

End Semester Examination, May 2023
B. Tech. – Sixth Semester
MOBILITY DESIGN AND AESTHETICS (AU-627/BAU-DS-634)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- a) Name the four key strategic dimensions for transport authority's sustainable mobility policies towards networked mobility systems. [CO-1][L-2]
- b) What are the various steps required of empirical illustration of a design considering explicit and latent needs of a customer? [CO-2][L-2]
- c) Name the four key strategic dimensions for transport authority's sustainable mobility policies towards networked mobility systems. [CO-2][L-2]
- d) What are explicit and latent needs? [CO-1][L-1]
- e) What are various strategic directions and imperatives for mobility solutions providers? [CO-1][L-1]
- f) State various dimensions of usability. [CO-3][L-3]
- g) You are given a role of an ergonomic designer for developing an automobile. What would be your primary goal in the automotive design process? [CO-3][L-3]
- h) What are the analytical methods to evaluate usability? [CO-2][L-2]
- i) A seat has to be designed for a new car. Which SAE standard would you opt for the seat to be ergonomic for a 95th percentile manikin? [CO-3][L-3]
- j) State various techniques for the measurement of driver's distraction. [CO-2][L-2] **2×10**

PART-A

- Q.2 A driver is driving a sports car at a speed of 120 km/hr. A sign board appears on his left hand side which indicates that the driver has to turn to the right for going to the desired destination. Design a schematic model and explain in details, how this information will be processed by the driver's brain? [CO-6] [L-6] **20**
- Q.3 With the help of a diagram explain the future of automotive "pyramid". [CO2][L3] **20**
- Q.4 Select the seven distinct areas on which the industry need to focus for future mobility solutions. [CO-6] [L-6] **20**

PART-B

- Q.5 A vehicle has to be designed for occupying 4 passengers including a driver. You are required to develop the concept design for the vehicle. Suggest the steps that should be taken for developing the concept design of the vehicle considering the ergonomic occupant packaging. [CO-4] [L-5] **20**
- Q.6 a) Identify the various commonly used hands operated automotive controls. [CO2][L2] **10**
b) What are the benefits and drawbacks of touch screen technology? [CO-2][L-2] **10**
- Q.7 State various drivers distraction measurement techniques along with the advantages, disadvantages of each technique. What are the various parameters measured by these techniques? [CO-3] [L-3] **20**

End Semester Examination, May 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) Define hybrid electric vehicles. [CO-3] [L-1]
- b) What is the use of actuators in the automotive industry? [CO-1] [L-1]
- c) What is the need for hybrid vehicles in today's era? [CO-6][L-1]
- d) What is meant by the hydrogen storage system? [CO-5][L-2]
- e) What is deep discharge? [CO-1][L-1]
- f) What is a fuel cell? [CO-5][L-1]
- g) Explain globalization and regionalization in context to automotive industry. [CO-5][L-1]
- h) Enlist various resistances against vehicle motion. [CO-3] [L-1]
- i) Define the term: 'brand management'. [CO-2] [L-1]
- j) Define 'integrated starter generator'. [CO-4] [L-1] **2×10**

PART-A

- Q.2 Integrate the challenges for designing the 21st-century vehicle. [CO-1][L-4] **20**
- Q.3 a) Categories the fuel cell based on electrolyte, operating temperature, and efficiency. [CO-2][L-4] **10**
b) Select fuel cell systems that generate energy from other conventional sources, and through the electrolysis process, water split into oxygen and hydrogen fuel. [CO-2][L-6] **10**
- Q.4 a) Evaluate the performance of the engine without a throttle butterfly valve. [CO-3][L-6] **10**
b) Compare the function of cam less engine with standard engine. [CO-3][L-4] **10**

PART-B

- Q.5 Analyze the best architecture for an electric hybrid with comparison among series-parallel 2x2 architecture and series architecture. [CO-4][L-4] **20**
- Q.6 Categories the lithium batteries based on construction, absorption voltage, and float voltage range. [CO-5][L-4] **20**
- Q.7 a) Select and explain the appropriate suspension system with a diagram for passenger vehicle. [CO-6][L-6] **10**
b) Integrate the function of the microcontroller to improve the performance of automobiles. [CO-6][L-5] **10**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
AIRCRAFT STABILITY AND CONTROL (BAE-DS-422)

Time: 3 hrs.
100

Max Marks:

No. of pages: 1

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

- Q.1
- a) Define 'stability of an aircraft'. [CO-1][L-1]
 - b) Differentiate between controllability and maneuverability. [CO-1][L-2]
 - c) Plot stability criteria for a civil transport aircraft. [CO-2][L-2]
 - d) Define 'tail volume ratio'. [CO-2][L-1]
 - e) Define 'tail efficiency factor'. [CO-3][L-1]
 - f) Differentiate between neutral point and aerodynamic centre. [CO-3][L-2]
 - g) Define 'static margin'. [CO-4][L-1]
 - h) List the requirements of aerodynamic and mass balancing. [CO-5][L-2]
 - i) Define 'weather cock stability'. [CO-6][L-1]
 - j) How can a design overcome rudder lock? [CO-5][L-2] **2×10**

PART-A

- Q.2 Derive equations of motions of an Aircraft with neat sketches for the following cases:
- a) Steady level flight.
 - b) Steady climb. [CO-1] [L-4] **10×2**
- Q.3 Evaluate the stability criteria for a wing and tail combination with necessary sketches and assumptions. [CO-2] [L-4] **20**
- Q.4 Design trim angle for an elevator with necessary sketches and equations. [CO3][L5] **20**

PART-B

- Q.5
- a) Explain with neat sketches different types of tabs used in Airplane. [CO-4][L-3] **10**
 - b) Write a short note on spoiler control and Frise aileron. [CO-4][L-3] **10**
- Q.6
- a) Evaluate the directional stability criteria using necessary sketches and equations. [CO-5] [L-4] **10**
 - b) Explain the different factors to be considered while designing a rudder. [CO-5][L-4] **10**
- Q.7
- a) Estimate equation of motion of an aircraft considering it as a rigid body with the help of a neat sketches. [CO-6] [L-4] **10**
 - b) Write a short note on 'different stability modes'. [CO-6][L-3] **10**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

AIRCRAFT DESIGN (BAE-DS-601)

Time: 3 hrs.

Max Marks:

100

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) List the different types of wing configurations with neat sketches. [CO-1] [L-1]
- b) Differentiate aerodyne and aerostat. [CO-1] [L-2]
- c) Define limit load and ultimate load. [CO-2] [L-1]
- d) List few examples of gust load. [CO-2] [L-1]
- e) How Wing Loading effects the take-off distance of an aircraft. [CO-3] [L-3]
- f) Sketch Schrenck's curve with necessary equations. [CO-3] [L-1]
- g) List the different types of landing gear configurations. [CO-4] [L-1]
- h) Sketch any two high lift devices. [CO-4] [L-2]
- i) List the major advantages of composites. [CO-5] [L-2]
- j) How Thrust is varying with respect to time for a jet engine. [CO-6] [L-2] **2×10**

PART-A

- Q.2 a) Explain aircraft design process with the help of a flow diagram. [CO-1][L-3] **10**
b) Write a short note on unmanned aerial vehicle and its classification. [CO1][L3] **10**

- Q.3 a) Explain structural design criteria and basic flight loading conditions with neat sketches. [CO-2] [L-3] **10**
b) Design V-n diagram for Boeing B-787-8 aircraft from the following table:

Property	Magnitude
Gross Weight	215912 kg
Wing Area	359.53 m ²
Wing Aspect Ratio	10.58
Sweep of t/c line	30°
Maximum Positive CL	1.91
Cruise Mach Number	0.85
Design Cruise Speed	190 m/s
Design Dive Speed	219.5 m/s
Maximum Positive Load Factor	2.54

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

- Q.4 Design a conventional civil transport aircraft that can carry 700 passengers plus their luggage. The aircraft must be able to fly with a cruise speed of mach 0.8, and have a range of 95×10^5 ft. assume that the aircraft is equipped with two high bypass ratio turbofan engines and is cruising at 35,000 ft altitude. Estimate the preliminary weight of the aircraft if TSFC, $C = 3.644 \times 10^{-4} \text{ s}^{-1}$, Speed of sound is 973.1 ft/s. [CO3][L-6] **20**

PART-B

- Q.5 a) Analyze the aerodynamic considerations for fuselage design with necessary plots and equations. [CO-4] [L-4] **10**
b) Write a short note on "Sandwich materials". [CO-4] [L-3] **10**
- Q.6 a) Explain the different steps to estimate C.G. location of an aircraft. [CO-5][L-4] **10**
b) Design Tail section of an aircraft for "stall control" and "spin control" with neat sketches. [CO-5][L-5] **10**
- Q.7 Explain the Sizing procedures used for turbo jet engine. [CO-6][L-4] **20**

End Semester Examination, May 2023

B. Tech. – Seventh Semester BASICS OF CFD (BAE-DS-721)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following in brief:

- a) Differentiate between 'uniform flow' and 'steady flow'. [CO-1][L-2]
- b) Define 'convection acceleration'. [CO-1][L-1]
- c) Explain 'streamline'. [CO-2][L-1]
- d) Differentiate between 'pathline' and 'streak lines'. [CO-3][L-2]
- e) State the assumptions used in navier-stokes theory. [CO-3][L-1]
- f) Illustrate crank-nicholson form for implicit scheme. [CO-4][L-2]
- g) Draw an example for physical plane and computational plane. [CO-4][L-2]
- h) Differentiate between 'metrics' and 'jacobians'. [CO-5][L-2]
- i) What are the factors to be considered while generating grid for a convergent-divergent nozzle to capture the shock? [CO-6][L-2]
- j) Differentiate between upwind and central differencing scheme used in finite volume method. [CO-5][L-2] **2×10**

PART-A

- Q.2 Illustrate the dynamics of fluid through the theory of Euler use necessary assumptions and diagrams for justification. [CO-1] [L-3] **20**
- Q.3 Consider a steel rod that is subjected to a temperature of 100°C on the left end and 25°C on the right end. If the rod is of length 0.05 meter, use the explicit method to find the temperature distribution in the rod from time, $t=0$ seconds to $t=9$ seconds. Use $\Delta x = 0.01$ m, $\Delta t = 3$ seconds. The Initial temperature of the rod is 20° c
Given $K = 54$ w/m-k, $\rho = 7800$ kg/m³, $C = 490$ J/ kg-K. [CO-2] [L-4] **20**
- Q.4 a) What is discretization? Explain finite difference approach in discretization using necessary graphs and equations. [CO-3] [L-3] **10**
b) Using finite difference approach derive second order mixed derivative of your choice. [CO-3] [L-3] **10**

PART-B

- Q.5 a) Write a short note on polynomial approach in discretization. [CO-4] [L-3] **10**
b) Consider the viscous flow of air over a flat plate. At a given station in the flow direction, the variation of the flow velocity, U in the direction perpendicular to the plate is given by the expression.

$$U = 1582 (1 - e^{-y/L})$$

Where L = Characteristic Length, $\mu = 3.7373 \times 10^{-7}$ slug / ft

y, inches	U, ft/s
0	0
0.10	150.54
0.20	286.77
0.30	410.03

Calculate the shear stress at the wall using first-order and second order one sided difference. [CO-4] [L-3] **10**

- Q.6 a) Evaluate the general transformation equation in a computational plane and explain the significance of metrics and jacobian. [CO-5] [L-3] **10**
b) Explain upwind differencing, central differencing and linear central differencing discretization techniques used in finite volume method. [CO-5] [L-3] **10**
- Q.7 a) Explain turbulence modelling using RANS equation. [CO-6] [L-3] **10**
b) Explain briefly about Lax-Wendroff and Max-Cormac technique. [CO-6] [L-3] **10**

End Semester Examination, May 2023

B. Tech. – Seventh Semester

ROCKET PROPULSION (BAE-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 'thrust coefficient'. [CO-1][L-2]
 - b) Enlist the salient features of a rocket propulsion. [CO-1][L-2]
 - c) Classify different types of propellants. [CO-2][L-2]
 - d) What are propellant grain? [CO-2][L-2]
 - e) Sketch different thrust curves used in solid rocketry. [CO-3][L-2]
 - f) List the different types of igniters used in liquid rockets. [CO-3][L-2]
 - g) List the major components of liquid rockets. [CO-4][L-2]
 - h) How propellant slosh affects the performance of a rocket? [CO-5][L-2]
 - i) List out the different methods used in thrust magnitude control. [CO-6][L-2]
 - j) List the salient features of Ion propulsion system. [CO-6][L-2]
- 2×10**

PART-A

- Q.2 Derive Tsiolkovsky's equation with necessary sketches. [CO-1][L-3] **20**
- Q.3 Differentiate the burning mechanism of Double Base Propellants and Composites Propellants with neat sketches. [CO-2] [L-3] **20**
- Q.4 a) Write a short note on: Ignition system in Solid Rockets. [CO-3][L-3] **10**
b) Write a short note on: Hybrid Rockets. [CO-3][L-3] **10**

