Procedure of determination of deflection using flexibility matrix method.

[CO-3][L-3] **10×2**

PART-B

Q.5 As The differential equation of a physical phenomenon is given by:

$$D^2y + 500x^2 = 0,\ 0 < x < L$$

Trail function : $y = a_1(x - x4)$

Boundary conditions : $y(0) = 0$

$y(1) = 0$

Evaluate the value of the parameter a_1 by the following methods:

a) Point collocation method.
b) Subdomain collocation method.
c) Method of least squares.
d) Galerkin method. [CO-4] [L-4] **20**

Q.6 Plan a mechanism to analyze a concrete beam of size 250 mm X 300 mm in STAAD Pro software. Assume all other necessary parameters. [CO-5][L-4] **20**

Q.7 Plan a mechanism to derive the expression for shape function for a 4 – Noded rectangular element. [CO-6][L-4] **20**

End Semester Examination, Dec. 2023

M. Tech – First Semester

ADVANCED SOLID MECHANICS (MCE-SE-102)

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

No. of pages: 2

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

Q.1 Answer the following questions:

a) If u = displacement field for a body in an elastic element, given by: $u = (3xy + x^2)\ i + (10y + 2z)\ j + (xyz + y^2)\ k$, evaluate the deformed position of a point originally located at (3, -4, 1). [CO-1][L-5]

b) Illustrate the existence of Linear Invariant and Quadratic Invariant with Strain Deviator. [CO-1][L-2]

c) Define the terms "plane stress and plane strain". [CO-2][L-1]

d) What do you understand by maximum principal stress theory? [CO-4][L-2]

[CO-MCE-SE-102.2] [L-1]

e) Correlate the significance of poisson's ratio and young's modulus of elasticity in determining shear modulus and bulk modulus of elasticity. [CO-3][L-2]

f) A rectangular steel bar having a cross – section 3 cm x 4 cm is subjected to a tensile force of 2500 N. if the axes are chosen as Standard Coordinate Axes, determine the Normal and Shear Stresses on a plane having Direction Cosines: $n_x = n_y = n_z = (1/\sqrt{2})$. [CO-2][L-5]

g) With the help of a neat sketch, define Pi – Plane. [CO-4][L-3]

h) Express Prandtl – Ruess equation. [CO-6][L-1]

i) Correlate the concept of shear strain in the determination of Degree of Twisting in an elastic material. [CO-5][L-3]

j) Justify the significance of *Warping Function* in determination of displacement produced by torsion in an elliptical bar. [CO-5][L-1] **2×10**

PART-A

Q.2 a) Derive the expression for Stress component on an arbitrary plane. [CO-3][L-4] **10**

b) "*The definition of STRESS does not hold true for some Structural elements with complex loadings.*" Justify with proper examples. [CO-3][L-3] **10**

Q.3 a) Derive an expression for the determination of Octahedral Stresses at a given point in an elastic field. [CO-2][L-4] **8**

b) At a point Q, the rectangular stress components are:
$\sigma_x = 2$, $\sigma_y = -3$, $\sigma_z = 5$, $\tau_{xy} = 3$, $\tau_{yz} = -2$, $\tau_{zx} = 2$

P. T. O.

The magnitude of the stresses are in kPa. Determine the Principal Stresses and check for invariance. [CO-2][L-3] **12**

Q.4 a) A cubical element is subjected to the following state of stresses:
Direct Stress in x – direction = 120 MPa, Direct Stress in y – direction = -40 MPa, Direct Stress in z – direction = -50 MPa, Shear Stress in xy = yz = zx plane = 0. On assuming the materials to be isotropic and homogeneous in nature, evaluate Principal Shear Strain and Octahedral Shear Strain. [CO-3][L-5] **8**

b) Derive a relation between three elastic constants. [CO-3][L-4] **12**

PART-B

Q.5 Explain the following theories of failure in detail:

a) Maximum principal stress theory
b) Maximum elastic strain theory
c) Maximum elastic energy theory
d) Octahedral shearing stress theory [CO-4][L-2] **20**

Q.6 a) Justify the significance of membrane analogy for generating the relation between tensile force 'F' and uniform lateral pressure 'p'. [CO-5][L-3] **8**

b) Correlate the application of laplace equation in determining the torsion of a circular bar. [CO-5][L-4] **12**

Q.7 a) With the help of suitable diagram, write a short note on the following:

i) Linearly elastic material
ii) Rigid – linear work hardening
iii) Linearly elastic – linear work hardening
iv) Linearly elastic – perfectly plastic [CO-6][L-3] **10**

b) List the various assumptions considered in the stress – strain relationship for a Plastic Flow. [CO-6][L-2] **10**

End Semester Examination, Dec. 2023

M. Tech (Structural Engineering) – First Semester

ADVANCED SOLID MECHANICS (MCE-SE-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 a) Determine the deformed position of a point originally located at (5, -1, 4) for the displacement field of a body is given by: $U = (xy + x^2)\, i + (4 + 2z)\, j + (xz + y^2)\, k$. [CO-6][L-3]

b) Define the term "orthonormality". [CO-1][L-3]

c) What is Airy's stress function based on?

[CO-4][L-3]2

d) State the expression for concluding: "Principal planes are orthogonal to each other". [CO-2][L-3]

e) With appropriate diagram, explain "Prandtl's Membrane analogy". [CO-5][L-3]

f) A rectangular steel bar having a cross – section 3 cm x 4 cm is subjected to a tensile force of 3000 N. If the axes are chosen as standard coordinate axes, determine the normal and shear stresses on a plane having direction cosines: $n_x=n_y=n_z=(1/\sqrt{2})$. [CO-2][L-3]

g) With the help of a neat sketch, define deviatoric plane. [CO-3][L-3]

h) What do you understand by prandtl – ruess equation? [CO-5][L-3]

i) Differentiate between cauchy traction and piola traction. [CO-1][L-3]

j) Explain the necessity of warping function in the evaluation of displacement produced by torsion in an elliptical bar. [CO-6][L-3] **2×10**

PART-A

Q.2 a) Enunciate the term "Tensor" with its ranks and components. Using transformation law, define rank "n" tensor. [CO-1][L-2] **10**

b) Discuss the importance of adopting constitutive relations in solving problems of theories of elasticity. [CO-1][L-2] **10**

Q.3 a) Determine the: Extremum value of the shear stress & their associated normal stresses; Octahedral shear stress and its associated normal stress for the state of stress at a point characterized by the components: σ_x = 60 MPa; σ_y= -28MPa; σ_z=55MPa; $\boldsymbol{\tau}_{xy}= \boldsymbol{\tau}_{yz}=\boldsymbol{\tau}_{zx}= 0$ [CO-2][L-4] **8**

b) Check for invariance at a point Q, the rectangular stress components are: σ_x = 1, σ_y = -2, σ_z = 4, τ_{xy}= 2,τ_{yz}= -3, τ_{zx}= 1. The magnitude of the stresses are in kPa. [CO-2][L-3] **12**

Q.4 a) What do you understand by Lame's displacement equation of equilibrium? [CO-3][L-2] **8**

b) Derive the equation that represents the mechanical, geometrical and physical characteristics of an elastic solid. [CO-3][L-6] **12**

PART-B

Q.5 Discuss the applications and derive the relationship for Airy's stress function of a finite plate with a hole subjected to tensile loading. [CO-4][L-5] **20**

Q.6 Derive the expression for torsion of a prismatic bar of solid section and highlight the assumptions considered. [CO-5][L-6] **20**

Q.7 Explain the following theories of failure in detail:

a) Maximum principal stress theory.
b) Maximum Elastic strain theory.
c) Maximum elastic energy theory.
d) Octahedral shearing stress theory. [CO-6][L-2] **20**

End Semester Examination, Dec. 2023

M. Tech. – First Semester

DESIGN OF INDUSTRIAL STUCTURES (MCE-SE-104)

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

No. of pages: 2

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

Q.1 Answer the following in brief:

a) Explain the classifications of pressed steel water tanks. [CO-2] [L-2]

b) State the various provisions for impact allowance of additional impact loads for a gantry girder. [CO-1] [L-2]

c) Define the position of crane wheels for maximum effect on gantry girder. [CO-2] [L-1]

d) With a proper diagram highlighting the various components, define "portal frames". [CO-3] [L-3]

e) Enunciate the factors increasing the Bin Loads. [CO-3] [L-2]

f) Where would you provide "Stiffening angles" on a water tank. Specify its allowable minimum Section Modulus. [CO-5] [L-2]

g) List the Assumptions considered in Janssen's Theory. [CO-4] [L-1]

h) Determine the height and diameter of flared portion of a chimney of height 60m and top diameter of 3m. [CO-5] [L-3]

i) Differentiate between Type-2 and Type-3 preside steel tanks [CO-1] [L-2]

j) List the advantages of a pressed steel water tanks. [CO-5] [L-1] **2×10**

PART-A

Q.2 Design a gantry girder considering the following data: Minimum hook approach is taken at 1.0 m for a 6.5 m span of gantry girder. Span of crane girder to be considered is 20m with a crane capacity of 250 kN. Self-weight of crane girder excluding trolley is 220 kN, self-weight of the trolley being 55 kN. Distance between the wheel is 3.5m with the self-wight of rails as 0.3 kN/m. [CO-1] [L-6] **20**

Q.3 Design the slab and beam component of a portal frame of the following data: hall dimensions 8m wide and 20m length consisting of number of portal frames at every 4m centre to centre. The height of the portal frame unto the centre of the beam is 5m. The live load on the floor is 3 kN/m^2 and the floor finish is 1 kN/m^2. Use M20 grade concrete and Fe415 grade steel. Taking the safe bearing capacity go soil as 120 kN/m^2. [CO-2] [L-6] **20**

Q.4 Draft a framework for the design of a rectangular steel bunker considering the various loads and allowance as per Indian standard. [CO-3] [L-5] **20**

PART-B

Q.5 Consider the location of Delhi with its the topography as almost flat and of Category 2.Design a self-supporting steel stack of height 70 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/m^2). Brickwork lining is 10cm and supported throughout its height. [CO-4] [L-4] **20**

P. T. O.

Q.6 Design for a circular elevated water tank to be located in Ahmedabad with data as follows:

a) Capacity: 3,00,000 Litres
b) Height of tank above G.L. : 9m
c) Tank supported over 8 columns [CO-5] [L-4] **20**

Q.7 a) Explain the different accessories of a pressed steel tanks. [CO-5] [L-3] **5**

b) Design the top and bottom tier beams of an elevated rectangular pressed steel tank having a capacity of 1,00,000 litres, open at the top. Height of staging to be considered is 12 m upto the top of the column. [CO-5] [L-4] **15**

End Semester Examination, Dec. 2023

M. Tech. (Civil Engineering) – Third Semester

DESIGN OF PRESTRESSED CONCRETE STRUCTURES (MCE-SE-301A)

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

No. of pages: 2

Note: *Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.*
Assume appropriate data if required. Use of IS code 1343:1980/2012 is allowed.