PART-B

- Q.5 Explain the expander cycle and bleed cycle of a liquid rocket system with a neat sketch. Also explain functions of its different components. [CO-4][L-4] **20**
- Q.6 What are the different cooling methods used in Liquid rockets? Explain them with neat sketches. [CO-5][L-4] **20**
- Q.7 a) Explain with the aid of schematic diagram the working of Arc Jet. [CO-6][L-3] **10**
b) Write a short note on: VASIMR. [CO-6][L-3] **10**

End Semester Examination, May 2023
OPEN ELECTIVE – COMMON FOR ALL BRANCHES
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 a propeller. | [CO-1][L-1] |
| b) Differentiate between MALE and HALE. | [CO-1][L-2] |
| c) List the different types of motions of a quadcopter. | [CO-2][L-1] |
| d) Enlist the factors influencing drag of a quadcopter. | [CO-2][L-1] |
| e) Enlist the functions of a signal conditioning unit. | [CO-3][L-3] |
| f) Define "Trilateration". | [CO-3][L-1] |
| g) Enlist the components of IMU. | [CO-3][L-1] |
| h) Define "Stalling". | [CO-4][L-2] |
| i) Define "Glide ratio". | [CO-5][L-2] |
| j) List the requirements of a Remote Pilot License. | [CO-6][L-2] 2×10 |

PART-A

- Q.2 a) Explain the different industrial applications of drone technology in detail. [CO1][L3] **10**
b) Classify drones based on weight and altitude. [CO-1][L-3] **10**
- Q.3 Predict the equations of motion of a drone also evaluate the total drag produced. [CO-2][L-5] **20**
- Q.4 a) Evaluate the working of Rate Gyro with a neat sketch. [CO-3][L-4] **10**
b) Write a short note on: "MEMS sensors used in drones". [CO-3][L-3] **10**

PART-B

- Q.5 a) Explain the working of a turbofan engine in a fixed wing drone. [CO-4][L-4] **10**
b) Explain the electric propulsion system with the help of a neat sketch. [CO4][L-4] **10**
- Q.6 a) Explain the different types of ground control stations used for operating drones. [CO-5][L-4] **10**
b) Differentiate between 'microprocessor and microcontroller'. [CO-5][L-3] **10**
- Q.7 Explain minimum ten rules established by DGCA as Drone Rules, 2021. [CO-6][L-4] **20**
- (CO-1, CO-2, CO- 4, CO-5) (L-5) **20**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

FUEL AND LUBRICANTS (BAU-DS-401)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- a) Differentiate between 'homogeneous and heterogeneous mixtures'. [CO1][L2]
- b) What is hydrogenation of oils? [CO1][L1]
- c) What do you mean by cracking? [CO2][L2]
- d) What is viscosity index? [CO2][L1]
- e) What are the different factors affecting delay period? [CO3][L4]
- f) Briefly explain advantages of hydrogen as fuel. [CO4][L3]
- g) Write advantages of an electric vehicle. [CO4][L2]
- h) What is boundary lubrication? [CO5][L1]
- i) What are semisolid lubricants? [CO6][L1]
- j) What are greases and lubricants? [CO6][L1] **2×10**

PART-A

Q.2 Explain in detail the petroleum refining process. In addition, explain the different products of refining process. Tabulate the basic properties of refining process products. [CO-1] [L-2] **20**

Q.3 a) Discuss the effect of following fuel properties on lubricant characteristics:
i) Precipitation number. ii) API gravity. [CO-2] [L-2] **5×2**
b) What is Calorific value? How it can be experimentally determined? [CO-3] [L-3] **10**

Q.4 Discuss in detail the different stages of combustion in spark ignition engines. Analyse why SI engines and CI engines have different sets of stages. [CO-2] [L-4] **20**

PART-B

Q.5 Design and explain with a labeled sketch, a hybrid vehicle with rear wheels powered with an IC Engine and front wheels powered by an electric supply of series of 8 batteries of 24V capacity. [CO-4] [L-5] **20**

Q.6 Grease is used mainly in pockets with severe operation conditions with high centrifugal force and extreme pressure and temperature conditions. Evaluate how engine oil with SAE rating of 10W50; can be operated in those conditions with the addition of certain additives. [CO-5] [L-5] **20**

Q.7 An engine is lubricated mostly by a Hydrostatic type of lubricating system. Analyze what changes you expect if the lubrication mechanism is changed to a hydrodynamic type of lubrication system. Explain with a suitable assumption and labeled diagram. [CO-6] [L-4] **20**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

INTERNAL COMBUSTION ENGINES AND GAS TURBINE (BAU-DS-421)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

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

Q.1 Answer the following in briefly:

- a) What is the functional requirement of injection system? [CO-1] [L-1]
- b) Need of pump for injection system. Justify the statement. [CO-1] [L-1]
- c) Examine the factors which does detonation depend. [CO-1] [L-3]
- d) How the efficiency of diesel cycle is greater than auto cycle at same compression ratio and heat rejection? [CO-2] [L-2]
- e) State the assumption made for air standard cycles. [CO-2] [L-2]
- f) Which lubrication system used for 2-Stroke engine? [CO-1][L-1]
- g) Write two properties of lubrication oil. [CO-2][L-2]
- h) Write formula for indicated thermal efficiency. [CO-2] [L-2]
- i) Define 'volumetric efficiency'. [CO-3] [L-1]
- j) Regeneration will effect the efficiency of engine. Justify. [CO-2] [L-1] **2×10**

PART-A

- Q.2 In an ideal Diesel cycle, the pressure and temperature are 1.03 bar and 27°C respectively. The maximum pressure in the cycle is 47 bar and the heat supplied during the cycle is 545 kJ/kg. Determine: i) the compression ratio ii) the temperature at the end of compression iii) the temperature at the end of constant pressure combustion and iv) the air-standard efficiency. Assume $\gamma=1.4$ and $C_p = 1.004$ kJ/kg K for air. [CO-4][L-5] **20**

- Q.3 a) Explain the following terms in connection with air fuel mixture:
i) Rich mixture ii) Stoichiometric mixture [CO-2][L-3] **10**
b) Classified the fuel injection system based on functional requirement. [CO-4][L-4] **10**

- Q.4 a) Compare the phenomena of diesel knock with detonation in SI engine. [CO-3][L-3] **10**
b) Analyze the parameters which affecting the delay period. [CO-4][L-4] **10**

PART-B

- Q.5 a) Differentiate in splash and circulating pump lubrication system on the basis of working principal. [CO-3][L-3] **10**
b) Compare wet sump and dry sump lubrication system with neat sketch. [CO-3][L-3] **10**

- Q.6 An I.C. engine uses 6 kg fuel having calorific value 44000 kJ/kg in one hour. The brake power developed is 18kW. The temperature of 11.5 kg of cooling water found to rise through 25° C per minute. The temperature of 4.2 kg of exhaust gas with specific heat 1 kJ/kg K was found to rise though 220° C. Draw heat balance sheet for the engine. [CO-6][L-5] **20**

- Q.7 a) Derive an expression for the efficiency of a simple gas turbine using P-V and T-S diagrams. With the help of the expression, compare the efficiencies of two turbines, one operating with air ($\gamma = 1.4$) as working fluid and other operating with argon ($\gamma = 1.66$) as the working fluid. [CO-6][L-4] **10**
- b) Compute the indicated mean effective pressure and efficiency of a Joule/Brayton cycle if the temperature at the end of combustion is 2000 K and the temperature and pressure before compression is 350 K and 1 bar. The pressure ratio is 1.3. Assume $C_p = 1.005$ kJ/kg.
- What inference can you make from the result obtained? Also suggest a method for improving the efficiency of the system and estimate the amount by which the efficiency will increase on implementation of the suggested method. [CO-6][L-6] **10**

End Semester Examination, May 2023
B. Tech. – Fifth Semester
AUTO ELECTRICAL AND ELECTRONICS (BAU-DS-501)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) What is the function of an ignition coil? [CO-1][L2]
- b) What is the significance of ballast resistance? [CO-1][L3]
- c) Explain what happens during the charging of a lead-acid battery. [CO-2][L1]
- d) Discuss the potential of Lithium Polymer batteries usage in automobiles. [CO2][L3]
- e) Why does armature reaction happen? [CO-3][L3]
- f) What is the requirement of electronic engine management system? [CO-4][L3]
- g) Illustrate the importance of spark plug length. [CO-5][L4]
- h) What is the significance of cable colors? [CO-5][L4]
- i) What is self-inductance? [CO-6][L2]
- j) What is a wiring harness? [CO-6][L3] **2×10**

PART-A

- Q.2 Design a wiring diagram of an 'Automobile Ignition System' with a distributor for a four-cylinder petrol engine. Explain each associated component in detail. [CO-1][L6] **20**
- Q.3 Discuss on charging and discharging chemical reactions that take place in a lead acid battery. Analyze what will happen if instead of dilute H₂SO₄, concentrated H₂SO₄ acid is being used? [CO-2][L4] **20**
- Q.4 Explain Delco Remy combined current and voltage regulators with a labelled sketch. Discuss how an alternator differs from a generator. What are the general defects that usually occur in an alternator? [CO-3][L4] **20**

PART-B

- Q.5 a) Analyze a Lambda Sensor performance in controlling the pollutant formation in an automobile. Discuss its different types. [CO4][L5] **10**
b) Design a labelled wiring diagram of the "Automobile Ignition System".. [CO4][L5] **10**
- Q.6 Distinguish the type of the timing advance system most suitable for ECU controlled MPFI system? Draw a labelled sketch and explain its working in detail. [CO-5][L5] **20**
- Q.7 Out of the four available reflectors (headlights) compare which type you will recommend for vehicle operation in hilly areas and why? [CO-5][L6] **20**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
AUTOMOTIVE COMPONENTS DESIGN (BAU-DS-601)

Time: 3 hrs.

Max Marks:

100

No. of pages: 2

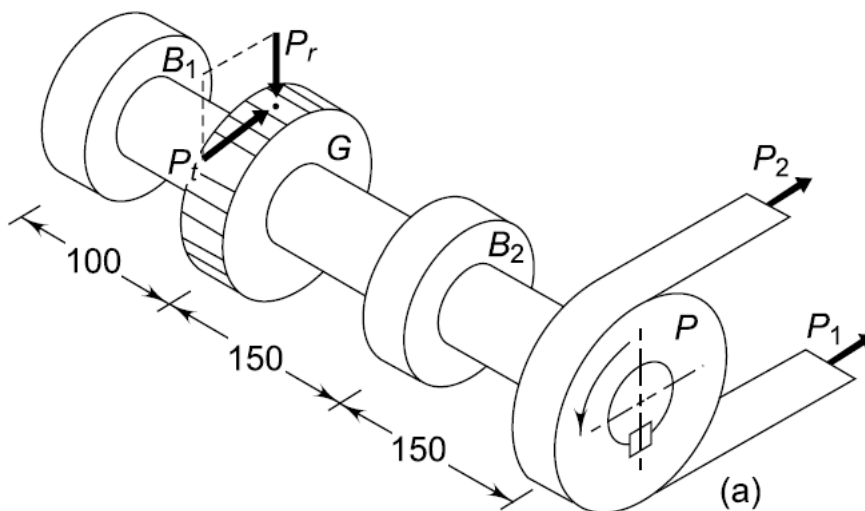
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

(Machine Design Data Book Allowed)

- Q.1
- a) Define 'piston skirt'. [CO-2] [L-1]
 - b) Write the expression for effect of surface factor under bending. [CO-1] [L-2]
 - c) Enlist the desired properties of a good lubricant. [CO-2] [L-2]
 - d) Name the forces which is acting on connecting rod. [CO-1] [L-1]
 - e) Describe the effect of stress concentration in design of machine parts. [CO-1] [L-1]
 - f) What are the advantages of involute teeth gears? [CO-2] [L-2]
 - g) Define addendum and dedendum of gears. [CO-2] [L-1]
 - h) What is fatigue failure? [CO-1] [L-1]
 - i) Define the properties of material used for shaft. [CO-2] [L-2]
 - j) Enlist type of stress induced in helical torsion spring. [CO-2] [L-2] **2×10**

PART-A

- Q.2
- a) Determine the diameter of a circular rod made of ductile material with a fatigue strength (complete stress reversal), $\sigma_e = 265$ MPa and a tensile yield strength of 350 MPa. The member is subjected to a varying axial load from $W_{min} = -300 \times 10^3$ N to $W_{max} = 700 \times 10^3$ N and has a stress concentration factor = 1.8. Use factor of safety as 2.0. [CO-4] [L-4] **10**
 - b) Derive the expression for Soderberg criteria for combination of stresses under reversal axial loading for ductile materials. [CO-3] [L-3] **10**
- Q.3
- a) Design a close coiled helical compression spring for a service load ranging from 2250 N to 2750 N. The axial deflection of the spring for the load range is 6 mm. Assume as pring index of 5. The permissible shear stress intensity is 420 MPa and modulus of rigidity, $G = 84$ kN/mm². Neglect the effect of stress concentration. [CO-6] [L-6] **15**
 - b) A pair of wheels of a railway wagon carries a load of 50 kN on each axle box, acting at a distance of 100 mm outside the wheel base. The gauge of the rails is 1.4 m. Find the diameter of the axle between the wheels, if the stress is not to exceed 100 MPa. [CO-2] [L-2] **5**
- Q.4
- A transmission shaft rotating at 720 rpm and transmitting power from the pulley P to the spur gear G is shown in figure (a). The belt tensions and the gear tooth forces are as follows:
- $P_1 = 498$ N $P_2 = 166$ N $P_t = 497$ N $P_r = 181$ N
- The weight of the pulley is 100 N. The diameter of the shaft at bearings B1 and B2 is 10 mm and 20 mm respectively. The load factor is 2.5 and the expected life for 90% of the bearings is 8000 h. Select single row deep groove ball bearings at B1 and B2.



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

PART-B

- Q.5 The following particulars of a single reduction spur gear are given:
 Gear ratio = 10:1; Distance between centres = 660 mm approximately; Pinion transmits 500kW at 1800 r.p.m.; Involute teeth of standard proportions (addendum = m) with pressure angle of 22.5° ; Permissible normal pressure between teeth = 175 N per mm of width.
 Find:
 a) The nearest standard module if no interference is to occur;
 b) The number of teeth on each wheel;
 c) The necessary width of the pinion; and
 d) The load on the bearings of the wheels due to power transmitted. [CO-4] [L-5] **20**
- Q.6 A four stroke diesel engine has the following specifications:
 Brake power = 5 kW; Speed = 1200 r.p.m; Indicated mean effective pressure = 0.35 N/mm^2 ; Mechanical efficiency = 80 %.
 Determine:
 a) Bore and length of the cylinder.
 b) Thickness of the cylinder head.
 c) Size of studs for the cylinder head. [CO-5] [L-5] **20**
- Q.7 Design a connecting rod for an I.C. engine running at 1800 r.p.m. and developing a maximum pressure of 3.15 N/mm^2 . The diameter of the piston is 100 mm; mass of the reciprocating parts per cylinder 2.25 kg; length of connecting rod 380 mm; stroke of piston 190 mm and compression ratio 6 : 1. Take a factor of safety of 6 for the design. Take length to diameter ratio for big end bearing as 1.3 and small end bearing as 2 and the corresponding bearing pressures as 10 N/mm^2 and 15 N/mm^2 . The density of material of the rod may be taken as 8000 kg/m^3 and the allowable stress in the bolts as 60 N/mm^2 and in cap as 80 N/mm^2 . The rod is to be of I-section for which you can choose your own proportions.
 Draw a neat dimensioned sketch showing provision for lubrication. Use Rankine formula for which the numerator constant may be taken as 320 N/mm^2 and the denominator constant $1 / 7500$. [CO-6] [L-5] **20**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

OFF ROAD VEHICLE (BAU-DS-623)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.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 an off-road vehicle, how it is different from normal vehicles? [CO-5][L2][2]
 - b) What is the basic difference between scrappers and graders? [CO-2][L2][2]
 - c) Summarize the advantages of a multi axle vehicle. [CO-5][L2][2]
 - d) Illustrate the difference between land clearing machines and earth movers. [CO-4][L2][2]
 - e) Develop a block diagram of a water-cooling system for a tractor. [CO-2][L6][2]
 - f) What are the applications of a tractor? [CO-5][L6][2]
 - g) Explain three ways of classification of bulldozers. [CO-1][L3][2]
 - h) What is the usage of a stampers? [CO-4][L2][2]
 - i) What is ripper a ripper and where it is used? [CO-4][L3][2]
 - j) Why diesel engines are mostly used in ORVs? [CO-5][L3][2] **2×10**

PART-A

- Q.2
- a) Differentiate between 'land clearing machines' and 'earth moving machines'. [CO-1] [L5] **10**
 - b) Evaluate the air standard diesel cycle thermal efficiency (in %) for a scraper diesel engine with a compression ratio of 10 and a cut-off ratio of 2. [CO-3][L5] **10**
- Q.3
- a) Illustrate the working of a fork lift trucks with a schematic diagram. [CO1] [L3] **10**
 - b) Explain the construction and working of tree dozer. [CO4] [L2] **10**
- Q.4
- Draw a neat labelled diagram and explain the working of a tractor. Also discuss on the applications of tractors. [CO3] [L3] **20**

PART-B

- Q.5
- A dump truck weighing 12 kN needs to be equipped with a 4-speed manual gearbox. The engine develops a maximum torque of 100 Nm. The vehicle should reach its maximum speed of 100 km/h when the engine is running at 3000 rpm. The vehicle should have a gradeability of 20 %. It is also required that the fourth gear correspond to a direct drive. Take the radius of the wheel as 0.3 m and the transmission efficiency to be 90 %. The value of wheel slip ratio can be taken as 0.05 and neglect rolling resistance for obtaining the first cut values of the gear ratios. Calculate the gear ratio of the final drive along with the value of the first, second and third gear ratio. [CO6] [L6] **20**
- Q.6
- How are bush cutter classified? Explain the purpose and construction of a bush cutter? Differentiate between scrappers and dozers. [CO5] [L2] **20**
- Q.7
- Discuss on power shovels, covering the construction, working and usages. Differentiate between Revolving and stripper shovels. [CO2] [L4] **20**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

AUTO REFRIGERATION AND AIR-CONDITIONING (BAU-DS-641)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 ventilation system of a car with sketch. [CO1][L2]
- b) Enlist the symptoms of bad or failing AC pressure switch. [CO1][L3]
- c) Explain essential preventive maintenance steps for a car heater system. [CO2][L2]
- d) Enlist the Thermo-electric materials. [CO3][L3]
- e) What are the functions of analyzer and Rectifier in a VAR system? [CO3][L2]
- f) Define the function of expansion valve. [CO3][L1]
- g) What is the role of humidity sensors? [CO5][L2]
- h) What is comfort chart? [CO6][L2]
- i) What are the limitations of PV plots? [CO6][L1]
- j) What are the refrigerants desirable properties? [CO5][L1] **2×10**

PART-A

- Q.2 Describe the Bell-Coleman cycle with a neat sketch. Derive an expression for COP assuming compression and expansion to be isentropic. [CO1] [L5] **20**
- Q.3 What are the methods of refrigeration? Explain the following systems with neat sketches:
a) Boot-strap air cooling system.
b) Boot- strap air evaporative cooling system. [CO2] [L4] **10×2**
- Q.4 a) What is an absorption system? How does it differ from vapor compression system? [CO3][L2] **10**
b) Discuss desirable properties of refrigerant and absorbent used in vapor absorption system. [CO3][L2] **10**

PART-B

- Q.5 What is a Psychrometric chart? What are the properties? Explain in detail the different types of air distribution systems. [CO4] [L5] **20**
- Q.6 An air-conditioned auditorium is to be maintained at 27°C dry bulb temperature and 60% RH. The ambient condition is 40°C DBT and 30°C WBT. The total sensible heat load is 100000kJ/h and total latent heat is 40000kJ/h. 60% of return air is recirculated and mixed with 40% of makeup air after cooling coil. The condition of air leaving the cooling coil is at 18°C. Determine a) RSHF, b) the condition of air entering the auditorium c) the amount of make-up d) ADP e) BPF of cooling coil. [CO5] [L5] **20**
- Q.7 What is the significance of cooling and dehumidifying coils? Explain the working principal in detail. [CO6] [L5] **20**

End Semester Examination, May 2023

B. Tech. – Seventh Semester

VEHICLE MAINTENANCE (BAU-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) Explain important criteria for a service system layout planning. [CO-1 L4]
- b) What is extended warranty? When is it provided? [CO-1 L3]
- c) List out general tools used in a service station. [CO-2 L2]
- d) Explain the procedures of a spark plug testing and cleaning. [CO-3 L3]
- e) What are the possible causes of white or grey smoke? [CO-3 L2]
- f) Explain the method of engine noise diagnosis. [CO-3 L1]
- g) What could be the possible faults for clutch chatter and noisy operation? [CO-5 L4]
- h) What is tyre pressure monitoring system? [CO-6 L2]
- i) Define Caster and Camber angles in steering system. [CO-6 L1]
- j) List out the various pollutants from the engine block. [CO-5 L1] **2×10**

PART-A

- Q.2 Design a layout of a service station with description of all essential operations and machinery procedures. Explain about all the departments in details. [CO-1 L6] **20**
- Q.3 Why wheel alignment and balancing is necessary? How a wheel is dynamically balanced on a wheel balancing machine? Explain steps for a front wheel drive vehicle. [CO-2 L4] **20**
- Q.4 a) An engine was found to have compression leakage from valve side. Discuss how the problem can be rectified using valve seat reconditioning method. [CO-3 L4] **10**
b) Why resurfacing of cylinder head is required before assembly of the engine. [CO-3 L5] **10**

PART-B

- Q.5 List down various symptoms and possible faults in a petrol injection system. Explain the procedure for testing and cleaning of petrol injectors. [CO-4 L-5] **20**
- Q.6 Clutch friction linings are subjected to severe rubbing so that generation of heat in relatively short periods takes place. Therefore, the lining material should have a combination of the certain properties to withstand the operating conditions. Elaborate and justify those properties. Also give considerations in designing of a friction material used in single plate and multi plate clutches. [CO-5 L-5] **20**
- Q.7 Discuss about the radial tyre construction and also design a process flow diagram so as to manufacture it in a manufacturing setup. [CO-6 L5] **20**

End Semester Examination, May 2023
OPEN ELECTIVE – COMMON FOR ALL BRANCHES
ELECTRIC MOBILITY (BAU-OE-001)

Time: 3 hrs.

Max Marks: **100**

No. of Pages: 2

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

Q.1 Answer in brief:

(2*10=20)

- 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 8000 N calculate rolling resistance if constant of rolling resistance is 0.20.
[CO-2] [L-2]
- c) Name five electric two wheeler manufacturers in Indian market. [CO-1] [L-1]
- d) The name of founder of India's first electric car company Reva was _____.
[CO-1] [L-1]
- e) Assume a vehicle has r_{wheel} of 0.3 m. Convert speed of 2 m/sec into kmph and rpm.
[CO-6] [BTL-6]
- f) Assume a vehicle has r_{wheel} of 0.2 m. Convert speed of 80 kmph into m/sec and rpm.
[CO-6] [L-6]
- g) Differentiate between energy density and power density of battery.
[CO-1][L-1]
- h) Write the chemical reaction that takes place in lead acid battery. [CO-1] [L-1]
- i) Explain the significance of SOC. [CO-2] [L-2]
- j) Name two companies who are setting battery swapping stations in India?
[CO-1] [L-1] **2×10**

PART-A

- Q.2 Justify the statement "electric vehicles in India are facing challenges / issues for commercial viability".
[CO-5] [L-5] **20**
- Q.3 Ankita wants to design electric scooty having gross vehicle weight of 198 kg. The other values considered for design are $K_r = 0.02$, gradient angle = 30° , radius of wheel = 6 inches, transmission gear ratio = 4. The bike achieves max speed of 40 km/hr in 5 seconds. Calculate power and torque requirement of the motor for the designed scooty?
[CO-4] [L-4] **20**
- Q.4 Compare DC brushed, DC brushless, induction, synchronous, switched reluctance motor on following parameters:

- a) Power to weight ratio.
- b) Torque speed.
- c) Efficiency.
- d) Cost of controllers.
- e) Cost of motors.

[CO-5] [L-5] **4×5**

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? [CO5][L5]
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 Li ion acid batteries?
[CO-2] [L-2] **5**
- Q.7 a) As an entrepreneur you want to open battery swapping 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, May 2023

BBA (General and Banking)/ BBA (G) IB/ B.Com (H) and I.I. — Fourth Semester
ENTREPRENEURSHIP FOUNDATIONS PRACTICE (BBA-O-07)

Time: 3 hrs.