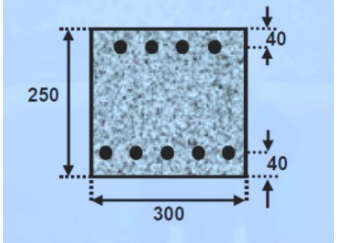
Q.1 Answer the following in brief:

a) Justify prestressed sections as compared to an RC section. [CO-1][L-2]
b) Enlist the devices used in pre tensioning and post tensioning. [CO-1][L-1]
c) Enlist advantages and disadvantages of post-tensioning over pre-tensioning. [CO-1][L-2]
d) Describe the indirect methods of empirically finding out the tensile strength of concrete. [CO-2][L-2]
e) Give the type of admixtures used in prestressed concrete and conformed by IS:9103-1999. [CO-2][L-1]
f) Write a short note on stiffness of concrete. [CO-2][L-2]
g) Depict the various losses of prestressed concrete during its life time through a flow diagram. [CO-3][L-2]
h) Which section would you recommend for maximum flexural efficiency and why? [CO-5][L-2]
i) Define Kern Point and Kern Zone. Justify its demarcation. [CO-4][L-2]
j) What is transmission length? [CO-6][L-1] **2×10**

PART-A

Q.2 a) Explain with a diagram the variation of internal forces developed in a prestressed member as compared to an RCC member. [CO-1][L-3] **10**
b) Illustrate with a schematic diagram the various stages of the post-tensioning operation. [CO-1][L-2] **10**

Q.3 a) Describe briefly the losses due to friction and wobble effect. [CO-3][L-3] **5**
b) Explain durability of concrete in prestressed constructions in context of the common durability problems. [CO-6][L-2] **5**
c) A prestressed concrete sleeper produced by pre-tensioning method has a rectangular cross-section of 300mm × 250 mm (b × h). It is prestressed with 9 numbers of straight 7mm diameter wires at 0.8 times the ultimate strength of 1570 N/mm2. Estimate the percentage loss of stress due to elastic shortening of concrete. Consider m = 6.



P. T. O.

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

Q.4 A post-tensioned beam with a rectangular section of 500 mm X 700 mm, the profile of the CGS is parabolic, with no eccentricity at the ends. The live load moment due to service loads at mid-span (MLL) is 500 kNm. The prestress after transfer (P0) is 1600 kN. Assume 15% loss at service. Grade of concrete is M30. Evaluate the following quantities.

a) Kern levels.
b) Cracking moment.
c) The stresses at the top and bottom fibres at transfer and at service.

Compare the stresses with the following allowable stresses at transfer and at service.
For compression, fcc,all = – 18.0 N/mm^2
For tension, fct,all = 1.5 N/mm^2. [CO-4][L-4] **20**

PART-B

Q.5 A Type 1 simply supported prestressed beam is to be designed with MT = 500 kNm including MSW = 50 kNm. The height of the beam is restricted to 900 mm. The prestress at transfer fp_0 = 1035 N/mm^2 and the prestress at service is fpe = 860 N/mm^2. Take the allowable compressive stresses as 12.5 N/mm^2 at transfer and 11.0 N/mm^2 at service. The prestressing strands can be taken as given below.
Type of prestressingtendon: 7-wire strand
Nominal diameter = 12.8 mm
Nominal area = 99.3 mm^2 [CO-5][L-5] **20**

Q.6 Design Torsional reinforcement for a rectangular section to carry the following ultimate loads. Assume section as 250 mm X 500 mm with As =500mm^2
Tu = 50 kNm; Mu = 200 kNm (including an estimate of self-weight); Vu = 80 kN.
The material properties are as: fck = 35 N/mm^2
fy = 250 N/mm^2 fpk = 1720 N/mm^2
The prestressing is fpe = 1035 N/mm^2. [CO-6][L-5] **20**

Q.7 Write short notes on ***any two*** of the following:
a) Balanced cantilever bridge.
b) Composite construction.
c) Deflection due to prestressing force by the load-balancing method for a parabolic tendon. [CO-6][L-3] **10×2**

End Semester Examination, Dec. 2023

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 terms traffic capacity, basic capacity, possible capacity and practical capacity in brief. [CO2 L-2]

b) Explain the various uses of speed and delay studies. [CO2 L-2]

c) Explain the various factors on which PCU values depend. [CO3 L-2]

d) Draw the fundamental diagram of traffic flow. [CO3 L-1]

e) A vehicle travelling at 40 kmph was stopped within 1.8 seconds after the application of the brakes. Determine the average skid resistance. [CO1 L-3]

f) Mention the applications of (a) accident location file (b) spot maps (c) collision diagram and (d) condition diagram. [CO4 L-2]

g) Explain briefly the various aspects to be investigated during parking studies. [CO4 L-2]

h) Differentiate between control delay, uniform delay and incremental delay. [CO5 L-1]

i) With neat sketch show some of important types of regulatory signs and mention the function of each. [CO4 L-2]

j) Define desire lines and also its importance in origin and destination studies. [CO1 L-3] **2×10**

PART-A

Q.2 a) Explain how road side interview method of O and D studies are carried out. Also mention its advantages and limitations. [CO1 L-2] **10**

b) 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. [CO1 L-2] **10**

Q.3 a) Calculate stream equivalency factor (Se) for the following flow of classified vehicles
for divided and undivided roads. [CO3 L-3] **6**

Vehicle Type	Flow(vehicles/h)	% of composition
Two-Wheeler	1441	36
Auto rickshaw	379	9.5
Car	1985	49.6
Mini Bus	44	1.1
Bus	56	1.4
Light commercial vehicle	15	0.4
Two/ Three axle truck	42	1
Bicycles	21	0.5
Cycle rickshaws	21	0.5

b) Explain the various steps for design of level of service for multi-lane highways.

P. T. O.

[CO3 L-2] **14**

Q.4 a) Explain the concept of headway in traffic and its significance in understanding vehicle spacing. [CO4 L-2] **10**

b) How do factors like traffic signal timings, lane management, and road capacity influence the applicability of queuing theory to real-world traffic scenarios? [CO4 L-2] **10**

PART-B

Q.5 a) Discuss the role of engineering, enforcement, administrative policy and education in collection of accident data. [CO4 L-2] **10**

b) Explain various stages of road safety audit and also discuss the general approach to improve road safety. [CO4 L-2] **10**

Q.6 a) The average normal flow of traffic on cross Roads A and B during design period are 650 and 340 pcu per hour; the saturation flow values on these roads are estimated as 1560 and 1200 pcu per hour respectively. The all-red time required for pedestrian crossing is 10 sec. Design two phase traffic signal by Webster's method. [CO5, L-3] **10**

b) Explain the various factors to be considered during the design of traffic signal timings. [CO5,L-2] **10**

Q.7 a) Classify the different types of traffic signs and mention importance of location and height of traffic signs in traffic congestion management. [CO4 L-2] **10**

b) Explain the various types of markings and also explain how it helps to control the traffic? [CO4 L-2] **10**

End Semester Examination, Dec. 2023

M. Tech. – First Semester

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

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

No. of pages: 2

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

Q.1 Answer the following in brief:

a) What factors or considerations need to be taken into account when forecasting urban goods movement? [CO-1][L-1]

b) Discuss various the benefits or advantages associated with conducting a post-card questionnaire survey. [CO-2][L-2]

c) Explain various factors governing trip generation and attraction. [CO-2][L-2]

d) Write down different methods used for trip distribution. [CO-4][L-1]

e) Define the term cordancount. [CO-3][L-1]

f) What assumptions underlie the concept of user equilibrium assignment in network modeling? [CO-3][L-1]

g) Enlist the various types of urban road system. [CO-1][L-1]

h) Define all or nothing assignment technique. [CO-5][L-1]

i) Explain the term "traffic assignment" and different techniques used for traffic assignment. [CO-5][L-2]

j) Illustrate the relationship between speed, density, and flow by presenting graphs. [CO-6][L-1] **2×10**

PART-A

Q.2 a) Explain the term "transportation planning". Also write the differentcomponents of a transportation system. [CO-1][L-2] **10**

b) How can you explain the classification system used for urban roads? [CO-2][L-2] **10**

Q.3 a) What is the classification system for urban goods movement within the field of urban transportation? [CO-2][L-2] **10**

b) Differentiate between home based and non-home-based trips. Write down thevarious characteristics that define a journey. [CO-2][L-1] **10**

Q.4 a) Discuss various types of trip. Also discuss the details of trip generation. [CO-3][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. [CO-3][L-3] **10**

Household size (x)				
	1	2	3	4
Trips	1	2	4	6
Per	2	4	5	7
day (y)	2	3	3	4
Σy	2	9	12	17

PART-B

P. T. O.

Q.5 a) Explain various factors that play a role in influencing the choice of transportation mode during trip generation? [CO-4][L-2] **10**

b) The total number of trips from zone I to zone J is 4200. Currently all trips are made by car. Government has two alternatives to introduce a bus or a metro. The travel characteristics and respective coefficients are given below. Decide the best alternative in terms of trips carried.

	$t_{ij}^{(v)}$	t_{ij}^{walk}	t_{ij}^{t}	F_{ij}	Φ_{ij}
Coefficient	0.06	0.03	0.07	0.2	0.2
Car	30	-	-	22	6
Bus	40	8	7	9	-
Metro	16	15	4	7	-

$t_{ij}^{(v)} \rightarrow$ in vehicle travel time

$t_{ij}^{walk} \rightarrow$ walking time

$t_{ij}^{t} \rightarrow$ waiting time

$F_{ij} \rightarrow$ Fare charged

$\phi_{ij} \rightarrow$ Parking cost

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

Q.6 a) Discuss various growth factor methods of trip generation? Describe any two in detail. [CO-5][L-2] **10**

b) The total trips produced in and attracted to the three zones A, B and C of a survey area in the design year are tabulated as:

Zone	Trips produced	Trips attracted
A	2000	3000
B	3000	4000
C	4000	2000

It is knownthat the trips between two zones are inversely proportional to the second power of the travel time between zones, which is uniformly 20 minutes. If the trip interchange between zones B and C is known to be 600, Calculate the trip interchange between zones A and B, A and C, B and A, C and B. [CO-5][L-2] **10**

Q.7 a) Describe the various types of movements within a specified study area and provide an explanation for each of them. [CO-6][L-2] **10**

b) Provide a comprehensive explanation of the home interview method, including an overview of the factors that influence trips based on data collected through home interviews. [CO-6][L-2] **10**

End Semester Examination, Dec. 2023

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 Answer the following in brief:

a) Give classification of a railway line as adopted by Indian Railways. [CO1][L-1]
b) Why is it desirable to have, as far as possible, a uniform gauge for the railway network of a country? [CO1][L-2]
c) What is meant by 'track modulus? [CO-2][L-2]
d) Differentiate between stock rail and tongue rail. [CO-2][L-3]
e) Why sleepers are used in railway tracks? [CO-3][L-2]
f) How is the weight of a rail section usually determined. [CO-4][L-2]
g) It is observed that at present tracks, are mostly laid with flat-footed rails. Give reasons for this preference in relation to other types of rail sections. [CO-1][L-3]
f) Indicate its usual range of values for a broad gauge track. [CO-1][L-1]
h) Why track drainage is important? [CO-3][L-3]
i) Differentiate between absolute and automatic block system. [CO-5][L-2]
j) Enlist various measures normally taken to improve the track to accommodate high speeds. [CO-6][L-2] **2×10**

PART-A

Q.2 Discuss the organizational structure of Indian Railways. How are the duties distributed in a typical zonal railway headquarter? [CO-1][L-2] **20**