Max Marks: **50**

No. of pages: 1

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

PART-A

Q.1 a) **State whether the following statements are TRUE or FALSE:**

- i) "A bootstrap is a business launched by an entrepreneur with outside cash or other support". Is this statement true or false?
- ii) Business model canvas has seven blocks. Is this statement true or false?
- iii) In today's world, if your product or services does not have a digital presence, it is assumed that you do not exist.
- iv) Acquiring a new customer is estimated to be five times more expensive than retaining an old customer. **1×4**

b) **Fill in the blanks:**

- i) Job description typically outlive _____, _____ and _____ of an employee.
- ii) Building relationship creates _____ proposition for the customer.
- iii) LLP means _____.
- iv) In business model canvas there are total _____ blocks.
- v) Give any two factors, which helps you to select social media channel to have digital presence of your business: _____ and _____.
- vi) For startup business which sort of legal entity is recommended _____? **1×6**

PART-B

- Q.2 How would you explore right type of co-founder, explain the purpose and reasoning for getting them on board. Describe the job description of each co-founder of your business enterprise. **10**
- Q.3 What do you understand by a business model? Draw the business model canvas and explain the Indigo Airlines key answers for all the blocks of its business model. **10**
- Q.4 Discuss "Bootstrapping" in brief and also explain different sources. **10**
- Q.5 Why it is important to build a digital presence? Identify the different types of digital channels. Explain your understanding how a digital channel relates to a particular business? **10**
- Q.6 What is a significance of MVP? Whether the MUP needs to be further refined or whether a pivot is required? When and how to pivot in order to ensure success for your business? **10**
- Q.7 Explain the significance of segmentation and Niche marketing for customer acquisition. Create a customer acquisition plan for your venture. **10**

End Semester Examination, May 2023

B. Tech. – Second Semester

BIOLOGY FOR ENGINEERS (BBT-100)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer briefly.

- a) Mention the significance of Binomial nomenclature with example. [CO-1] [L-1]
- b) How does an organism interact with its environment? [CO-1] [L-1]
- c) Enumerate any five characteristics of living beings. [CO-2] [L-1]
- d) Mention key features of a virus. [CO-2] [L-1]
- e) Why are Archaea-bacteria called extremophiles? [CO-1] [L-1]
- f) Why are blood groups identified before blood transfusion? [CO-4] [L-1]
- g) Identify the function of kidney. [CO-4] [L-1]
- h) What is Myocardial infarction? [CO-4] [L-1]
- i) Enlist the functions of connective tissue. [CO-3] [L-1]
- j) Identify the types of biological datasets. [CO-1] [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 structure of a plant cell. [CO-2] [L-3] **10**
- Q.3 a) Describe the characteristic features and importance of fungi. [CO-2] [L-2] **10**
b) Evaluate the applications of microbes in bioremediation. [CO-2] [L-5] **10**
- Q.4 a) Analyze the role of proteins in living organisms. [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) Explain the process of digestion 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 hypertension and hypotension, and suggest ways to prevent them. [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, May 2023

B. Tech. – Third Semester CELL BIOLOGY (BBT-DS-301)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- a) List two types of transport mechanisms across the cell membrane.
- b) What are microtubules and microfilaments?
- c) Define "Apoptosis".
- d) Illustrate the GPCR signaling pathway.
- e) Explain the functions of nucleus.
- f) Write a short note on the lysosomes.
- g) List the cell membrane proteins.
- h) Compare convergence and divergence mode of cell signaling.
- i) Explain the neurotransmitters.
- j) Define "Extracellular Matrix"

[CO-1,2,3,4][L-1,2,5] **2×10**

PART-A

Q.2 Compare between 'endoplasmic reticulum' and 'golgi complex structure' and functions. [CO-2][L-4] **20**

Q.3 Describe the fluid mosaic model of cell membrane with diagram. [CO-1][L-2] **20**

Q.4 Describe the structure and function of the mitochondria and nucleus. [CO-2][L-4] **20**

PART-B

Q.5 Explain various receptors of the cell signaling. [CO-3][L-2] **20**

Q.6 Describe the cell junctions and adhesion. [CO-3][L-2] **20**

Q.7 a) Illustrate the structure and function of neurons. [CO-4][L-2] **10**
b) Discuss the structural proteins of the muscles. [CO-4][L-6] **10**

End Semester Examination, May 2023
B. Tech. – Third Semester
MICROBIOLOGY (BBT-DS-302/ BBT-DS-302A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following questions:

- a) How Robert Koch contributed to the field of microbiology? [CO-1][L-2]
- b) How bacteria can be classified on the basis of the morphological characteristics? [CO-1][L-2]
- c) What is a selective medium? Give an example. [CO-2][L-2]
- d) How algae and cyanobacteria are similar? How do they differ? [CO-3][L-2]
- e) What is a turbidostat? [CO-3][L-2]
- f) Define generation time and growth rate in microorganisms. [CO-3][L-3]
- g) What do you mean by transducing phages? [CO-5][L-3]
- h) How much energy is captured in TCA? [CO-4][L-2]
- i) Differentiate between an antiseptic and a disinfectant. [CO-6][L-3]
- j) How a heat sensitive liquid is sterilized? [CO-3][L-2] **2×10**

PART-A

- Q.2 a) Describe how Pasteur's work conclusively disproved the theory of spontaneous generation. [CO-1][L-2] **6**
b) Describe briefly the major kinds of microbial characteristics that are useful in their classification. [CO-2][L-2] **14**
- Q.3 Diagram a Gram-positive and Gram-negative bacterial cell wall. Demonstrate the differences in the chemical structure of these two types of bacterial cell walls. Where and when does penicillin affect bacterial cells? [CO-3][L-3] **20**
- Q.4 a) How spore formation takes place in bacteria? Enumerate the differences between a vegetative cell and a spore. [CO-3][L-2] **12**
b) How microbial growth is influenced by physical factors in its environment. [CO-3][L-2] **8**

PART-B

- Q.5 What is transduction and how it was discovered in bacteria? How it is used for mapping of genes? [CO-5][L-3] **20**
- Q.6 a) Show how oxidation of one molecule of acetyl Co-A can yield 12 ATP molecules. [CO-5,4][L-3] **12**
b) How synchronous cultures are important in microbiology? How can they be obtained? [CO-3][L-3] **8**
- Q.7 Give an account of different chemical methods that are used to control microbial populations along with their mode of action upon microorganisms. Also mention the practical applications of these agents. [CO-6][L-3] **20**

End Semester Examination, May 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:

- Compare the structures of the following two hexose sugars: D-glucose and D-fructose. [CO-1][L-2]
- Explain the basis for a positive "Iodine test" displayed by starch. [CO-1][L-3]
- Differentiate between N-linked and O-linked glycoproteins. [CO-1][L-1]
- Draw the expected ionic states of glycine when it is dissolved in water, acidic solution and in basic solution. [CO-2][L-2]
- Is the following statement true? "Glyceraldehyde, the simplest aldose exists as D- and L-enantiomers but the simplest ketose sugar, dihydroxyacetone does not have enantiomers". Explain. [CO-2][L-3]
- Analyse the structures of the following two disaccharides, maltose (formed of two units of glucose, $C_{12}H_{22}O_{11}$) and sucrose (formed of a glucose and a fructose unit, $C_{12}H_{22}O_{11}$). Comment on their capacity to act as reducing agents. [CO-4][L-1]
- Summarize the effects that various factors including pH, temperature and substrate concentration, would have on enzyme activity. [CO-1][L-2]
- How is oxaloacetate replenished for TCA cycle? [CO-3][L-2]
- Malonyl CoA is the building block for fatty acid synthesis. How is it produced? [CO-4][L-2]
- Why is gluconeogenesis an essential metabolic pathway even though it is energetically expensive? [CO-2][L-3] **2×10**

PART-A

- Chains of amino acids fold to attain energetically favoured protein structures. Explain the limitations of protein folding and how they are resolved. [CO-1][L-3] **20**
- Describe the various types of phospholipids. Give examples. [CO-1][L-2] **20**
- Illustrate a typical amino acid titration curve and explain what information about the properties of the amino acid can be derived from it. [CO-3][L-4] **20**

PART-B

- Explain how a competitive inhibitor affects the V_{max} and K_m of an enzyme. [CO-3][L-3] **20**
- Describe the four complexes and three electron carriers of the electron transport chain. [CO-2][L-2] **20**
- Explain the steps of urea cycle and its significance in detail. [CO-4][L-2] **20**

End Semester Examination, May 2023
B. Tech. – Third Semester
BIO-ANALYTICAL 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**. Marks are indicated against each question.

Q.1 Answer the following in brief:

- a) Explain the importance of instrument calibration. [CO-1][L-3]
- b) List six bioanalytical instruments. [CO-1][L-1]
- c) Describe the principle behind partition chromatography. [CO-3][L-1]
- d) You have purified a protein. Would you choose a spectroscopic method to determine its concentration? Explain why? [CO-5][L-5]
- e) Mention a utility of x-ray spectroscopy. [CO-6][L-3]
- f) List the instruments that are used to monitor radioactivity. [CO-6][L-1]
- g) Is isoelectric focusing a suitable method to determine the p_i of a protein? Explain. [CO-4][L-3]
- h) Explain the bright field and dark field microscopy. [CO-3][L-2]
- i) Differentiate between scanning electron microscopy and transmission electron microscopy. [CO-5][L-2]
- j) List the properties of α , β and γ rays. [CO-6][L-1] **2×10**

PART-A

- Q.2 Describe image formation in a compound microscope with the help of a ray diagram. [CO-1][L-2] **20**
- Q.3 Discuss a utility of molecular exclusion chromatography. [CO-3][L-3] **20**
- Q.4 Devise a methodology to isolate nucleus from cell extracts. Give reasons for your choice of instruments. [CO-2][L-6] **20**

PART-B

- Q.5 Differentiate between native and SDS-polyacrylamide gel electrophoresis. [CO-4][L-2] **20**
- Q.6 Provide a sketch and description of the various components of a UV-Vis spectrophotometer. [CO-5][L-3] **20**
- Q.7 How is DNA separated, visualized and analyzed by gel electrophoresis? [CO-4][L-3] **20**

End Semester Examination, May 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 the following in brief:

- a) Explain any genomic databank.
- b) What are the main differences between dynamic programming in local and global sequence alignment?
- c) What type of information can be extracted from primary database?
- d) How pair wise sequence alignment is related to homology studies?
- e) How are trees used by CLUSTALW in conducting multiple sequence alignment.
- f) What is the role of EMBL?
- g) Elaborate any file format with suitable example.
- h) Enumerate the advantages of X-ray crystallography?
- i) What do you mean by peptide mass fingerprinting?
- j) Illustrate advantages of STS content mapping.

2×10

PART-A

Q.2 What is DBMS? Explain ER Model with suitable diagram. [CO-1] [L-2] **20**

Q.3 Apply the Smith Waterman algorithm to determine the best alignment for the following nucleotide sequences, using +2 for match score, -1 for mismatch score and 0 for gap penalty. Sequence #1: ATGCT; Sequence #2: AAGAT. [CO-2] [L-5] **20**

Q.4 Among various methods employed for phylogenetic analysis distance method is considered better than maximum likelihood method. Comment on this using an example. [CO-3] [L-4] **20**

PART-B

Q.5 a) Explain any protein structure prediction method. **15**
b) What are the challenges faced in integration of biological data? [CO-4] [L-4] **5**

Q.6 a) Describe HMM approaches for prediction of genes in DNA. **10**
b) Discuss advantages and limitations of using HMM. [CO-5] [L-3] **10**

Q.7 a) Elaborate the steps followed in genome assembly. **14**
b) What are the advantages of informatics technique in assembling genome? [CO-6] [L-3] **6**

End Semester Examination, May 2023

B. Tech. (Biotechnology) - Fourth Semester

MOLECULAR BIOLOGY (BBT-DS-401)

Time: 3 hrs.

Max. Marks: **100**

No. of pages: 1

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

Q.1 Answer in brief:

a) Complete the following, label A, B and C and name the process central (Dogma)

A DNA \xrightarrow{B} mRNA \xrightarrow{C} Protein

[CO-1] [L-1]

b) What is bi-directional replication?

[CO-1] [L-1]

c) Define 'C-value paradox'.

[CO-1] [L-1]

d) Illustrate the term translation.

[CO-3] [L-2]

e) Explain the core and regulatory promoters of Eukaryotes.

[CO-2] [L-2]

f) Write a short note on the post translational modification.

[CO-3] [L-1]

g) List the enzymes involved in eukaryotic DNA replication.

[CO-1] [L-1]

h) Compare prokaryotic and eukaryotic transcription factors.

[CO-4] [L-5]

i) Explain the genetic codon.

[CO-4] [L-2]

j) Define lac operon system of prokaryotes.

[CO-3] [L-1] **2×10**

PART-A

Q.2 a) Explain the DNA double helix structure with diagram. [CO-1][L-2] **10**

b) Evaluate the activity of different enzymes involved in DNA replication. [CO-1][L-5] **10**

Q.3 a) Describe the various mechanisms of genetic material compaction to fit within the nucleus. [CO-1] [L-2] **10**

b) How many subunits are there in E.Coli RNA polymerase? Add a note in core enzyme and holoenzyme of E.Coli RNA Polymerase. [CO-1] [L-1] **10**

Q.4 a) Distinguish between prokaryotes promoters with eukaryotic promoters for transcription process. [CO-2] [L-4] **10**

b) Compare rho dependent and independent termination of transcription. [CO-2] [L-5] **10**

PART-B

Q.5 Explain post translational modifications. Explain any two in detail. [CO-3] [L-5] **20**

Q.6 Describe the transposable elements in bacteria and their evolutionary significance. [CO-3] [L-2] **20**

Q.7 Describe the translation process in detail. [CO-4] [L-2] **20**

End Semester Examination, May 2023

B. Tech. (Biotechnology) - Fourth Semester

IMMUNOLOGY (BBT-DS-402A)

Time: 3 hrs.

Max. Marks: **100**

No. of pages: **1**

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

Q.1 Answer in brief:

- a) Define the terms epitope and paratope. [CO-1] [L-1]
- b) Contrast between innate and adaptive immune response. [CO-2] [L-2]
- c) Illustrate the process of opsonization. [CO-3] [L-3]
- d) Analyze the properties of polyclonal antibodies. [CO-5] [L-4]
- e) Outline the causative agents for autoimmune disorders. [CO-4] [L-5]
- f) Elaborate the risk associated with whole organism vaccine and attenuated vaccine. [CO-6] [L-4]
- g) What is Hypersensitivity? [CO-3] [L-1]
- h) Explain about the immunity to protozoal infections. [CO-5] [L-2]
- i) Determine the significance of MAC formation. [CO-4] [L-4]
- j) Identify the reasons for spur formation in ODDT with suitable example. [CO-2] [L-3] **2×10**

PART-A

- Q.2 a) Describe structure organization and function of mucous associated lymphoid tissue. (MALT) [CO-1][L-1] **10**
b) What is major histocompatibility complex? Contrast between MHCI and MHCII. [CO-1] [L-3] **10**
- Q.3 Discuss the papain and pepsin cleavage components of antibody. Determine the structure and functions of IgG and IgA antibodies. [CO-2] [L-5] **20**
- Q.4 a) Analyze the formation of antibody heavy chain and light chain gene formation. [CO-4] [L-4] **10**
b) Explain the antigen processing from endogenous and exogenous pathway. [CO-3] [L-5] **10**

PART-B

- Q.5 Evaluate the difference between alternate and lectin complement pathway. Mention the names of antibodies that activate classic pathway. [CO-3] [L-5] **20**
- Q.6 a) Illustrate the way by which the immune system works against viral infections. [CO-5] [L-4] **10**
b) Discuss Type-I and Type-IV hypersensitivity mechanisms. [CO-6] [L-4] **10**
- Q.7 Explain transplantation and its types. Design an experiment to show the transplantation graft rejection. [CO-6] [L-6] **20**

End Semester Examination, May 2023
B. Tech. (Biotechnology) - Fourth Semester
FERMENTATION TECHNOLOGY (BBT-DS-403A)

Time: 3 hrs.

Max. Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 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) Enlist the various media based on the nutritional components. [CO-1] [L-1]
- b) Name the various characteristics of ideal media for industrial fermentation. [CO-3] [L-1]
- c) List four key features of an ideal biotechnological bioprocess. [CO-2] [L-1]
- d) What are primary and secondary metabolites? [CO-3] [L-1]
- e) What are the characteristics of an ideal strain for bioprocessing? [CO-1] [L-1]
- f) List the formula to demonstrate that during steady state, specific growth rate is independent of substrate concentration. [CO-3] [L-1]
- g) Names the various important aspects of fermentation economics. [CO-3] [L-2]
- h) What is HPLC? [CO-2] [L-1]
- i) What is diauxic growth? [CO-3] [L-1]
- j) Draw the labeled diagram of quadrant streaking. [CO-3] [L-2] **2×10**

PART-A

Q.2 What is downstream processing? Explain all the steps involved in downstream processing. [CO-1][L-2] **20**

Q.3 Illustrate the process of 'screening'. Also, explain all the steps involved in screening to get the active pharmaceutical ingredient (API) of interest. [CO-3] [L-2] **20**

Q.4 Discuss the various strategies for strain improvement. [CO-4] [L-6] **20**

PART-B

Q.5 Explain the stirred tank bioreactors (STR). Discuss the unit operations in STR. [CO-3] [L-5] **20**

Q.6 Explain why cell disruption is required in downstream processing. Discuss in detail, the various methods of cell disruption. [CO-4] [L-2] **20**

Q.7 Discuss the various methods of sterilization in detail. [CO-3] [L-6] **20**

End Semester Examination, May 2023

B. Tech. (Biotechnology) - Fourth Semester

BIOSTATISTICS (BBT-DS-404)

Time: 3 hrs.

100

Max. Marks:

No. of pages: 6

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

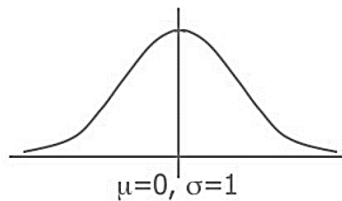
Q.1 Answer the following in brief:

a) State the difference between discrete and continuous random variable.

(CO-1)(L1,2)

b) Identify the type of normal distribution given below:

(CO-3)(L2,3)



c) What do you mean by statistic?

(CO-3)(L3)

d) What is range?

(CO-3)(L3)

e) What is the significance of kurtosis?

(CO-3)(L3,4)

f) The C.V. for sample 1 and 2 is 6.9% and 12.5%, respectively. Which sample according to you is more variable?

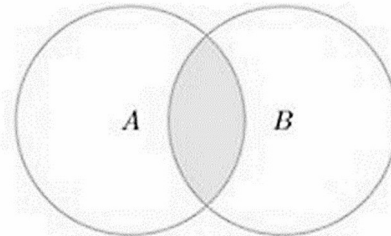
(CO-5) (L3,4)

g) What is the property of exhaustiveness in probability?

(CO-1)(L1,2)

h) For the SET notation given below, identify the type of probability.

(CO-3)(L3,4)

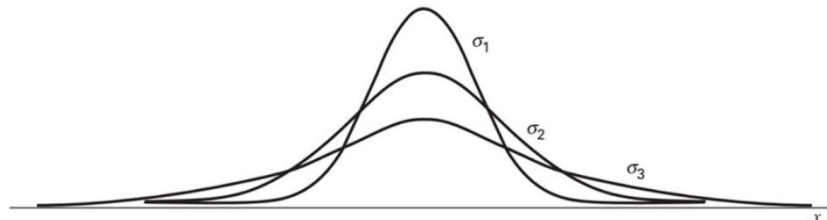


i) What is the conditional probability?

(CO-4)(L3,4,5)

j) For the three normal distributions given below, what is the nature of mean and variance?

(CO-3)(BTL3,4)



2×10

PART A

Q.2 The following table gives the age distribution for the number of deaths, in New York State due to accidents for residents age 25 and older. For the data given construct the following:

Age	Number of Deaths due to accidents
20-30	100
30-40	200
40-50	300
50-60	300
60-70	400

- a) Histogram for the given data. (CO-1,2,3)(L6)
b) A cumulative frequency distribution table. (CO-1,2,3,4)(L4)
c) A probability distribution table. (CO-1,2,3,4)(L4)
d) Cumulative relative frequency distribution table. (CO-1,2,3,4)(L4) **5×4**

Q.3 a) Suppose two samples of human males yield the following results:

	Sample1	Sample2
Age	20 years	10 years
Mean Weight	150 pounds	60 pounds
Standard Deviation	5pounds	5pounds

Calculate the coefficient of variation for both samples and identify which sample is more variable? (CO-1,2,3,5)(L4,5)

5

- b) Indicate for the following variables which you think would be a better measure of central tendency, the mean, the median, or mode, and justify your choice:
- i) Annual incomes of licensed doctors in India. (CO-5)(L5)
 - ii) Diagnoses of patients seen in the emergency department of a large city hospital. (CO-5)(L5)
 - iii) Weights of high-school female football players. (CO-5)(L5) **2×3**
- c) Your statistics teacher tells you on the first day of class that there will be five exams during the term. From the scores on these tests for each student, the instructor will compute a measure of central tendency that will serve as the student's final course grade. Before taking the first test, you must choose whether you want your final grade to be the mean or the median of the five exam scores. Which would you choose? Why? (CO-5,6)(L5) **3**
- d) Identify the skewness on the basis of the data given below:
- i) Mean=Median=Mode (CO-5)(L5)
 - ii) Mode<Median<Mean (CO-5)(L5)
 - iii) Mean<Median<Mode (CO-5)(L5) **1×3**
- e) A simpler and random sample of 11 subjects was drawn from the population. The age (in years) of the 11 subjects is as follows:
 $x_1 = 8, x_2 = 15, x_3 = 25, x_4 = 17, x_5 = 18, x_6 = 19, x_7 = 13, x_8 = 51, x_9 = 12, x_{10} = 13, x_{11} = 19$
Calculate:
- i) Mean (CO-1,2)(L3)
 - ii) Median (CO-1,2)(L3)
 - iii) Mode (CO-1,2)(L3) **1×3**

Q.4 a) The primary aim of a study by Carter should be italicized et.al., was to investigate the effect of the age at onset of bipolar disorder on the course of the illness. One

of the variables investigated was family history of mood disorders. Table given below shows the frequency investigated was of a family history of mood disorders in the two groups of interest (Early age at onset defined to be 18 years or younger and Later age at onset defined to be later than 18years).

Frequency of Family History of Mood Disorder by Age Group Among Bipolar Subjects			
Family History of Mood Disorders	Early = 18(E)	Later > 18(L)	Total
Negative (A)	28	35	63
Bipolar disorder (B)	19	38	57
Unipolar (C)	41	44	85
Unipolar and bipolar (D)	53	60	113
Total	141	177	318

Source: Tasha D. Carter, Emanuela Mundo, Sagar V. Parkh, and James L. Kennedy, "Early Age at Onset as a Risk Factor for Poor Outcome of Bipolar Disorder," *Journal of Psychiatric Research*, 37 (2003), 297-303.

Answer the following questions:

- i) What is the probability that this person will be 18 years old or younger?
(CO-1,2,3,5)(L5,6)
 - ii) Suppose we pick a subject at random from the 318 subjects and find that he is 18 years or younger (E). What is the probability that this subject will be one who has no family history of mood disorders (A)?
(CO-1,2,3,5)(L5,6)
 - iii) Suppose we pick a subject at random and find that he is 18 years or above (L). What is the probability that this subject will be one who has a history of Bipolar disorder in their family (B)?
(CO-1,2,3,5)(L5,6)
 - iv) What is the probability that a person picked at random from the 318 subjects will be Early (E) and will be a person who has no family history of mood disorders (A)?
(CO-1,2,3,5)(L5,6)
 - v) What is the joint probability of Early (E) age at onset and a negative family history of mood disorders (A)?
(CO-1,2,3,5)(L5,6)
 - vi) What is the probability that a person picked at random from 318 subjects will be late onset (L) and will be a person who has history of both unipolar and bipolar disorder in their family?
(CO-1,2,3,5)(L5,6)
 - vii) What is the probability that this person will be an Early age (E) of onset subject or will have no family history of mood disorders (A) or both?
(CO-1,2,3,5)(L5,6)
 - viii) What is the probability that this person will be 18 years old or above?
(CO-1,2,3,5)(L5,6)
 - ix) Suppose we pick a subject at random and find that he is 18 years or above (L). What is the probability that this subject will be one who has a history of unipolar disorder in their family (B)?
(CO-1,2,3,5)(L5,6)
 - x) What is the joint probability of Late (E) age at onset and a negative family history of mood disorders (A)?
(CO-1,2,3,5)(L5,6) **1 × 10**
- b) A medical research team wished to evaluate a proposed screening test for Alzheimer's disease. The test was given to a random sample of 450 patients with Alzheimer's disease and an independent random sample of 500 patients without symptoms of the disease. The two samples were drawn from populations of

Alzheimer's Diagnosis?			
Test Result	Yes (D)	No (\bar{D})	Total
Positive (T)	430	15	
Negative (\bar{T})	20	500	
Total			

subjects who were 65 years of age or older. The results are as follows:

- i) Estimate the sensitivity of the test. (CO-1,2,3,5)(L3)
- ii) Estimate the specificity of the test. (CO-1,2,3,5)(L3)
- iii) Estimate the predictive value positive. (CO-1,2,3,5)(L3)
- iv) Estimate the predictive value negative. (CO-1,2,3,5)(L3) **10**

PART-B

Q.5 In an article appearing in the Journal of the American Dietetic Association, Holbenetal. looked at food security status in families in the Appalachian region of southern Ohio, USA. The purpose of the study was to examine hunger rates of families with children in a local Head Start program in Athens, Ohio. The survey instrument included the 18-question U.S. House hold Food Security Survey Module for measuring hunger and food security. In addition, participants were asked how many food assistance programs they had used in the last 12 months. Table below shows the number of food assistance programs used by subjects in this sample.

Number of Assistance Programs Utilized by Families with Children in Head Start Programs in Southern Ohio	
Number of Programs	Frequency
1	62
2	47
3	39
4	39
5	58
6	37
7	4
8	11
Total	297

Source: David H. Holben, Ph.D. and John P. Holcomb, Ph.D. Used with permission.