Q.3 a) What are various types of track stresses induced in a rail section? Explain briefly how these are evaluated? [CO-2][L-3] **10**

b) How is track modulus expressed? State the factors affecting it and give the values of at least one of these factors for the tracks in our country. [CO-2][L-3] **10**

Q.4 Draw a typical cross section of a permanent way. Explain briefly the functions of the various components of the railway track. [CO-3][L-3] **20**

PART-B

Q.5 Draw a neat sketch of a left-hand turnout and name its various components. Describe any one method of designing a turnout and give the detailed procedure for calculating the (a) lead, (b) radius, and (c) heel divergence. [CO-4][L-4] **20**

Q.6 a) Describe the locations and purposes of the following signals: a) warner, b) outer, c) home, d) starter, e) 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 a) Distinguish between surface and underground railway systems. Enumerate the factors that favour the selection of one over the other. [CO-6][L-3] **10**

b) In what way has the underground railway system assumed considerable importance and promise for the metropolitan transport system? Describe briefly the principle tasks involved in the construction of an underground railway system. [CO-6][L-3] **10**

End Semester Examination, Dec. 2023

M. Tech. – Third / Fifth Semester

TRAFFIC SIMULATION MODELLING AND APPLICATION (MCE-TE-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
a) Explain the steps to determine the microscopic speed of particles based on corresponding macroscopic relationship. [CO1 L-2]
b) Discuss various types of random number generators used in the context of traffic engineering, and how do they impact the reliability and accuracy of traffic simulation models? [CO3 L-2]
c) How do queuing theory concepts contribute to the understanding and application of traffic simulation and modeling? [CO4 L-2]
d) Explain various types of queue disciplines and also mention example for each. [CO4 L-2]
e) Draw the flow diagram of a macroscopic traffic simulation model. [CO1 L-2]
f) Differentiate between model verification and model validation. [CO5 L-2]
g) Define Poisson distribution function (pdf) and write down the expression for the same. [CO1 L-1]
h) Write down the rules for deceleration and randomization in cellular automaton model. [CO5 L-1]
i) Discuss the key distinctions between continuous distributions and discrete distributions when applied in traffic engineering analysis? [CO2 L-2]
j) Discuss the concept and significance of the gamma distribution in the context of traffic simulation modeling. [CO1 L-1] **2×10**

PART-A

Q.2
a) How is traffic micro-simulation modeling utilized in the development of a base model for traffic analysis and management? [CO1 L-3] **10**
b) How can simulation be applied effectively in diverse fields for modeling purposes? Provide specific examples from various fields to illustrate its broad applicability and advantages. [CO1 L-3] **10**

Q.3
a) Why is it important to assess and validate the randomness of pseudo-random number generators? Explain the significance and potential implications of testing the randomness of generated numbers. [CO3 L-3] **10**
b) How the Monte Carlo method applied within traffic simulation models? Could you provide a detailed explanation with the support of a relevant case study? [CO2 L-4] **10**

Q.4 Discuss the various techniques employed to generate random variates, particularly focusing on the inverse transform technique and how is it utilized in statistical simulations or modeling? [CO2 L-3] **20**

PART-B

Q.5
a) Discuss queuing pattern classification, and include a diagram to illustrate the different types of queuing patterns? [CO4 L-2] **10**
b) In the morning peak hours, there is incoming traffic to a toll booth as described in the table below. The toll plaza comprises three booths, and each booth can

process an average of one vehicle every 8 seconds. Calculate the maximum queue length and the longest delay experienced by an individual vehicle during this peak period.

Time period	10 min volume
8.00-8.10	300
8.10-8.20	200
8.20-8.30	400
8.30-8.40	350
8.40-8.50	300
8.50-9.00	250

[CO4 L-3] **10**

Q.6 a) How are traffic simulation models applied to analyze dynamic traffic systems and support the design of transportation solutions in the field of traffic simulation modeling and application? [CO5 L-3] **10**

b) Discuss various key components and methodologies involved in developing comprehensive simulation models for midblock and intersections under both homogeneous and mixed traffic conditions. Focus on vehicle arrival models and related considerations. [CO5 L-3] **10**

Q.7 Explain step-by-step process of cellular automata model and provide illustrate examples to demonstrate its functioning. [CO5 L-4] **20**

End Semester Examination, Dec. 2023

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) Give an example (with proof) of a sequence of independent random variables Z1, Z2, . . . with E (Zi) = 0, Var (Zi) = 1 such that √ n(Zn) does not converge in distribution to N(0, 1). [CO-1][L-1] **10**

b) Discuss central limit theorem. [CO-1][L-2] **10**

Q.2 Given a sample of n 100 students from a university with over 50,000 students enrolled. Classify these students as either living on campus, living off campus with their parents, or living off campus independently. Observe the counts (x1,x2,x3)= (34, 44, 22).
Compute the form of the likelihood function for the unknown proportions of students in the population that are in these categories. [CO-1][L-5] **20**

Q.3 a) Explain the unsupervised learning that is used for dimensionality reduction. [CO-2][L-1] **10**

b) Explain in detail method of making decisions about the parameters of a population, based on random sampling. [CO-2][L-2] **10**

Q.4 a) Given a polygon of m sides, count number of triangles and diagonals that can be formed using vertices of polygon. [CO-2][L-4] **10**

b) Prove that if graph G has n≥2vertices such that the sum of the degrees of 2 different vertices is at least n−2, so there are 2 different simple paths ('foreign' to one another) such that the union of both simple paths, builds the original graph (The path can be of length 0 meaning it has only 1 vertex). [CO-3][L-4] **10**

Q.5 Write short notes on the following:

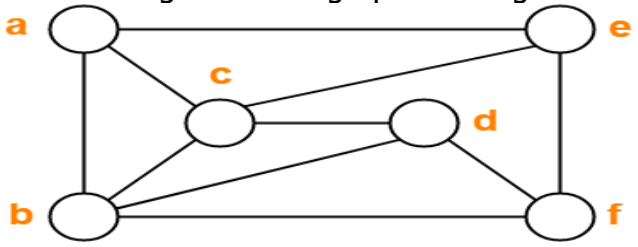
a) Information retrieval.
b) Bioinformatics.
c) Reinforcement learning.
d) Soft computing. [CO-2][L-1] **5×4**

Q.6 a) Differentiate between SRS document and design document. What are the contents we should contain in the SRS document and design document. [CO-1][L-2] **10**

b) Explain operating system functions and services in detail. [CO-1][L-2] **10**

[CO-1][L-2]10

Q.7 a) Write the algorithm for graph coloring. Find chromatic number of the following graph:



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

Q.8 a) Explain in detail recent trends in various distribution functions in Mathematical field of computer science in field of data mining. [CO-3][L-2] **10**

b) Discuss in detail problem of over fitting model assessment. [CO-1][L-2] **10**

End Semester Examination, Dec. 2023

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) How machine learning programming is used to optimize the performance? Explain in detail. [CO-5][L-4] 10

b) Illustrate with an example the importance of confusion matrix. [CO-3] [L-4] 10

Q.2 a) Write short notes on ***(any two):***

a) Principal component analysis.
b) Hidden Markov model.
c) Machine learning packages in R Tool. [CO-3][L-2] **5×2**

b) Define 'regularization'. Why is it useful? [CO-4][L-3] **10**

Q.3 a) How to combat overfitting and underfitting? [CO-4][L-4] **10**

b) Describe Retinal variables with an example. [CO-2][L-2] **10**

Q.4 a) What is a ROC? Explain how ROC curve works. [CO-4][L-5] **10**

b) How data cleaning plays a vital role in the analysis? [CO-5][L-4] **10**

Q.5 a) Differentiate between univariate, bivariate and multivariate analysis. [CO-5][L-3] **10**

b) What are the support vectors in Support Vector Machine (SVM)? [CO-2][L-3] **10**

Q.6 a) Compare different kernels in SVM. [CO-5][L-4] **10**

b) What are Entropy and Information gain in Decision tree algorithm? [CO-5][L-2] 10

Q.7 a) Define logistic regression. Mention an example where you have used logistic regression recently. [CO-1][L-2] **10**

b) Assume the following dataset as given below: {(2,2), (4,4), (5,5), (6,6), (7,7), (9,9), (0,6), (6,0)} Use K-Means with K=3, for a single iteration, What are the new clusters and what are their centroids? [CO-2][L-3] 10

Q.8 a) How will you define the number of clusters in a clustering algorithm? [CO-4][L-4] 10

b) When will you use classification over regression? Explain with help of an example. [CO-3][L-4] 10

End Semester Examination, Dec. 2023

M. Tech. – Third Semester

MOBILE APPLICATIONS AND SERVICES (MCS-321)

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) Describe the Android app development lifecycle, including the steps involved from conceptualization to deployment. Highlight best practices that developers should follow during each stage. [CO1][L2] **10**

b) Define mobile computing and explain its significance in today's digital world. Discuss at least two real-life examples where mobile computing has transformed the way people work and interact. [CO4][L2] **10**

Q.2 a) Describe multichannel and multimodal UIs. Enlist examples of mobile applications that offer users multiple interaction channels. How do these applications enhance the user experience? [CO3][L2] **10**

b) Explain the importance of data storage and retrieval in mobile app development. Discuss at least three common data storage methods used in mobile applications and their respective use cases. [CO-4] [L-2] **10**

Q.3 a) Discuss the challenges and opportunities in designing user interfaces for both VUIs and traditional graphical user interfaces (GUIs) in mobile applications. [CO2][L2] **10**

b) How do you create a custom notification and alarm system for an Android app. Explain the steps? [CO-1] [L-2] **10**

Q.4 a) Describe mobile agents and peer-to-peer architecture in Android multimedia apps. [CO-4] [L-2] **10**

b) What are the key principles of designing an effective user interface (UI) for mobile applications? Discuss at least three design guidelines. [CO3][L2] **10**

Q.5 a) Explain the significance of following agile development methodology in mobile app development. How does an agile approach enhance flexibility and collaboration? [CO-2][L-2] **10**

b) Explain the importance of testing in mobile app development. Describe unit testing, user acceptance testing, and their significance in app quality assurance. [CO-4][L-2] **10**

Q.6 How the recent trends in IoT communication protocols, mobile computing techniques, and agent-based communications can be integrated to create innovative mobile applications that solve real-world problems? Discuss. [CO-5][L-2] **20**

Q.7 a) Explain the process of packaging and deploying an Android app. Describe the key components and steps involved in preparing an app for release to the Google Play Store. [CO1][L2] **10**

b) Explain various text-to-speech (TTS) techniques in mobile applications. How does TTS technology work, and what are its potential applications and benefits? [CO3][L2] **10**

Q.8 a) What are location-based services in mobile application development? [CO-5][L2] **10**

b) How Wireless Communications might affect the development and implementation of the Internet of Things (IoT)? [CO-2][L-3] **10**

End Semester Examination, Dec. 2023

M. Tech. – Third / Fifth Semester

LOW POWER VLSI DESIGN (MEC-353)

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) Discuss various sources of power dissipation in CMOS circuit. [CO-1][L-2] **10**

b) What is scaling? Explain its different types in details. [CO-1][L-2] **10**

Q.2 a) What are the different strategies of reducing the power dissipation related to clock distribution in VLSI circuit? Explain in detail. [CO-3][L-2] **10**

b) Discuss flow graph transformation in detail. [CO-1][L-2] **10**

Q.3 Discuss the power reduction strategies for SRAM and DRAM cells. [CO-4][L-2] **20**