Use the data given in the table and answer the following:

- i) Using the data construct probability distribution table. (CO-1,2,3,4)(L6) **4**
- ii) Construct accumulative probability distribution table. (CO-1,2,3,4)(L6) **4**
- iii) What is the probability that a randomly selected family used three assistance programs? (CO-1,2,3,4)(L5) **1**
- iv) What is the probability that a randomly selected family used either one or two programs? (CO-1,2,3,4)(L5) **2**
- v) What is the probability that a family picked at random used two or fewer assistance programs? (CO-1,2,3,4)(L5) **1**
- vi) What is the probability that a randomly selected family used fewer than four programs? (CO-1,2,3,4)(L5) **1**
- vii) What is the probability that a randomly selected family used five or more programs? (CO-1,2,3,4) (L5) **1**
- viii) What is the probability that a randomly selected family used between three and five programs, inclusive? (CO-1,2,3,4)(L5) **2**
- xi) What is the probability that a randomly selected family used seven or more programs? (CO-1,2,3, 4)(L5) **2**
- x) What is the probability that a randomly selected family used between five and six programs, inclusive? (CO-1,2,3,4)(L5) **2**

4/6

Q.6 a) Coughlin et al. estimated the percentage of women living in border counties along the southern United States with Mexico (designated counties in California, Arizona, New Mexico, and Texas) who have less than a high school education to be 18.7%. Assume the corresponding probability is 0.19. Suppose we select three women at random. Find the probability that the number with less than a high-school education is:

- i.) Exactly Zero (CO-1,2,3,5) (L5)
- ii.) Exactly one (CO-1,2,3,5) (L5)
- iii.) More than one (CO-1,2,3,5) (L5)
- iv.) Two or fewer (CO-1,2,3,5) (L5)
- v.) Exactly three (CO-1,2,3,5) (L5) **1×5**

b) In a survey of nursing students pursuing a master's degree, 75 percent stated that they expect to be promoted to a higher position within one month after receiving the degree. If this percentage holds for the entire population, find, for a sample of 15, the probability that the number expecting a promotion within a month after receiving their degree is:

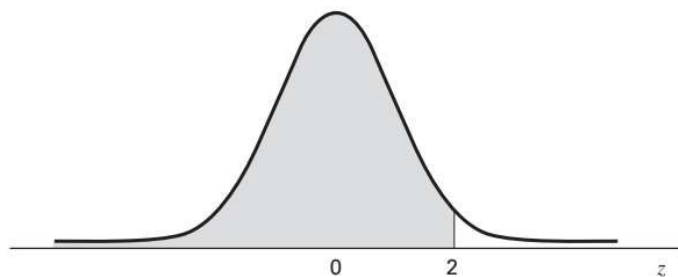
- i) Six (CO-1,2,3,5) (L5)
- ii) at least seven (CO-1,2,3,5) (L5)
- iii) No more than five (CO-1,2,3,5) (L5)
- iv) Between six and nine, inclusive (CO-1,2,3,5) (L5)
- v) More than four, inclusive (CO-1,2,3,5) (L5) **1×5**

c) In a study of drug-induced anaphylaxis among patients taking rocuronium bromide as part of their anesthesia, Laake and Røttingen found that the occurrence of anaphylaxis followed a Poisson model with $\lambda=12$ incidents per year in Norway. Find the probability that in the next year, among patients receiving rocuronium,

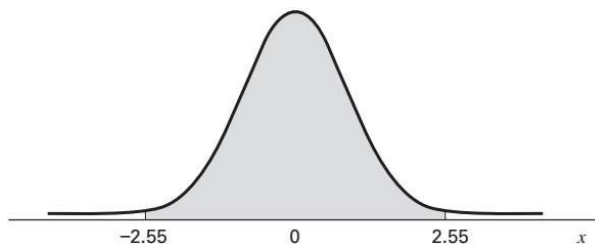
- i) Exactly 3 will experience anaphylaxis (CO-1,2,3,5) (L5)
- ii) at least 3 patients (CO-1,2,3,5) (L5)
- iii) more than 2 (CO-1,2,3,5) (L5)
- iv) less than 7 (CO-1,2,3,5) (L5)
- v) between 4 and 5 (CO-1,2,3,5) (L5) **1×5**

d) Find area of the shaded region under the standard normal distribution:

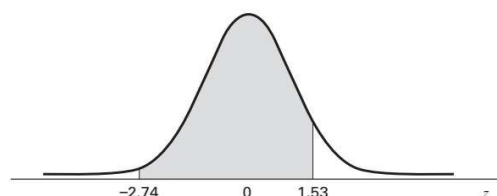
- i) (CO-1,2,3,4,5) (L4)



- ii) (CO-1,2,3,4,5) (L4)

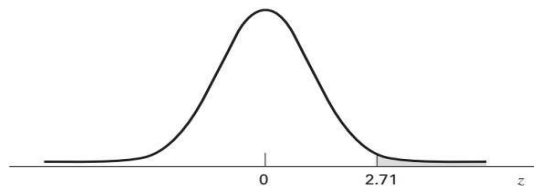


- iii) (CO-1,2,3,4,5) (L4)



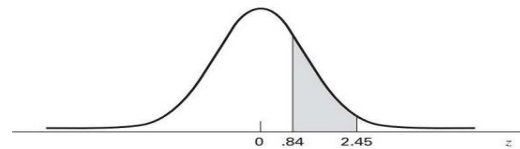
iv)

(CO-1,2,3,4,5)(L4)



v)

(CO-1,2,3,4,5)(L4)



1×5

Q.7 a) Given the standard normal distribution find:

- i) $P(z \geq 0.60)$ (CO-1,2,3,4)(L4)
- ii) $P(z \geq -0.64)$ (CO-1,2,3,4)(L4)
- iii) $P(z \leq -1.63)$ (CO-1,2,3,4)(L4)
- iv) $P(z \leq 1.83)$ (CO-1,2,3,4)(L4)
- v) $P(-1.76 \leq z \leq 3.33)$ (CO-1,2,3,4)(L4)
- vi) $P(-2.33 \leq z \leq 2.76)$ (CO-1,2,3,4)(L4)
- vii) $P(z = 0.67)$ (CO-1,2,3,4)(L4)
- viii) $P(-1.28 \leq z \leq 1.28)$ (CO-1,2,3,4)(L4) **1×8**

b) Explain why each of the following measurements is or is not the result of a Bernoulli trial:

- i) The gender of a new born child. (CO-5)(L5)
- ii) The classification of a hospital patient's condition as stable, critical, fair, good, or poor. (CO-5)(L5)
- iii) The weighting rams of a new born child. (CO-5)(L5)
- iv) The number of surgical procedures performed in a hospital in a week. (CO-5)(L5)
- v) A hospital patient's temperature in degrees Celsius. (CO-5)(L5)
- vi) A hospital patient's vital signs recorded as normal or not normal. (CO-5)(L5) **2×6**

Table1

Cumulative Binomial Probability Distribution

$n = 5$										
$x \backslash p$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.9510	.9039	.8587	.8154	.7738	.7339	.6957	.6591	.6240	.5905
1	.9990	.9962	.9915	.9852	.9774	.9681	.9575	.9456	.9326	.9185
2	1.0000	.9999	.9997	.9994	.9988	.9980	.9969	.9955	.9937	.9914
3	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9997	.9995
4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$x \backslash p$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.5584	.5277	.4984	.4704	.4437	.4182	.3939	.3707	.3487	.3277
1	.9035	.8875	.8708	.8533	.8352	.8165	.7973	.7776	.7576	.7373
2	.9888	.9857	.9821	.9780	.9734	.9682	.9625	.9563	.9495	.9421
3	.9993	.9991	.9987	.9983	.9978	.9971	.9964	.9955	.9945	.9933
4	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9999	.9998	.9998	.9997
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$x \backslash p$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.3077	.2887	.2707	.2536	.2373	.2219	.2073	.1935	.1804	.1681
1	.7167	.6959	.6749	.6539	.6328	.6117	.5907	.5697	.5489	.5282
2	.9341	.9256	.9164	.9067	.8965	.8857	.8743	.8624	.8499	.8369
3	.9919	.9903	.9886	.9866	.9844	.9819	.9792	.9762	.9728	.9692
4	.9996	.9995	.9994	.9992	.9990	.9988	.9986	.9983	.9979	.9976
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$x \backslash p$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.1564	.1454	.1350	.1252	.1160	.1074	.0992	.0916	.0845	.0778
1	.5077	.4875	.4675	.4478	.4284	.4094	.3907	.3724	.3545	.3370
2	.8234	.8095	.7950	.7801	.7648	.7491	.7330	.7165	.6997	.6826
3	.9653	.9610	.9564	.9514	.9460	.9402	.9340	.9274	.9204	.9130
4	.9971	.9966	.9961	.9955	.9947	.9940	.9931	.9921	.9910	.9898
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 5$ (continued)										
$x \backslash p$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0715	.0656	.0602	.0551	.0503	.0459	.0418	.0380	.0345	.0312
1	.3199	.3033	.2871	.2714	.2562	.2415	.2272	.2135	.2002	.1875
2	.6651	.6475	.6295	.6114	.5931	.5747	.5561	.5375	.5187	.5000
3	.9051	.8967	.8879	.8786	.8688	.8585	.8478	.8365	.8247	.8125
4	.9884	.9869	.9853	.9835	.9815	.9794	.9771	.9745	.9718	.9688
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 6$										
$x \backslash p$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.9415	.8858	.8330	.7828	.7351	.6899	.6470	.6064	.5679	.5314
1	.9985	.9943	.9875	.9784	.9672	.9541	.9392	.9227	.9048	.8857
2	1.0000	.9998	.9995	.9988	.9978	.9962	.9942	.9915	.9882	.9841
3	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9997	.9995	.9992	.9987
4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$x \backslash p$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.4970	.4644	.4336	.4046	.3771	.3513	.3269	.3040	.2824	.2621
1	.8655	.8444	.8224	.7997	.7765	.7528	.7287	.7044	.6799	.6554
2	.9794	.9739	.9676	.9605	.9527	.9440	.9345	.9241	.9130	.9011
3	.9982	.9975	.9966	.9955	.9941	.9925	.9906	.9884	.9859	.9830
4	.9999	.9999	.9998	.9997	.9996	.9995	.9993	.9990	.9987	.9984
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$x \backslash p$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.2431	.2252	.2084	.1927	.1780	.1642	.1513	.1393	.1281	.1176
1	.6308	.6063	.5820	.5578	.5339	.5104	.4872	.4644	.4420	.4202
2	.8885	.8750	.8609	.8461	.8306	.8144	.7977	.7804	.7626	.7443
3	.9798	.9761	.9720	.9674	.9624	.9569	.9508	.9443	.9372	.9295
4	.9980	.9975	.9969	.9962	.9954	.9944	.9933	.9921	.9907	.9891
5	.9999	.9999	.9999	.9998	.9998	.9997	.9996	.9995	.9994	.9993
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$x \backslash p$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.1079	.0989	.0905	.0827	.0754	.0687	.0625	.0568	.0515	.0467
1	.3988	.3780	.3578	.3381	.3191	.3006	.2828	.2657	.2492	.2333
2	.7256	.7064	.6870	.6672	.6471	.6268	.6063	.5857	.5650	.5443
3	.9213	.9125	.9031	.8931	.8826	.8714	.8596	.8473	.8343	.8208
4	.9873	.9852	.9830	.9805	.9777	.9746	.9712	.9675	.9635	.9590
5	.9991	.9989	.9987	.9985	.9982	.9978	.9974	.9970	.9965	.9959
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

<i>n</i> = 6 (continued)										
$\begin{matrix} p \\ x \end{matrix}$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0422	.0381	.0343	.0308	.0277	.0248	.0222	.0198	.0176	.0156
1	.2181	.2035	.1895	.1762	.1636	.1515	.1401	.1293	.1190	.1094
2	.5236	.5029	.4823	.4618	.4415	.4214	.4015	.3820	.3627	.3437
3	.8067	.7920	.7768	.7610	.7447	.7280	.7107	.6930	.6748	.6562
4	.9542	.9490	.9434	.9373	.9308	.9238	.9163	.9083	.8997	.8906
5	.9952	.9945	.9937	.9927	.9917	.9905	.9892	.9878	.9862	.9844
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