Q.4 a) A 32 bit off-chip bus operating at 5Y and 66MHz clock rate is driving a capacitance of 25pF/bit. Each bit is estimated to have a toggling probability of 0.25 at each clock cycle. Calculate the power dissipation in operating the bus. [CO-2][L-3] **10**

b) Classify and explain the probabilistic power analysis techniques in detail. [CO-2][L-4] **10**

Q.5 a) What is a signal entropy? Discuss how power can be estimated using entropy? [CO-3][L-2] **10**

b) Describe Adiabatic computation. [CO-3][L-2] **10**

[CO-3] [L-1] 7

Q.6 a) Discuss different approaches for achieving low power microprocessor design system. [CO-4][L-2] **10**

b) What do you understand by Precomputation logic? [CO-4][L-1] **10**

Q.7 a) What do you understand by Monte Carlo simulation? [CO-3][L-1] **10**

b) Explain how threshold voltage affects the power performance of VLSI circuit? [CO-2][L-2] **10**

Q.8 Write short notes on:

a) Power consumption in flip flop and latches. [CO-4][L-2] **10**

b) Process variation and its impact. [CO-1][L-2] **10**

End Semester Examination, Dec. 2023

M. Tech. – Third Semester

PNEUMATIC AND HYDRAULIC CONTROL (MEEIR-356)

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) Explain the components of a pneumatic system and their roles. How do pneumatic systems differ from hydraulic systems in terms of working fluid? [CO-1][L-1] **10**

b) Enumerate the safety considerations for working with hydraulic and pneumatic systems. [CO-1][L-2] **10**

Q.2 a) Explain the fundamental principles involved in designing a fluid power system. [CO-2][L-3] **10**

b) Discuss the trade-offs between speed and torque in hydraulic motors with their related applications. [CO-2][L-2] **10**

Q.3 a) Explain the key considerations in selecting an appropriate linear actuator for a specific application. [CO-2][L-2] **10**

b) Explain the benefits of integrating electronic control with hydraulic components [CO-2][L-2] **5**

c) Compare and contrast fixed displacement pumps with variable displacement pumps, discussing their advantages and limitations. [CO-2][L-3] **5**

Q.4 Compare the working principle following types of cylinders:
a) Single Acting Cylinder, b) Double Acting Cylinder and Cylinder Cushioning. [CO-3][L-2] **20**

Q.5 Explain the operation of Single-Acting Pneumatic Actuators, their advantages, and typical applications. [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) Describe the principles of flow control valves in pneumatic systems and their role in speed control. [CO-3][L-1] **10**

b) Explain Regenerative Circuit with application of drill machine. [CO-5][L-3] **10**

Q.8 a) Explain the operation of single-acting pneumatic actuators, their advantages, and typical applications. Provide real-world examples of scenarios where single-acting pneumatic actuators are used. [CO-4][L-4] **10**

b) Explain working of simple Pneumatic Control Memory Valves. [CO-5][L-4] **10**

End Semester Examination, Dec. 2023

M. Tech. – Third Semester

HUMAN RESOURCE MANAGEMENT (M-HM-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 Attempt ***any four*** of the following:

a) Recall the competencies of HR managers. [CO-1][L-1]
b) Discuss the concept of job analysis. [CO-1][L-2]
c) List the objectives of induction. [CO-4][L-1]
d) Discuss the benefits of training. [CO-1][L-2]
e) Outline the objectives of performance management system. [CO-5][L-1]
f) Discuss VRS as a separation process. [CO-5][L-2] **4×5**

PART-A

Q.2 Comprehend the challenges of HRM. [CO-5][L-4] **20**

Q.3 Illustrate the process of human resource planning. [CO-2][L-3] **20**

Q.4 Recall the sources of recruitment with its importance in the organization. [CO-5][L-1] **20**

PART-B

Q.5 Discuss the process of designing a training program. [CO-5][L-2] **20**

Q.6 How would you design and determine a compensation structure? [CO-6][L-6] **20**

Q.7 Discuss the following:

a) Turnover. (b) Layoff. [CO-5][L-2] **20**

End Semester Examination, Dec. 2023

M. Tech. – Fifth Semester

INDUSTRIAL SAFETY (M-ID-002)

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 dangers associated with electricity. [CO-1][L-2]
b) Write short note on FDS. [CO-2][L-2]
c) Describes various types of corrosion. [CO-3][L-1]
d) Discuss various types of maintenance management. [CO-2][L-3] **5×4**

Q.2 Evaluate the potential risks and consequences of electrical failures in an industrial environment.How can a systematic risk assessment be conducted to mitigate these risks effectively? [CO-1][L-3] **20**

Q.3 In a given industrial facility, outline the specific steps that should be taken to prevent fires,including the use of fire extinguishers, emergency evacuation procedures, and employee training programs. [CO-2][L-4] **20**

Q.4 What do you understand by globally harmonized system hazchem safety. Explain it with pictorial diagram of GHS. [CO-3][L-2] **20**

Q.5 Explain hazards associated with semiconductor fabrication. [CO-4][L-2] **20**

Q.6 Evaluate the role of maintenance management in economic growth of industry. [CO-5][L-2] **20**

Q.7 Assess the economic implications of a major industrial accident. How would the direct andindirect costs impact the affected industry and potentially influence the overall economic performance of the country? [CO-1,2,3,4,5][L-4] **20**

End Semester Examination, Dec. 2023

M. Tech. – Third Semester

OPERATION RESEARCH (M-ID-003)

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

No. of pages: 2

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

Q.1 Answer the following in brief:

a) Discuss unique optimum in operation research. [CO-1][L-2]

b) Summarize "critical path" in network planning. [CO-2][L-2]

c) Distinguish between "linear programming" and "non-linear programming". [CO-2][L-2]

d) Briefly discuss "Elementary Graph Theory". [CO-1][L-2]

e) List the various disadvantages of Graphical Method for solving the linear programming problems. [CO-4][L-2]

f) With neat sketch explain the pessimistic time in competition of an event in PERT. [CO-2][L-1]

g) Differentiate between "Probabilistic" and "deterministic" inventory control models. [CO-1][L-2]

h) Interpret the necessity of game theory in business decisions. [CO-4][L-2]

i) List the reasons for Sensitivity Analysis. [CO-3][L-2]

j) Point out the various limitations of Simulation Method. [CO-4][L-2] **2×10**

PART-A

Q.2 Summarize the following statements in brief:

a) Operation research plays an important role in decision making. [CO-2][L-2] **12**

b) Cost involved in inventory. [CO-1][L-2] **8**

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

Maximize $z = -2x_1 - 3x_2$

$$x_1 + x_2 \geq 2$$
$$2x_1 + x_2 \leq 10$$
$$x_1 + x_2 \geq 8$$

Subject to the constraints: $x_1 \geq 0; x_2 \geq 0$ [CO-2,3][L-2]

20

Q.4 on 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
6-7	8

a) Draw the network diagram and find out the critical path

P. T. O.

b) Calculate the Total, Free, Independent and Interference floats. [CO-2,4][L-2] **20**

PART-B

Q.5 A book store wishes to carry a particular book in stock. The demand of the book certain and there is a lead time of 2 days for stock replenishment. The probabilities of demand are given below:

Demand units /day	0	1	2	3	4
Probability	0.05	0.10	0.30	0.45	0.10

Each time an order is placed the placed the store incurs an ordering cost of Rs 10 per order. The store also in a carry cost of Rs 0.5 per book per day. The inventory carrying cost is calculated on the basis of at the end of each day. The manager of the book store wishes to compare to options for his inventory decision.

a) Order 5 books when the present inventory plus any outstanding order falls below 8 books.
b) Order 8 books when the present inventory plus any outstanding order falls below 8 books.

Current (beginning of ist day) the store has a stock of 8 books ordered two days and are expected to arrive the next day. Carryout simulations run for 10 days to recommend an appropriate option. You may use random number in the sequences, using the first day one.

89, 34, 78, 63, 61, 81, 39, 16, 13, 73. [CO-2,4][L-4]

20

Q.6 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	8	6.	4	6	3	1
Knurling	13	14	9	12	8	13

Determine the order in which the jobs should be processed in order to minimize the total time required to perform all the jobs. Also find the minimum elapsed time.

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

20

Q.7 The following table gives a list of various activities and their immediate predecessors involved in installation of CAT scanner in hospital:

Activity	Description	Immediate Predecessor	Estimated Duration (days)
A	Finalization of the layout plans	-----	2
B	Demolition of structure	A	6
C	Walls Erection	B	12
D	Flooring	B	8
E	Electrical wiring	C	6
F	Air-conditioning ducting	C	4
G	Fire alarm installation	C	3
H	False ceiling and light fittings	E,F,G	10
I	Wall plastering and painting	H	9
J	Equipment installing	D,I	6
K	Calibration and testing	J	3
L	Final finishing	K	2
M	Handling over	L	1

a) Prepare a network diagram for the project.
b) Find the total time requirement to install CAT scanner. [CO-3,4][L-4]

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End Semester Examination, Dec. 2023

M. Tech.–Third Semester

COST MANAGEMENT OF ENGINEERING PROJECTS (M-ID-004)

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) Interpret the strategic cost management process in brief. [CO-2][L-2] **10**
b) Distinguish between incremental cost and opportunity cost. [CO-2][L-4] **10**

Q.2 Explain the term project. Also, explain the various types of projects in detail. [CO-1][L2-] **20**

Q.3 a) Outline the importance of managing a project. [CO-4][L-4] **10**
b) Outline the importance of data driven decision making in project. [CO-4][L-4] **10**

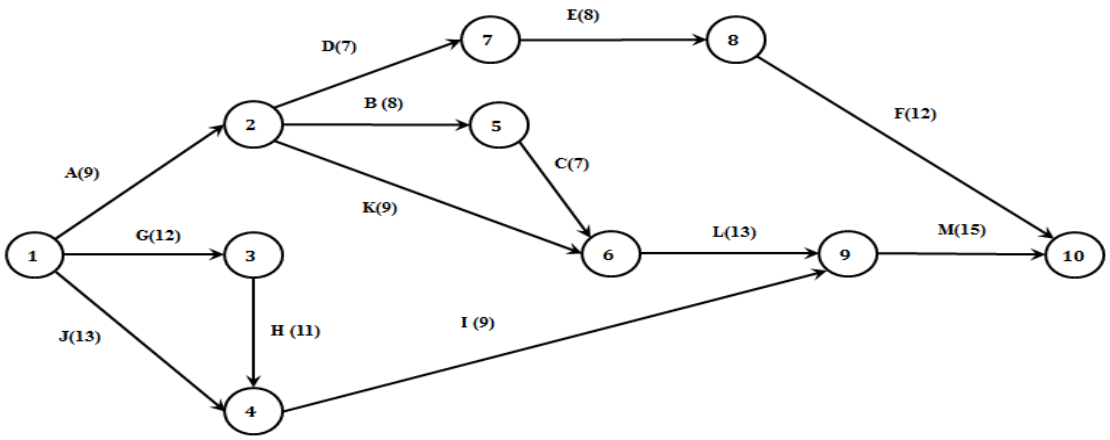
Q.4 Summarize the importance of each member in project commissioning based on performed activities. [CO-3][L-2] **20**

Q.5 Demonstrate the role of bar charts and network diagram in project planning and execution with neat sketch. [CO-3][L-4] **20**

Q.6 Appraise the process of material requirement planning and its role in project management. [CO-1][L-5] **20**

Q.7 Summarize the concept of activity-based cost management in brief. [CO-2][L-3] **20**

Q.8 A Find out the critical path and total float of project work on machining. The details regarding interdependency of activity and time taken are illustrated below:



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

End Semester Examination, Dec. 2023

M. Tech. – Third/Fifth Semester

WASTE TO ENERGY (M-ID-006)

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) Draw a hierarchy of municipal solid waste management. Explain the principle of solid waste management. [CO-1][L-1] **10**

b) How does incineration help in the management of solid waste? Describe the incineration technologies and air emissions and its control in detail. [CO-1][L-2] **10**

Q.2 a) Explain the process of pyrolysis. Comparison between slow and fast pyrolysis methods. [CO-2][L-2] **10**

b) Explain the earth kiln and metal kiln type of charcoal production processes. [CO-2][L-2] **10**

Q.3 a) Explain the design, construction and operation of fluidized bed gasifier. [CO3][L3] **10**

b) Discuss the following:

i) Equilibrium.

ii) Kinetic consideration of gasifier in detail. [CO-3][L-2] **5×2**

Q.4 a) Compare the following combustors with respect to operational and constructional features.

i) Fixed bed ii) Inclined grate iii) Fluidized bed [CO-2][L-3] **10**

b) Differentiate between biomass and biogas. [CO-2][L-3] **10**

Q.5 a) Explain the disposal methods of e-wastes. [CO-5][L-2] **10**

b) Estimate the moisture content and density of a solid waste sample with the following composition based on 100kg sample.