<i>n</i> = 7										
$\begin{matrix} p \\ x \end{matrix}$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.9321	.8681	.8080	.7514	.6983	.6485	.6017	.5578	.5168	.4783
1	.9980	.9921	.9829	.9706	.9556	.9382	.9187	.8974	.8745	.8503
2	1.0000	.9997	.9991	.9980	.9962	.9937	.9903	.9860	.9807	.9743
3	1.0000	1.0000	1.0000	.9999	.9998	.9996	.9993	.9988	.9982	.9973
4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$\begin{matrix} p \\ x \end{matrix}$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.4423	.4087	.3773	.3479	.3206	.2951	.2714	.2493	.2288	.2097
1	.8250	.7988	.7719	.7444	.7166	.6885	.6604	.6323	.6044	.5767
2	.9669	.9584	.9487	.9380	.9262	.9134	.8995	.8846	.8687	.8520
3	.9961	.9946	.9928	.9906	.9879	.9847	.9811	.9769	.9721	.9667
4	.9997	.9996	.9994	.9991	.9988	.9983	.9978	.9971	.9963	.9953
5	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9998	.9997	.9996
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$\begin{matrix} p \\ x \end{matrix}$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.1920	.1757	.1605	.1465	.1335	.1215	.1105	.1003	.0910	.0824
1	.5494	.5225	.4960	.4702	.4449	.4204	.3965	.3734	.3510	.3294
2	.8343	.8159	.7967	.7769	.7564	.7354	.7139	.6919	.6696	.6471
3	.9606	.9539	.9464	.9383	.9294	.9198	.9095	.8984	.8866	.8740
4	.9942	.9928	.9912	.9893	.9871	.9847	.9819	.9787	.9752	.9712
5	.9995	.9994	.9992	.9989	.9987	.9983	.9979	.9974	.9969	.9962
6	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9999	.9998	.9998
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

<i>n</i> = 7 (continued)										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.0745	.0672	.0606	.0546	.0490	.0440	.0394	.0352	.0314	.0280
1	.3086	.2887	.2696	.2513	.2338	.2172	.2013	.1863	.1721	.1586
2	.6243	.6013	.5783	.5553	.5323	.5094	.4866	.4641	.4419	.4199
3	.8606	.8466	.8318	.8163	.8002	.7833	.7659	.7479	.7293	.7102
4	.9668	.9620	.9566	.9508	.9444	.9375	.9299	.9218	.9131	.9037
5	.9954	.9945	.9935	.9923	.9910	.9895	.9877	.9858	.9836	.9812
6	.9997	.9997	.9996	.9995	.9994	.9992	.9991	.9989	.9986	.9984
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0249	.0221	.0195	.0173	.0152	.0134	.0117	.0103	.0090	.0078
1	.1459	.1340	.1228	.1123	.1024	.0932	.0847	.0767	.0693	.0625
2	.3983	.3771	.3564	.3362	.3164	.2973	.2787	.2607	.2433	.2266
3	.6906	.6706	.6502	.6294	.6083	.5869	.5654	.5437	.5219	.5000
4	.8937	.8831	.8718	.8598	.8471	.8337	.8197	.8049	.7895	.7734
5	.9784	.9754	.9721	.9684	.9643	.9598	.9549	.9496	.9438	.9375
6	.9981	.9977	.9973	.9968	.9963	.9956	.9949	.9941	.9932	.9922
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>n</i> = 8										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.9227	.8508	.7837	.7214	.6634	.6096	.5596	.5132	.4703	.4305
1	.9973	.9897	.9777	.9619	.9428	.9208	.8965	.8702	.8423	.8131
2	.9999	.9996	.9987	.9969	.9942	.9904	.9853	.9789	.9711	.9619
3	1.0000	1.0000	.9999	.9998	.9996	.9993	.9987	.9978	.9966	.9950
4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9997	.9996
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.3937	.3596	.3282	.2992	.2725	.2479	.2252	.2044	.1853	.1678
1	.7829	.7520	.7206	.6889	.6572	.6256	.5943	.5634	.5330	.5033
2	.9513	.9392	.9257	.9109	.8948	.8774	.8588	.8392	.8185	.7969
3	.9929	.9903	.9871	.9832	.9786	.9733	.9672	.9603	.9524	.9437
4	.9993	.9990	.9985	.9979	.9971	.9962	.9950	.9935	.9917	.9896
5	1.0000	.9999	.9999	.9998	.9998	.9997	.9995	.9993	.9991	.9988
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

<i>n</i> = 8 (continued)										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.1517	.1370	.1236	.1113	.1001	.0899	.0806	.0722	.0646	.0576
1	.4743	.4462	.4189	.3925	.3671	.3427	.3193	.2969	.2756	.2553
2	.7745	.7514	.7276	.7033	.6785	.6535	.6282	.6027	.5772	.5518
3	.9341	.9235	.9120	.8996	.8862	.8719	.8567	.8406	.8237	.8059
4	.9871	.9842	.9809	.9770	.9727	.9678	.9623	.9562	.9495	.9420
5	.9984	.9979	.9973	.9966	.9958	.9948	.9936	.9922	.9906	.9887
6	.9999	.9998	.9998	.9997	.9996	.9995	.9994	.9992	.9990	.9987
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.0514	.0457	.0406	.0360	.0319	.0281	.0248	.0218	.0192	.0168
1	.2360	.2178	.2006	.1844	.1691	.1548	.1414	.1289	.1172	.1064
2	.5264	.5013	.4764	.4519	.4278	.4042	.3811	.3585	.3366	.3154
3	.7874	.7681	.7481	.7276	.7064	.6847	.6626	.6401	.6172	.5941
4	.9339	.9250	.9154	.9051	.8939	.8820	.8693	.8557	.8414	.8263
5	.9866	.9841	.9813	.9782	.9747	.9707	.9664	.9615	.9561	.9502
6	.9984	.9980	.9976	.9970	.9964	.9957	.9949	.9939	.9928	.9915
7	.9999	.9999	.9999	.9998	.9998	.9997	.9996	.9996	.9995	.9993
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0147	.0128	.0111	.0097	.0084	.0072	.0062	.0053	.0046	.0039
1	.0963	.0870	.0784	.0705	.0632	.0565	.0504	.0448	.0398	.0352
2	.2948	.2750	.2560	.2376	.2201	.2034	.1875	.1724	.1581	.1445
3	.5708	.5473	.5238	.5004	.4770	.4537	.4306	.4078	.3854	.3633
4	.8105	.7938	.7765	.7584	.7396	.7202	.7001	.6795	.6584	.6367
5	.9437	.9366	.9289	.9206	.9115	.9018	.8914	.8802	.8682	.8555
6	.9900	.9883	.9864	.9843	.9819	.9792	.9761	.9728	.9690	.9648
7	.9992	.9990	.9988	.9986	.9983	.9980	.9976	.9972	.9967	.9961
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>n</i> = 9										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.9135	.8337	.7602	.6925	.6302	.5730	.5204	.4722	.4279	.3874
1	.9966	.9869	.9718	.9522	.9288	.9022	.8729	.8417	.8088	.7748
2	.9999	.9994	.9980	.9955	.9916	.9862	.9791	.9702	.9595	.9470
3	1.0000	1.0000	.9999	.9997	.9994	.9987	.9977	.9963	.9943	.9917
4	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9997	.9995	.9991
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

<i>n</i> = 9 (continued)										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.3504	.3165	.2855	.2573	.2316	.2082	.1869	.1676	.1501	.1342
1	.7401	.7049	.6696	.6343	.5995	.5652	.5315	.4988	.4670	.4362
2	.9327	.9167	.8991	.8798	.8591	.8371	.8139	.7895	.7643	.7382
3	.9883	.9842	.9791	.9731	.9661	.9580	.9488	.9385	.9270	.9144
4	.9986	.9979	.9970	.9959	.9944	.9925	.9902	.9875	.9842	.9804
5	.9999	.9998	.9997	.9996	.9994	.9991	.9987	.9983	.9977	.9969
6	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9998	.9997
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.1199	.1069	.0952	.0846	.0751	.0665	.0589	.0520	.0458	.0404
1	.4066	.3782	.3509	.3250	.3003	.2770	.2548	.2340	.2144	.1960
2	.7115	.6842	.6566	.6287	.6007	.5727	.5448	.5171	.4898	.4628
3	.9006	.8856	.8696	.8525	.8343	.8151	.7950	.7740	.7522	.7297
4	.9760	.9709	.9650	.9584	.9511	.9429	.9338	.9238	.9130	.9012
5	.9960	.9949	.9935	.9919	.9900	.9878	.9851	.9821	.9787	.9747
6	.9996	.9994	.9992	.9990	.9987	.9983	.9978	.9972	.9965	.9957
7	1.0000	1.0000	.9999	.9999	.9999	.9999	.9998	.9997	.9997	.9996
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.0355	.0311	.0272	.0238	.0207	.0180	.0156	.0135	.0117	.0101
1	.1788	.1628	.1478	.1339	.1211	.1092	.0983	.0882	.0790	.0705
2	.4364	.4106	.3854	.3610	.3373	.3144	.2924	.2713	.2511	.2318
3	.7065	.6827	.6585	.6338	.6089	.5837	.5584	.5331	.5078	.4826
4	.8885	.8748	.8602	.8447	.8283	.8110	.7928	.7738	.7540	.7334
5	.9702	.9652	.9596	.9533	.9464	.9388	.9304	.9213	.9114	.9006
6	.9947	.9936	.9922	.9906	.9888	.9867	.9843	.9816	.9785	.9750
7	.9994	.9993	.9991	.9989	.9986	.9983	.9979	.9974	.9969	.9962
8	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9999	.9998	.9998	.9997
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0087	.0074	.0064	.0054	.0046	.0039	.0033	.0028	.0023	.0020
1	.0628	.0558	.0495	.0437	.0385	.0338	.0296	.0259	.0225	.0195
2	.2134	.1961	.1796	.1641	.1495	.1358	.1231	.1111	.1001	.0898
3	.4576	.4330	.4087	.3848	.3614	.3386	.3164	.2948	.2740	.2539
4	.7122	.6903	.6678	.6449	.6214	.5976	.5735	.5491	.5246	.5000
5	.8891	.8767	.8634	.8492	.8342	.8183	.8015	.7839	.7654	.7461
6	.9710	.9666	.9617	.9563	.9502	.9436	.9363	.9283	.9196	.9102
7	.9954	.9945	.9935	.9923	.9909	.9893	.9875	.9855	.9831	.9805
8	.9997	.9996	.9995	.9994	.9992	.9991	.9989	.9986	.9984	.9980
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 10$										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.9044	.8171	.7374	.6648	.5987	.5386	.4840	.4344	.3894	.3487
1	.9957	.9838	.9655	.9418	.9139	.8824	.8483	.8121	.7746	.7361
2	.9999	.9991	.9972	.9938	.9885	.9812	.9717	.9599	.9460	.9298
3	1.0000	1.0000	.9999	.9996	.9990	.9980	.9964	.9942	.9912	.9872
4	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9997	.9994	.9990	.9984
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.3118	.2785	.2484	.2213	.1969	.1749	.1552	.1374	.1216	.1074
1	.6972	.6583	.6196	.5816	.5443	.5080	.4730	.4392	.4068	.3758
2	.9116	.8913	.8692	.8455	.8202	.7936	.7659	.7372	.7078	.6778
3	.9822	.9761	.9687	.9600	.9500	.9386	.9259	.9117	.8961	.8791
4	.9975	.9963	.9947	.9927	.9901	.9870	.9832	.9787	.9734	.9672
5	.9997	.9996	.9994	.9990	.9986	.9980	.9973	.9963	.9951	.9936
6	1.0000	1.0000	.9999	.9999	.9999	.9998	.9997	.9996	.9994	.9991
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.0947	.0834	.0733	.0643	.0563	.0492	.0430	.0374	.0326	.0282
1	.3464	.3185	.2921	.2673	.2440	.2222	.2019	.1830	.1655	.1493
2	.6474	.6169	.5863	.5558	.5256	.4958	.4665	.4378	.4099	.3828
3	.8609	.8413	.8206	.7988	.7759	.7521	.7274	.7021	.6761	.6496
4	.9601	.9521	.9431	.9330	.9219	.9096	.8963	.8819	.8663	.8497
5	.9918	.9896	.9870	.9839	.9803	.9761	.9713	.9658	.9596	.9527
6	.9988	.9984	.9979	.9973	.9965	.9955	.9944	.9930	.9913	.9894
7	.9999	.9998	.9998	.9997	.9996	.9994	.9993	.9990	.9988	.9984
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9999
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.0245	.0211	.0182	.0157	.0135	.0115	.0098	.0084	.0071	.0060
1	.1344	.1206	.1080	.0965	.0860	.0764	.0677	.0598	.0527	.0464
2	.3566	.3313	.3070	.2838	.2616	.2405	.2206	.2017	.1840	.1673
3	.6228	.5956	.5684	.5411	.5138	.4868	.4600	.4336	.4077	.3823
4	.8321	.8133	.7936	.7730	.7515	.7292	.7061	.6823	.6580	.6331
5	.9449	.9363	.9268	.9164	.9051	.8928	.8795	.8652	.8500	.8338
6	.9871	.9845	.9815	.9780	.9740	.9695	.9644	.9587	.9523	.9452
7	.9980	.9975	.9968	.9961	.9952	.9941	.9929	.9914	.9897	.9877
8	.9998	.9997	.9997	.9996	.9995	.9993	.9991	.9989	.9986	.9983
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