Component	% by mass in %	Moisture content in %	Typical Density kg/m3
Food waste	20	70	290
Paper	40	6	85
Cardboard	5	5	50
Plastics	15	2	65
Garden trimmings	5	60	105
Wood	10	20	240
Tin cans	5	3	90

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

Q.6 a) Explain bio-diesel production in detail. [CO-3][L-2] **10**

b) 15 Kg biomass was kept in oven for drying. After drying its weight was found as 12.5 Kg. The dried biomass (after grinding) was kept in muffle furnace for volatile matter removal, after volatile matter removal biomass weight was observed as 7.5 Kg. Finally it was again kept in muffle furnace for conversion in Ash. Ash was found as 1.2 Kg. Now calculate % age of moisture content (wet basis and dry basis), % age of volatile matter, % age of Ash and % age of fixed carbon. [CO-5][L-4] **10**

Q.7 a) Explain waste to energy process of anaerobic digestion. [CO-3][L-3] **10**

b) Explain design, constructional features of biogas plant technology. [CO-3][L-3] **10**

Q.8 a) What are government initiatives for promoting biogas and waste management? [CO-4][L-1] **10**

b) Write short notes on:

i) Liquefaction.

ii) Biomass energy programme. [CO-4][L-1] **5×2**

End Semester Examination, Dec. 2023

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 Define AshtangYog? How it helps to cultivate mental clarity, mindful breathing, physical strength and endurance. [CO1][L3] **10**

PART-A

Q.2 Name the types of Niyama's and explain each in brief. [CO-1][L-1] **10**

Q.3 What do you understand by the term Yama? How does the yama's help a common man to behave in the society? [CO-1][L-1] **10**

Q.4 What are the four sources of energy? How it helps an individual to sustain? [CO-1][L-1] **10**

PART-B

Q.5 What is alternate nostril breathing pranayama and bhramari pranayama? Elaborate in detail and how they enhance and strengthen the body immunity? [CO-1][L-3] **10**

Q.6 Which limb of Ashtang yog is aasana? Describe any two types of asana with their benefits. [CO-1][L-3] **10**

Q.7 "Yoga Chitta Vritti Nirodha" what do you understand by this sutra of Patanjali. How it helps the modulations of the mind? [CO-2][L-3] **10**

End Semester Examination, Dec. 2023

M. Tech. – First Semester

DISASTER MANAGEMENT (M-MC-003)

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 Answer the following in brief:

a) Discuss the immediate consequences of a natural disaster. [CO1][L-1]

b) List the landslide-prone areas in the Himalayan region of India. [CO3][L-1]

c) How can disaster preparedness efforts help lessen the repercussions of future events? [CO2][L-2]

d) How do you identify and prioritize risks in a risk assessment? [CO5][L-2]

e) Explain the concept of deforestation and its effects on terrestrial ecosystems. [CO3][L-2]

f) Discuss the steps involved in disaster risk assessment. [CO3][L-2]

g) Differentiate between structural and non-structural measures. [CO6][L-1]

h) How do urban planning and building codes contribute to disaster mitigation in cities? [CO6][L-2]

i) Which states India are at high risk for floods and droughts? [CO4][L-2]

j) Explain the significance of disaster resilience in minimizing repercussions. [CO3][L-2] **1×10**

PART-A

Q.2 How do natural disasters affect ecosystems and the environment, and what are the long-term ecological consequences of these events? [CO1][L-2] **10**

Q.3 Explain various key factors that contribute to industrial accidents, and how can a proactive safety culture be fostered within organizations to minimize these risks? [CO2][L-2] **10**

Q.4 How does the disruption of healthcare infrastructure during and after a disaster impact the management of diseases and epidemics? [CO3][L-3] **10**

PART-B

Q.5 Explain the role of advanced technology in enhancing early warning systems, real-time monitoring, and overall disaster management effectiveness, and how can these innovations be integrated into existing disaster preparedness strategies? [CO4][L-3] **10**

Q.6 How does a risk assessment help in developing effective disaster preparedness and mitigation strategies? [CO5][L-3] **10**

Q.7 How do non-structural mitigation measures consider the socioeconomic and cultural aspects of communities to effectively reduce vulnerability and enhance adaptive capacity during disasters? [CO6][L-3] **10**

End Semester Examination, Dec. 2023

M. Tech (ALL BRANCHES) - First Semester

RESEARCH METHODOLOGY AND IPR (M-MC-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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) Explain the objective of doing research. [CO-1][L-2]

b) Give the name of any four states that fall under the territorial jurisdiction of Mumbai in context of filing patents. [CO-6][L-2]

c) Briefly explain the importance of ethics in research? [CO-3][L-2]

d) Why are patents necessary? [CO-5][L-3]

e) Write difference between 'research methods and methodology'. [CO-2][L-2] **2×5**

PART-A

Q.2 a) Discuss the different types of research. [CO-1][L-2] **5**

b) Describe research process in flow chart. [CO-1][L-2] **5**

Q.3 Explain the Iceberg's principle and its relation with research. [CO-2][L-2] **10**

Q.4 a) Describe the role of any two stakeholders of research. [CO-3][L-2] **5**

b) What do you mean by research report? Explain its characteristics. [CO-3][L-2] **5**

PART-B

Q.5 Discuss the importance of intellectual property rights. Why do we need to promote and protect the intellectual property rights? [CO-4][L-5] **10**

Q.6 You are working on a patent and are ready to file your application prepare a list of documents to be submitted along with your application. [CO-5][L-4] **10**

Q.7 a) Discuss a case of any Geographical Indication in Indian context and the efforts made by local agency to ensure genuine supply of that product. [CO6][L-3] **5**

b) Write short notes on:

i) IPR of biological systems.

ii) Administration of patent system. [CO-6][L-2] **5**

End Semester Examination, Dec. 2023

M. Tech. – Third Semester

RELIABILITY ENGINEERING (MME-324)

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) Give an example of a reliable system.
b) When is reliability of system as nearly one?
c) List the various causes of failure.
d) Evaluate the lognormal distribution for standard deviation of 0.5.
e) Differentiate between Weibell and Exponential Distribution.
f) What is the Cut Set and Tie Set method?
g) Illustrate the failure model for stress and strength.
h) Mention the factors involved in designing a redundancy system.
i) Justify the purpose of life testing.
j) Differentiate between the vaiours errors observed while sampling.

(MME-324.1, MME-324.2, MME-324.3, MME-324.4, MME-324.5, MME-324.6.) **2×10**

PART-A

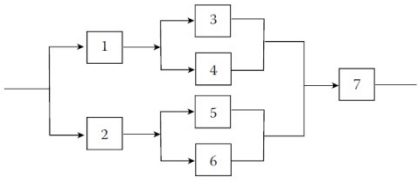
Q.2 A lot containing 150 newly designed insulators for a motor needed to be life tested but instead a sample of 10 small motors with a newly designed insulator have been taken for life testing with no replacement of failed insulators. Data for their failures is shown in the data below:

Insulator No.	1	2	3	4	5	6	7	8	9	10
Failure at (hours)	400	450	500	600	650	700	800	850	950	1050

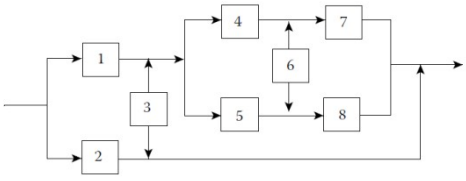
The test is to be conducted when 8th motor fails and the total time for test is given to be of 1500 hours.

a) Identify the type of reliability test being conducted and explain in detail. **10**
b) Calculate MTTF. **4**
c) Failure Rate or Hazard rate. **4**
d) Number of insulators used for testing. (CO-5, 6: L5, L6) **2**

Q.3 Select the system A or B, most appropriate and reliable having the combination of the following components and justify, why?



A



B

Justify the reason for opting mort appropriate and reliable combination of following components.

If the reliability of components for both systems is as follows:

R1= 0.1, R2=0.15, R3= 0.25, R4= 0.4, R5= 0.45, R6= 0.8 and R7 = 0.7.

(CO-1,2: L6) **20**

Q.4 a) Illustrate various ways for improving the reliability of a system. (CO-2: L2) **10**

P. T. O.

b) Design the failure curve, along with the factors that affect the failures at various periods of the product life. (CO-3: L3) **10**

PART-B

Q.5 a) Discuss the working of K-out of-M systems with its applications. (CO-2: L2) **10**
b) Illustrate Multi state Models and explain the Markov model. (CO-4: L2) **10**

Q.6 a) Differentiate between Parallel Systems and Stand by systems. Elaborate the various types of standby systems with examples. (CO-3: L3) **10**
b) Identify the failure models. Explain any one failure model with an example. (CO-5: L3) **10**

Q.7 a) Summarize the concept and implementation of FMEA. Support your answer by highlighting its various types. (CO-6: L4) **10**
b) Elaborate:
i) Accelerated life testing and its loading methods.
ii) Step-stress method. (CO-5: L4) **5×2**

End Semester Examination, Dec. 2023

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 briefly:

a) Define 'endosymbiosis'. [CO-1][L-1]

b) List the function(s) of ER. [CO-2][L-2]

c) Can the terms DNA, Chromosome and Genome be synonymously used? Justify. [CO-3][L-2]

d) What is a replisome? [CO-2][L-1]

e) How is a tRNA charged? [CO-4][L-2]

f) List the functions of DNA Pol-I. [CO-3][L-2]

g) Name the various post translational modifications of proteins. [CO-5][L-2]

h) Define Wobble hypothesis. [CO-5][L-1]

i) What is the principle of Sanger sequencing? [CO-6][L-2]

j) What is a cDNA library? [CO-6][L-2] **2×10**

PART-A

Q.2 Describe the structure and function of membrane bound organelles in a eukaryotic cell and explain the composition of the plasma membrane. [CO-1][L-2] **20**

Q.3 Classify cellular signaling receptors. Explain how signals are transferred across the cell membrane using an example. [CO-2][L-2] **20**

Q.4 a) Discuss the mechanism(s) involved in the repair of UV induced DNA damage. [CO-2] [L-6] **10**

b) Compare homologous and non-homologous recombination. [CO-2][L-2] **10**

PART-B

Q.5 Explain using a well labelled diagram(s) transcription in prokaryotes. [CO-4][L-2] **20**

Q.6 Compartmentalization in eukaryotes paved way for regulated synthesis of macromolecules and decoupling of transcription and translation. Justify with valid reasons?" [CO-5][L-3] **20**

Q.7 The journey of a gene to form a functional protein product goes through a series of steps. From your understanding of the course, explain the steps where genes can be regulated. [CO-6][L-4] **20**

End Semester Examination, Dec. 2023

M. Sc. (Biotechnology) - 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 in brief:

a) What is the importance of Bergeys manual in bacterial classification? [CO1][L2]

b) In Gram negative bacteria how do small molecules move into the periplasm from the outside of the cell? [CO2][L3]

c) Why do we use peptone, yeast extract and beef extract in a complex media? [CO2][L2]

d) Differentiate between an antiseptic and a disinfectant. [CO4][L3]

e) What is the difference between F^+ X F^- and Hfr X F^-. [CO5][L3]

f) How air can be sterilized? [CO6][L2]

g) What is the difference crystal violet and nigrosine dye? [CO2][L3]

h) How selective medium is different from differential medium? Give an example of each. [CO1][L4] **2½×8**

PART-A

Q.2 a) "Microorganisms are much more than just agents of disease". Justify the statement. [CO1][L2] **8**

b) Discuss the experiments carried out by the opponents and proponents of theory of spontaneous generation. [CO1][L2] **12**

Q.3 a) Define 'synchronous culture' and explain how it can be obtained. [CO2][L2] **12**

b) A bacteria having generation time of 10 minutes fill a vessel completely in 3 hrs. How much time will it take to fill half of the vessel? [CO3][L3] **8**

Q.4 a) Give a brief account of various inclusion bodies present in a bacterial cell. [CO2][L2] **10**

b) How peptidoglycan is synthesized? How do antibiotics target peptidoglycan synthesis? [CO3][L3] **10**

PART-B

Q.5 Describe the following mechanisms of genetic recombination in bacteria:

a) Generalized and specialized transduction.

b) High frequency recombination (Hfr) conjugation. [CO5][L3] **10×2**

Q.6 a) Explain the process of fractional sterilization. [CO6][L3] **8**

b) What method of sterilization would be appropriate for each of the following. Give reason.

Nutrient broth
Laminar air flow chamber
Oil
Inoculating loop
Antibiotics
Glass pipettes and Petri plates. [CO6][L3] **12**

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. 2023

M. Sc. (Biotechnology) – First Semester

BIOMOLECULES (MS-BT-103)

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 Explain the principles of thermodynamics and discuss their relevance in biological systems. [CO-1][L-2] **20**

Q.2 Illustrate the secondary structure of a protein. How are proteins purified, evaluate the criteria of homogeneity of proteins. [CO-1][L-2] **20**

Q.3 Summarize the types, structural features and biological roles of polysaccharides with examples. [CO-2][L-5] **20**

Q.4 What are hormones? Discuss their types, mechanism of action and physiological effects. [CO-3][L-6] **20**

Q.5 Differentiate between macronutrients and micronutrients. Appraise their role in physiology and metabolism with examples. [CO-4][L-4] **20**

Q.6 Demonstrate the mechanism of enzyme action. How is the rate of enzymatic reaction determined? [CO-4][L-3] **20**

Q.7 Discuss the stoichiometry of glycolysis while illustrating its reactions. [CO-5][L-3] **20**

Q.8 Analyze the role of various body fluids in maintaining homeostasis. [CO-6][L-4] **20**

End Semester Examination, Dec. 2023

M. Sc. (Biotechnology) – First Semester

BIOANALYTICAL TECHNIQUES (MS-BT-104)

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 Explain the optical path of a compound microscope. Describe the Rayleigh criterion for resolution. [CO-1][L-2] **20**

Q.2 Illustrate the ray diagram of a fluorescence microscope. Explain the phenomena of fluorescence. [CO-1][L-2] **20**

Q.3 Broadly classify the centrifuges on the basis of rotors. Discuss their features and applications. [CO-2][L-5] **20**

Q.4 Appraise the advantages of column chromatography over planar chromatography. Describe the theoretical plate model of column chromatography. [CO-3][L-5] **20**

Q.5 Analyze the factors affecting resolution in chromatography. Explain the method of performing paper chromatography. [CO-4][L-4] **20**

Q.6 Demonstrate the process of agarose gel electrophoresis and give its applications. [CO-4][L-3] **20**

Q.7 Illustrate the instrumentation of Nuclear magnetic resonance spectroscopy and explain its principle. [CO-5][L-2] **20**

Q.8 Elaborate any one method of radioactivity detection and measurement. Enumerate the hazards caused by radioactive waste. [CO-6][L-3] **20**

End Semester Examination, Dec. 2023

M. Sc. (Microbiology/Biotechnology) – 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. Probability Distribution table Booklet will be provided.*

Q.1 Answer the following:

a) Differentiate between qualitative and quantitative variable. [CO1][L3]

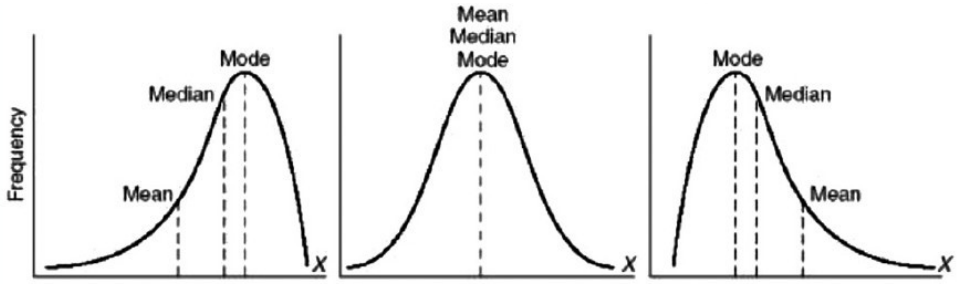
b) What is a sampling distribution? [CO4][L2]

c) What is the difference between Skewness and kurtosis? [CO1][L3]

d) How is mean related to mode? With an example. [CO1][L2]

e) Derive a relationship between Arithmetic mean and Geometric mean. [CO1][L4]

f) Categorize the populations A, B and C on the basis of their skewness: [CO2][L4]



g) When sampling is done from a normally distributed population, the mean of sample means equals _____ and variance of the sample means equals_____. [CO1][L5]

h) For the following observations calculate the Interquartile range.
Sample = {15, 12, 13, 20, 30, 42, 17, 25, 40} [CO1][L4]

i) Can mean and variance be categorized as moments? Elaborate with proof. [CO1][L5]

j) Give two examples of events which do not give mutually exclusive outcomes? [CO2][L2] **2×10**

PART-A

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

7	10	12	4	8	7	3	8	5
12	11	3	8	1	1	13	10	4
4	5	5	8	7	7	3	2	3
8	13	1	7	17	3	4	5	5
3	1	17	10	4	7	7	11	8

[CO2][L4] **20**

Q.3 For the following set of observations, calculate the 1st, 2nd and 3rd quartile along with the interquartile range.

30	55	27	45	56	48	45	49	32	57	47	56
37	55	52	34	54	42	32	59	35	46	24	57
32	26	40	28	53	54	29	42	42	54	53	59
39	56	59	58	49	53	30	53	21	34	28	50
52	57	43	46	54	31	22	31	24	24	57	29

[CO3][L5] **20**

Q.4 The following table shows 1000 nursing school applicants classified according to scores made ona college entrance examination and the quality of the high school from which they graduated, asrated by a group of educators:

	Quality of High Schools			
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:

[CO4] [L6] **20**

PART-B

Q.5 a) Results from the 2009–2010 National Health and Nutrition Examination Survey (NHANES), show that 35.7 percent of U.S. adults aged 20 and over are obese (obese as defined with BMI $\geq 30^{0}.0$). We designate this population proportion as p = 0.357. If we randomly select 150 individuals from this population, what is the probability that $\leq .40$ in the sample who are obese? [CO4] [L5] **10**

b) Consider the following for a certain type of client's home visit by a public health nurse, where average= μ and standard deviation= σ.
Suppose for client -1 μ =45 mins, and σ =15 min and for client-2 μ =30 ins, and σ =20 min.
If a nurse randomly visits 35 "client-1" types ad 40 "client-2" types. What is the probability that the difference between the two 'groups' average (μ) will be $\geq$ 20 mins? [CO4] [L5] **10**

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 andan independent random sample of 500 patients without symptoms of the disease. The twosamples were drawn from populations of subjects who were 65 years of age or older. Theresults are as follows:

	Alzheimer's Diagnosis?		
Test Result	Yes (*D*)	No ($\overline{D}$)	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
2	142
3	72
4	39
5	20
6	6
7	9
8	2
9	1

[CO4] [L6] **20**

Normal Distribution

1.

z	−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	.0068	.0069	.0071	.0073	.0075	.0078	.0080	.0082	−2.40
−2.30	.0084	.0087	.0089	.0091	.0094	.0096	.0099	.0102	.0104	.0107	−2.30
−2.20	.0110	.0113	.0116	.0119	.0122	.0125	.0129	.0132	.0136	.0139	−2.20
−2.10	.0143	.0146	.0150	.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	.0329	.0336	.0344	.0351	.0359	−1.80
−1.70	.0367	.0375	.0384	.0392	.0401	.0409	.0418	.0427	.0436	.0446	−1.70
−1.60	.0455	.0465	.0475	.0485	.0495	.0505	.0516	.0526	.0537	.0548	−1.60
−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

2.

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	z
0.00	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359	0.00
0.10	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753	0.10
0.20	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141	0.20
0.30	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517	0.30
0.40	.6554	.6591	.6628	.6664	.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	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	3.60
3.70	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	3.70
3.80	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	3.80

End Semester Examination, Dec. 2023

M. Sc. (Biotechnology) – 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**. Attempt at least **ONE** question from each **UNIT**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) What will happen if sucrose is not added to the plant tissue culture medium? [CO-1][L-4]

b) Mention the disadvantages associated with callus. [CO-1][L-2]

c) Distinguish between heterokaryon and hybrid. [CO-1][L-3]

d) Identify the extra-chromosomal genes in a plant cell. [CO-1][L-3]

e) How is hairy root culture obtained? [CO-1][L-2]

f) Define the role of phenolics in Agrobacterium infection. [CO-1][L-1]

g) Name any two viruses that can be used as vectors for plant transformation. [CO-1][L-1]

h) What are genetic markers? [CO-1][L-1]

i) Is Golden rice a transgenic? How? [CO-3][L-2]

j) What are Restriction endonucleases? [CO-1][L-1] **2×10**

UNIT-I

Q.2 a) Analyze the merits of pollen culture and describe the process. [CO-1][L-4] **10**

b) Describe the composition of plant tissue culture medium (MS) and evaluate the importance of each component. [CO-1] [L-5] **10**

Q.3 a) How can you test the viability of somatic hybrids? Explain the methods of protoplast isolation from plant tissue. [CO-2][L-3] **10**

b) Classify various types of plant germplasms and elaborate any one ex-situ method of plant germplasm conservation. [CO-2][L-5] **10**

UNIT-II

Q.4 a) Analyze the essential features of *Agrobacterium tumefaciens* that make it a suitable vector for transgene transfer in plants. [CO-3][L-4] **10**

b) Explain particle bombardment method of direct gene transfer in plants. [CO-3][L-2] **10**

Q.5 a) How are binary vectors advantageous? Describe the components of Binary Ti plasmid vector system. [CO-4][L-3] **10**

b) What are opines? How they are produced and what will be the impact if they are not produced? [CO-4][L-2] **10**

UNIT-III

Q.6 a) Appraise any two plant transformation strategies to overcome abiotic stress. [CO-6][L-4] **10**

b) Elaborate the mechanism of stress resistance in transgenic Bt cotton, and state its merits and demerits. [CO-3][L-2] **10**

Q.7 Discuss the molecular basis of RAPD polymorphism and mention the advantages, limitations and applications of the technique. [CO-5][L-6] **20**

End Semester Examination, Dec. 2023

M. Sc. (Biotechnology) – 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**. Marks are indicated against each question.*

Q.1 Answer briefly:

a) What is the objective of environmentally sustainable waste management system? [CO-5][L-1]

b) List the environmental impact of improper waste disposal on land. [CO-1][L-1]

c) List the sources contributing to commercial waste water. [CO-1][L-1]

d) Define Lagoons and analyze their role in waste water treatment. [CO-1][L-2]

e) Name Hot Spots of Biodiversity. [CO-5][L-1]

f) Define Biopiracy. [CO-6][L-1]

g) Differentiate between Green business and Green design. [CO-4][L-3]

h) What is microbial metal resistance? [CO-4][L-1]

i) Comment on the limitations of phytoremediation. [CO-5][L-1]

j) Analyze the oligodynamic effect of metals. [CO-3][L-2] **2×10**

PART-A

Q.2 a) What are the main water quality parameters? Why is it important to test water quality? [CO-1][L-2] **15**

b) Describe the process and operation of a trickling filter bioreactor. [CO-1][L-2] **5**

Q.3 a) Describe the concepts and principles of bioremediation using microbes. Evaluate its constraints. [CO-3][L-5] **10**

b) Explain the in situ technologies for Bioremediation. [CO-3][L-2] **10**

Q.4 What are bioreactors? Describe the different methods used for tertiary waste water treatment. [CO-1][L-2] **20**

PART-B

Q.5 a) What are hyper accumulators? Analyse their role in Phytoremediation. [CO-5][L-4] **10**

b) What are protected areas? Differentiate between in situ and ex situ conservation of Biodiversity. [CO-4][L-2] **10**

Q.6 a) What is the importance of biodiversity and how it can be conserved? [CO-6][L-2] **10**

b) Convention of Biodiversity promotes nature's well-being. Justify the statement. [CO-3][L-5] **10**

Q.7 a) Describe the concept and principles of Sustainable Development. [CO-5][L-2] **10**

b) Discuss in detail the concept of bioprospecting and biopiracy. [CO-5][L-1] **10**

End Semester Examination, Dec. 2023

M. Sc. – 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**. Marks are indicated against each question.*

Q.1 Answer the following briefly:

a) What is the difference between probiotics and prebiotics? [CO-6][L-2]

b) Why is the use of genetically modified food an issue? [CO-6][L-2]

c) What would be two reasons for you to recommend Single Cell Protein (SCP) as an alternate food source? [CO-4][L-5]

d) List the types of reactions that are catalyzed by the seven IUBMB classes of enzymes. [CO-6][L-1]

e) What is the limitation of the lock and key model of enzyme-substrate complex formation? [CO-6][L-1]

f) How do enzymes increase rate of a reaction? [CO-6][L-2]

g) Explain the principle behind salting-in and salting-out of proteins. [CO-2][L-2]

h) Why is dough rheology important in the process of baking? [CO-4][L-3]

i) Why is catalase used in combination with glucose oxidase in food processing? [CO-3][L-2]

j) What are the major steps in the conversion of starch into syrup? [CO-3][L-1] **2×10**

PART-A

Q.2 a) How do different parameters of food affect microbial growth? [CO-1][L-2] **10**

b) You sample a food item and test it using a standard plate count method for spoilage. After incubating your plate at optimum conditions, no colonies appear. Provide your inference from this observation. [CO-2][L-4] **10**

Q.3 a) Suggest two methods of milk processing to make it suitable for consumption by a lactose intolerant person. [CO-3][L-6] **10**

b) What are various reasons for food spoilage? [CO-5][L-2] **10**

Q.4 How is the phenomenon of fermentation utilized in food industry? [CO-5][L-3] **20**

PART-B

Q.5 a) Compare the competitive, non-competitive and uncompetitive types of enzyme inhibitions. [CO-3][L-2] **10**

b) Suggest a method for removing high salt from your enzyme preparation and describe it. [CO-2][L-3] **10**

Q.6 a) Why does the plot of substrate concentration versus rate of reaction of an enzyme that follows Michaelis-Menten equation, looks like a hyperbola? [CO-2][L-4] **10**

b) An enzyme with a K_m value of 0.04 mmol/L hydrolyzed its substrate [S] of concentration 0.02 mmol/L. The initial velocity observed was 0.0015 mmol/L.min^{-1}. Calculate the maximum velocity, V_{max} for this enzyme. [CO-2][L-3] **10**

Q.7 a) How are the enzymes, proteases, asparaginase and glucose oxidase useful in food industry? [CO-4][L-2] **10**

b) Name four enzymes used in food industry and describe their usage. [CO-4][L-2] **10**

End Semester Examination, Dec. 2023

M. Sc. (Biotechnology) – Third Semester

ANIMAL BIOTECHNOLOGY (MS-BT-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 briefly:

a) Explain the significance of sub culturing. [CO-1][L-2]
b) Define 'ITS cells'. [CO-2][L-1]
c) Differentiate between electro-spinning and freeze-drying techniques in scaffold synthesis with the diagram. [CO-4][L-2]
d) List out the scope of animal cell culture technology. [CO-1][L-1]
e) What do you mean by explant in animal tissue culture? [CO-3][L-1]
f) Compare mRNA vaccines and toxoid vaccines. [CO-6][L-4]
g) Contrast RFLP and RAPD. [CO-5][L-4]
h) Name any two drugs secreted in the mammary glands of transgenic animals. [CO-6][L-1]
i) What do you mean by white biotechnology? [CO-1][L-1]
j) Give brief information about the use of artificial media. [CO-3][L-2] **2×10**

PART-A

Q.2 a) Detail out the requirement of laminar air flow in animal cell culture lab. Discuss the role of Carbon dioxide for animal cells. [CO-1][L-6] **10**

b) What is cell line? Describe the type of cell line with their characteristics in detail. [CO-2][L-2] **10**

Q.3 Give details about the:

a) Organ culture and its significance.
b) Recombinant vaccines against viral infections. [CO-4][L-2] **10×2**

Q.4 a) Where does a bioreactor find its application in animal cell culture? Discuss different type of animal cell bioreactors with diagram? [CO-3-1][L-6] **10**

b) Explain the detailed principle, process, and application of different cytotoxicity tests. [CO-5][L-2] **10**

PART-B

Q.5 Write explanatory notes on:

a) Five different types of stem cells. [CO-4][L-2]
b) Cell separation. [CO-3][L-2] **10×2**

Q.6 The mammary gland has generally been considered the organ of choice to express valuable recombinant proteins in transgenic animal bioreactors. Estimate the statement by giving examples of various biopharmaceuticals. [CO-5][L-5] **20**

Q.7 What do you mean by egg and sperm retrieval? Analyze the critical steps in the procedure of IVF. Illustrate the procedure of embryo transfer. [CO-6][L-4] **20**

End Semester Examination, Dec. 2023

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

STEM CELL AND REGENERATIVE MEDICINE (MS-BT-324)

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

No of page: 1

Note: *Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt at least **ONE** question from each **UNIT**. Each question carries equal marks.*

Q.1 Answer the following in brief:

a) Enlist the advantages and disadvantages of embryonic stem cells. [CO-1][L-1]
b) Contrast between oligopotent and totipotent cells with examples. [CO-2][L-3]
c) Outline the role of stem cell niche environment in the differentiation and development of fetus. [CO-3][L-4]
d) Comment on the challenges to the use of stem cells as regenerative therapy. [CO-2][L-3]
e) Explain cell fate mapping and also mention some tools use for fate mapping. [CO-5][L-2]
f) Compare Cancer stem cells and cancer cells. [CO-4][L-5]
g) Enlist the types of delta ligands present in mammals. [CO-5][L-1]
h) Determine different sources of stem cells for regenerative therapy. [CO-6][L-1]
i) Discuss the requirements for the stem cell regenerative therapy for nervous system repair. [CO-3][L-2]
j) Contrast between Type I and Type II diabetes. [CO-6][L-4] **2×10**

UNIT-I

Q.2 a) Compare adult stem cells and embryonic stem cells. Discuss the mi RNA effect on the cell differentiation. [CO-1][L-6] **10**
b) Analyze Conditional specification and Syncytial specification by which a cell can become specified for a particular fate. [CO-2][L-4] **10**

Q.3 a) Illustrate the molecular basis of pluripotency and determine the effect of epigenetic factors on cell differentiation. [CO-3][L-3] **10**
b) Evaluate the significance of transcription factors and its function in the stem cell differentiation. [CO-4][L-5] **10**

UNIT-II

Q.4 What are the distinguishing features of cancer stem cells? How JAK STAT pathway impact in the formation of cancer stem cells. [CO-4] [L-3] **20**

Q.5 a) Which pathway is involved in the cell-cell communication process via influencing the patterns of gene expression and differentiation. Illustrate the mechanism of action after binding of ligand to notch receptor for the modification of gene expression. [CO-3][L-3] **10**
b) How is the Hedgehog pathway activated? Explain its function and the inhibitors of its pathway. [CO-5] [L-5] **10**

UNIT-III

Q.6 Discuss types of neurological disorders. How Parkinson disease could occur. Explain stem cell therapy could be used for the treatment of Parkinson disease. [CO-5] [L-6] **20**

Q.7 a) Discuss about cause and types of Diabetes. Elaborate the strategies for its treatment. [CO-6] [L-6] **10**
b) Illustrate the ethical issues associated with the use of stem cells in medicine. [CO-5] [L-4] **10**

End Semester Examination, Dec. 2023

M. Sc. (Microbiology) – First Semester

CLINICAL BIOCHEMISTRY (MS-MB-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 Explain the structure and properties of water and analyze the interactions of various biomolecules with water. [CO-1][L-2] **20**

Q.2 Illustrate the structural hierarchy of a protein. Describe gel filtration technique to separate proteins. [CO-1][L-2] **20**

Q.3 Describe the structure and properties of any one disaccharide and elaborate its biological roles. [CO-2][L-2] **20**

Q.4 Demonstrate the mechanism of action of hormones involving cAMP. [CO-3][L-3] **20**

Q.5 Evaluate the nutritional sources and deficiency symptoms of micronutrients. [CO-4][L-5] **20**

Q.6 Classify enzymes into major classes and explain Koshland's Induced Fit Model of enzyme activity. [CO-4][L-4] **20**

Q.7 Discuss the clinical relevance of lipidmetabolism. [CO-5][L-5] **20**

Q.8 Analyze the causes and symptoms of Alkaptonuria. [CO-6][L-4] **20**

End Semester Examination, Dec. 2023

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 brief:

a) State Louis Pasture contributions in Microbiology. [CO-1][L-1]

b) Is skin a favorable microenvironment for colonization by bacteria? Why? [CO-1][L-2]

c) Examine why knowledge of the normal human microbiota is important? [CO-1][L-3]

d) Why are some antibiotics toxic? [CO-1][L-4]

e) Comment on microbiota and its functions. [CO-2][L-2]

f) Determine the characteristics of MRSA. [CO-2][L-4]

g) How bacteria become resistant to Penicillin. [CO-2][L-5]

h) Illustrate the precaution for the transport of patient's sample to the diagnostic lab. [CO-2][L-3]

i) Describe DNA vaccine. [CO-3][L-1]

j) Elaborate the safety factors concern that is associated with attenuated vaccine. Give an example of attenuated vaccine. [CO-3][L-6] **2×10**

UNIT-I

Q.2 a) Elaborate the significance of normal bacterial and fungal microbiota to host at different sites? [CO-1][L-2] **10**

b) Compare exotoxins and endotoxin's structure and mode of action with example. [CO-1][L-5] **10**

Q.3 Explain Prions. Describe its types and the diseases caused by it. [CO-1][L-2] **20**

UNIT-II

Q.4 a) Explain the ways by which pathogens develop resistance against chemotherapeutic agents. [CO-2][L-2] **10**

b) Illustrate the mechanism of action and the therapeutic use of antifungal agents. [CO-2][L-3] **10**

Q.5 a) Explain the strategy for the collection and transportation of clinical samples to the diagnostic lab. [CO-2][L-3] **10**

b) Determine the strategy for laboratory diagnosis for bacterial, fungal and viral infections. [CO-2][L-5] **10**

UNIT-III

Q.6 a) Compare between Active and Passive Immunity with examples. [CO-3][L-5] **10**

b) Explain different types of vaccines. Comments on the safety factors associated with vaccine. [CO-3][L-3] **10**

Q.7 Discuss different strategies for designing of vaccine. Explain the types of vaccines available for covid -19 virus. [CO-3] [L-6] **20**

End Semester Examination, Dec. 2023

M. Sc. (Microbiology) – 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**. Marks are indicated against each question.*

Q.1 Answer the following in brief:

a) List the viral characteristics (structure and target tissue) that would promote transmission by arthropods, by mother's milk, and by sexual activity? [CO2][L1]
b) What are endo-toxins? [CO1][L1]
c) Define evasion mechanisms. [CO3][L1]
d) Illustrate the host immune response. [CO2][L3]
e) Explain bacterial adherence mechanisms. [CO1][L1]
f) Write a short note on the antigenic variations. [CO3][L1]
g) List the emerging infectious disease across the world. [CO3][L1]
h) Compare primary viremia with the secondary viremia. [CO2][L5]
i) Explain the function of sigma factors. [CO1][L2]
j) Define Host –pathogen interactions. [CO1][L1] **2×10**

PART-A

Q.2 A 13-year-old girl was admitted to the hospital with a 5-day history of fever and a nonproductive cough. She had received 3 days of treatment with a cephalosporin as an outpatient, with no relief of symptoms. Upon admission, examination of the chest revealed bilateral crackling rales, dullness to percussion, and a chest radiograph that showed a right lower lobe infiltrate. Bacterial stains and cultures were negative, but a polymerase chain reaction (PCR) test for Mycoplasma pneumoniae was positive.

a) What is unique about the cellular structure of mycoplasmas? How does this affect their susceptibility to antibiotics? [CO1][L5] **10**
b) What is the most sensitive test for the diagnosis of M. pneumoniae infection? [CO1][L4] **10**

Q.3 Describe the routes by which viruses gain entry into the body? For each route, list the barriers to infection and a virus that infects by it. [CO2][L2] **20**

Q.4 Describe the key factors and mechanisms through which bacteria can cause disease. Consider Listeria as a reference and discuss how adhesion, invasion, and toxin production contribute to bacterial pathogenicity. [CO1][L4] **20**

PART-B

Q.5 Illustrate various host defense mechanisms for pathogens. [CO3][L3] **20**

Q.6 Describe the infectious disease and their epidemiology. [CO3][L2] **20**

Q.7 Describe the features of these viruses that are similar, and those that are different.

a) Poliovirus and rhinovirus.
b) Poliovirus and rotavirus.
c) Poliovirus and western equine encephalitis (WEE) virus.
d) Yellow fever virus and dengue virus.
e) Epstein-Barr virus (EBV) and cytomegalovirus (CMV). [CO2][L5] **4×5**

End Semester Examination, Dec. 2023

M. Sc. (Microbiology) - Third Semester

SYNTHETIC BIOLOGY (MS-MB-303)

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

No. of pages: 2

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

Q.1 Answer the following in brief:

a) Expand iGEM and state its importance. [CO-1][L-2]

b) Point out the major difference in synthetic biology and genetic engineering. [CO-1][L-2]

c) Define Operon and write three major lessons that we learn while studying operons. [CO-1][L-3]

d) What are reporter genes? How do they help in understanding synthetic systems? [CO-2][L-3]

e) Network biology and systems biology refer to_____. [CO-2][L-2]

f) What is a feedback loop? Mention different types. [CO-2][L-2]

g) Denote and illustrate major types of gates in synthetic biology. [CO-3][L-3]

h) Give an example of toggle switch looking at your surroundings. [CO-3][L-4]

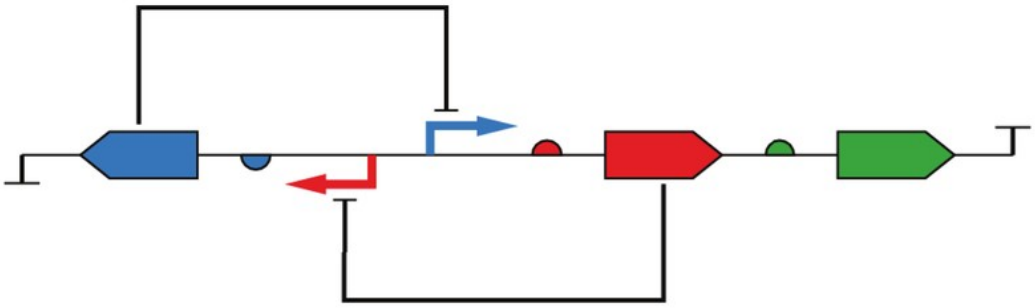
i) Mention various DNA Sequence alignment tools. [CO-4][L-2]

j) Mention and explain the two approaches for pathway engineering. [CO4][L3] **2×10**

PART-A

Q.2 Explain the functioning of Trp operon taking all possible scenarios. [CO-1][L-2] **20**

Q.3 Label the symbols and explain the processing of the given circuit:



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

Q.4 Consider the split T7 RNAP Expression System, where one input produces the T7 N-term and the second input produces the T7 C-term and both join to produce the output. Draw the gate and truth table for the scenario. [CO-2][L-4] **20**

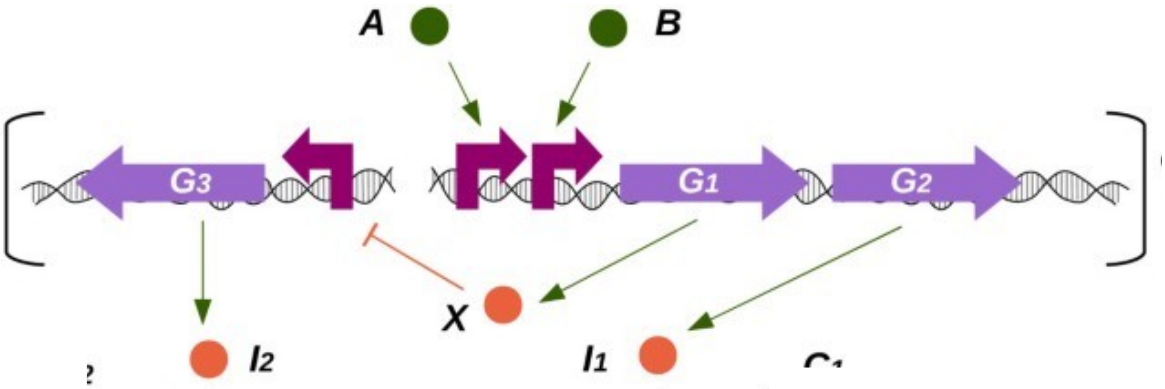
PART-B

Q.5 Oscillators, represillators and toggle switches explain synthetic principles. Explain with appropriate illustrations [CO-3][L-3] **20**

Q.6 Explain various softwares and databases that can be utilized before designing strategies of synthetic biology-based experiments. [CO-3][L-2] **20**

P. T. O.

Q.7 Draw the circuit by applying logic gates, truth table and graph explaining the situation given in the figure.



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

End Semester Examination, Dec. 2023

M. Sc. (Microbiology) – Third Semester

FOOD AND DAIRY MICROBIOLOGY (MS-MB-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**. Marks are indicated against each question.*

Q.1 Answer briefly:

a) Explain how oscillating magnetic field pulse is used to preserve food. [CO-2][L-2]
b) Define food poisoning with an example. [CO-2][L-1]
c) Differentiate between high and low temp foods preservation methods. [CO-1][L-2]
d) List out factors responsible for canned food spoilage. [CO-1][L-1]
e) Explain why bifid bacterium is used as probiotic. [CO-1][L-2]
f) Write a short note on shelf life. [CO-2][L-1]
g) Contrast class I and organisms class preservatives. [CO-3][L-3]
h) Name any responsible for spoilage of stored grains. [CO-3][L-1]
i) What do you mean by food sanitation? [CO-3][L-2]
j) Give a brief on any two food-borne liver infections. [CO-1,2,3][L-1,2,3,4] **2×10**

PART-A

Q.2 a) Explain the principle underlying the spoilage of vegetables and fruits. [CO-1][L-4] **10**

b) Spoilage of meat starts immediately after the slaughter of an animal. Analyze and explain the changes observed. [CO-2][L-4] **10**

Q.3 a) Evaluate the various intrinsic, extrinsic and implicit factors that influence microbial growth in food. [CO-2][L-5] **10**

b) Explain the principle underlying the fermentation process. Discuss the process of beer and wine fermentation in detail. [CO-2][L-2] **10**

Q.4 a) What do you understand by the oxidation reduction potential? How does it affect the growth of the microorganism? [CO-1][L-2] **10**

b) Explain the detailed principle of physical methods used for food preservation. [CO-1][L-2] **10**

PART-B

Q.5 Discuss symptoms and preventions food borne viral infections:

a) Hepatitis A.
b) Bovine Spongiform encephalopathy. [CO-3][L-2] **10×2**

Q.6 Write short notes on:

a) Principles of food preservation.
b) Aflatoxin. [CO-2][L-1] **10×2**

Q.7 Summarize major food control agencies along with their regulations. [CO-3][L-2] **20**