<i>n</i> = 10 (continued)										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0051	.0043	.0036	.0030	.0025	.0021	.0017	.0014	.0012	.0010
1	.0406	.0355	.0309	.0269	.0233	.0201	.0173	.0148	.0126	.0107
2	.1517	.1372	.1236	.1111	.0996	.0889	.0791	.0702	.0621	.0547
3	.3575	.3335	.3102	.2877	.2660	.2453	.2255	.2067	.1888	.1719
4	.6078	.5822	.5564	.5304	.5044	.4784	.4526	.4270	.4018	.3770
5	.8166	.7984	.7793	.7593	.7384	.7168	.6943	.6712	.6474	.6230
6	.9374	.9288	.9194	.9092	.8980	.8859	.8729	.8590	.8440	.8281
7	.9854	.9828	.9798	.9764	.9726	.9683	.9634	.9580	.9520	.9453
8	.9979	.9975	.9969	.9963	.9955	.9946	.9935	.9923	.9909	.9893
9	.9999	.9998	.9998	.9997	.9997	.9996	.9995	.9994	.9992	.9990
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>n</i> = 11										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.8953	.8007	.7153	.6382	.5688	.5063	.4501	.3996	.3544	.3138
1	.9948	.9805	.9587	.9308	.8981	.8618	.8228	.7819	.7399	.6974
2	.9998	.9988	.9963	.9917	.9848	.9752	.9630	.9481	.9305	.9104
3	1.0000	1.0000	.9998	.9993	.9984	.9970	.9947	.9915	.9871	.9815
4	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9995	.9990	.9983	.9972
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9997
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.2775	.2451	.2161	.1903	.1673	.1469	.1288	.1127	.0985	.0859
1	.6548	.6127	.5714	.5311	.4922	.4547	.4189	.3849	.3526	.3221
2	.8880	.8634	.8368	.8085	.7788	.7479	.7161	.6836	.6506	.6174
3	.9744	.9659	.9558	.9440	.9306	.9154	.8987	.8803	.8603	.8389
4	.9958	.9939	.9913	.9881	.9841	.9793	.9734	.9666	.9587	.9496
5	.9995	.9992	.9988	.9982	.9973	.9963	.9949	.9932	.9910	.9883
6	1.0000	.9999	.9999	.9998	.9997	.9995	.9993	.9990	.9986	.9980
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9998
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.0748	.0650	.0564	.0489	.0422	.0364	.0314	.0270	.0231	.0198
1	.2935	.2667	.2418	.2186	.1971	.1773	.1590	.1423	.1270	.1130
2	.5842	.5512	.5186	.4866	.4552	.4247	.3951	.3665	.3390	.3127
3	.8160	.7919	.7667	.7404	.7133	.6854	.6570	.6281	.5989	.5696
4	.9393	.9277	.9149	.9008	.8854	.8687	.8507	.8315	.8112	.7897
5	.9852	.9814	.9769	.9717	.9657	.9588	.9510	.9423	.9326	.9218
6	.9973	.9965	.9954	.9941	.9924	.9905	.9881	.9854	.9821	.9784
7	.9997	.9995	.9993	.9991	.9988	.9984	.9979	.9973	.9966	.9957
8	1.0000	1.0000	.9999	.9999	.9999	.9998	.9998	.9997	.9996	.9994
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 11$ (continued)										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.0169	.0144	.0122	.0104	.0088	.0074	.0062	.0052	.0044	.0036
1	.1003	.0888	.0784	.0690	.0606	.0530	.0463	.0403	.0350	.0302
2	.2877	.2639	.2413	.2201	.2001	.1814	.1640	.1478	.1328	.1189
3	.5402	.5110	.4821	.4536	.4256	.3981	.3714	.3455	.3204	.2963
4	.7672	.7437	.7193	.6941	.6683	.6419	.6150	.5878	.5603	.5328
5	.9099	.8969	.8829	.8676	.8513	.8339	.8153	.7957	.7751	.7535
6	.9740	.9691	.9634	.9570	.9499	.9419	.9330	.9232	.9124	.9006
7	.9946	.9933	.9918	.9899	.9878	.9852	.9823	.9790	.9751	.9707
8	.9992	.9990	.9987	.9984	.9980	.9974	.9968	.9961	.9952	.9941
9	.9999	.9999	.9999	.9998	.9998	.9997	.9996	.9995	.9994	.9993
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0030	.0025	.0021	.0017	.0014	.0011	.0009	.0008	.0006	.0005
1	.0261	.0224	.0192	.0164	.0139	.0118	.0100	.0084	.0070	.0059
2	.1062	.0945	.0838	.0740	.0652	.0572	.0501	.0436	.0378	.0327
3	.2731	.2510	.2300	.2100	.1911	.1734	.1567	.1412	.1267	.1133
4	.5052	.4777	.4505	.4236	.3971	.3712	.3459	.3213	.2974	.2744
5	.7310	.7076	.6834	.6586	.6331	.6071	.5807	.5540	.5271	.5000
6	.8879	.8740	.8592	.8432	.8262	.8081	.7890	.7688	.7477	.7256
7	.9657	.9601	.9539	.9468	.9390	.9304	.9209	.9105	.8991	.8867
8	.9928	.9913	.9896	.9875	.9852	.9825	.9794	.9759	.9718	.9673
9	.9991	.9988	.9986	.9982	.9978	.9973	.9967	.9960	.9951	.9941
10	.9999	.9999	.9999	.9999	.9998	.9998	.9998	.9997	.9996	.9995
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$n = 12$										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.8864	.7847	.6938	.6127	.5404	.4759	.4186	.3677	.3225	.2824
1	.9938	.9769	.9514	.9191	.8816	.8405	.7967	.7513	.7052	.6590
2	.9998	.9985	.9952	.9893	.9804	.9684	.9532	.9348	.9134	.8891
3	1.0000	.9999	.9997	.9990	.9978	.9957	.9925	.9880	.9820	.9744
4	1.0000	1.0000	1.0000	.9999	.9998	.9996	.9991	.9984	.9973	.9957
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9997	.9995
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 12$ (continued)										
$x \backslash p$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.2470	.2157	.1880	.1637	.1422	.1234	.1069	.0924	.0798	.0687
1	.6133	.5686	.5252	.4834	.4435	.4055	.3696	.3359	.3043	.2749
2	.8623	.8333	.8023	.7697	.7358	.7010	.6656	.6298	.5940	.5583
3	.9649	.9536	.9403	.9250	.9078	.8886	.8676	.8448	.8205	.7946
4	.9935	.9905	.9867	.9819	.9761	.9690	.9607	.9511	.9400	.9274
5	.9991	.9986	.9978	.9967	.9954	.9935	.9912	.9884	.9849	.9806
6	.9999	.9998	.9997	.9996	.9993	.9990	.9985	.9979	.9971	.9961
7	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9997	.9996	.9994
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$x \backslash p$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.0591	.0507	.0434	.0371	.0317	.0270	.0229	.0194	.0164	.0138
1	.2476	.2224	.1991	.1778	.1584	.1406	.1245	.1100	.0968	.0850
2	.5232	.4886	.4550	.4222	.3907	.3603	.3313	.3037	.2775	.2528
3	.7674	.7390	.7096	.6795	.6488	.6176	.5863	.5548	.5235	.4925
4	.9134	.8979	.8808	.8623	.8424	.8210	.7984	.7746	.7496	.7237
5	.9755	.9696	.9626	.9547	.9456	.9354	.9240	.9113	.8974	.8822
6	.9948	.9932	.9911	.9887	.9857	.9822	.9781	.9733	.9678	.9614
7	.9992	.9989	.9984	.9979	.9972	.9964	.9953	.9940	.9924	.9905
8	.9999	.9999	.9998	.9997	.9996	.9995	.9993	.9990	.9987	.9983
9	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9998	.9998
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$x \backslash p$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.0116	.0098	.0082	.0068	.0057	.0047	.0039	.0032	.0027	.0022
1	.0744	.0650	.0565	.0491	.0424	.0366	.0315	.0270	.0230	.0196
2	.2296	.2078	.1876	.1687	.1513	.1352	.1205	.1069	.0946	.0834
3	.4619	.4319	.4027	.3742	.3467	.3201	.2947	.2704	.2472	.2253
4	.6968	.6692	.6410	.6124	.5833	.5541	.5249	.4957	.4668	.4382
5	.8657	.8479	.8289	.8087	.7873	.7648	.7412	.7167	.6913	.6652
6	.9542	.9460	.9368	.9266	.9154	.9030	.8894	.8747	.8589	.8418
7	.9882	.9856	.9824	.9787	.9745	.9696	.9641	.9578	.9507	.9427
8	.9978	.9972	.9964	.9955	.9944	.9930	.9915	.9896	.9873	.9847
9	.9997	.9996	.9995	.9993	.9992	.9989	.9986	.9982	.9978	.9972
10	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9999	.9998	.9998	.9997
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 12$ (continued)										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0018	.0014	.0012	.0010	.0008	.0006	.0005	.0004	.0003	.0002
1	.0166	.0140	.0118	.0099	.0083	.0069	.0057	.0047	.0039	.0032
2	.0733	.0642	.0560	.0487	.0421	.0363	.0312	.0267	.0227	.0193
3	.2047	.1853	.1671	.1502	.1345	.1199	.1066	.0943	.0832	.0730
4	.4101	.3825	.3557	.3296	.3044	.2802	.2570	.2348	.2138	.1938
5	.6384	.6111	.5833	.5552	.5269	.4986	.4703	.4423	.4145	.3872
6	.8235	.8041	.7836	.7620	.7393	.7157	.6911	.6657	.6396	.6128
7	.9338	.9240	.9131	.9012	.8883	.8742	.8589	.8425	.8249	.8062
8	.9817	.9782	.9742	.9696	.9644	.9585	.9519	.9445	.9362	.9270
9	.9965	.9957	.9947	.9935	.9921	.9905	.9886	.9863	.9837	.9807
10	.9996	.9995	.9993	.9991	.9989	.9986	.9983	.9979	.9974	.9968
11	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9999	.9999	.9998	.9998
12	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 13$										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.8775	.7690	.6730	.5882	.5133	.4474	.3893	.3383	.2935	.2542
1	.9928	.9730	.9436	.9068	.8646	.8186	.7702	.7206	.6707	.6213
2	.9997	.9980	.9938	.9865	.9755	.9608	.9422	.9201	.8946	.8661
3	1.0000	.9999	.9995	.9986	.9969	.9940	.9897	.9837	.9758	.9658
4	1.0000	1.0000	1.0000	.9999	.9997	.9993	.9987	.9976	.9959	.9935
5	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9997	.9995	.9991
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.2198	.1898	.1636	.1408	.1209	.1037	.0887	.0758	.0646	.0550
1	.5730	.5262	.4814	.4386	.3983	.3604	.3249	.2920	.2616	.2336
2	.8349	.8015	.7663	.7296	.6920	.6537	.6152	.5769	.5389	.5017
3	.9536	.9391	.9224	.9033	.8820	.8586	.8333	.8061	.7774	.7473
4	.9903	.9861	.9807	.9740	.9658	.9562	.9449	.9319	.9173	.9009
5	.9985	.9976	.9964	.9947	.9925	.9896	.9861	.9817	.9763	.9700
6	.9998	.9997	.9995	.9992	.9987	.9981	.9973	.9962	.9948	.9930
7	1.0000	1.0000	.9999	.9999	.9998	.9997	.9996	.9994	.9991	.9988
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 13$ (continued)

$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.0467	.0396	.0334	.0282	.0238	.0200	.0167	.0140	.0117	.0097
1	.2080	.1846	.1633	.1441	.1267	.1111	.0971	.0846	.0735	.0637
2	.4653	.4301	.3961	.3636	.3326	.3032	.2755	.2495	.2251	.2025
3	.7161	.6839	.6511	.6178	.5843	.5507	.5174	.4845	.4522	.4206
4	.8827	.8629	.8415	.8184	.7940	.7681	.7411	.7130	.6840	.6543
5	.9625	.9538	.9438	.9325	.9198	.9056	.8901	.8730	.8545	.8346
6	.9907	.9880	.9846	.9805	.9757	.9701	.9635	.9560	.9473	.9376
7	.9983	.9976	.9968	.9957	.9944	.9927	.9907	.9882	.9853	.9818
8	.9998	.9996	.9995	.9993	.9990	.9987	.9982	.9976	.9969	.9960
9	1.0000	1.0000	.9999	.9999	.9999	.9998	.9997	.9996	.9995	.9993
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.0080	.0066	.0055	.0045	.0037	.0030	.0025	.0020	.0016	.0013
1	.0550	.0473	.0406	.0347	.0296	.0251	.0213	.0179	.0151	.0126
2	.1815	.1621	.1443	.1280	.1132	.0997	.0875	.0765	.0667	.0579
3	.3899	.3602	.3317	.3043	.2783	.2536	.2302	.2083	.1877	.1686
4	.6240	.5933	.5624	.5314	.5005	.4699	.4397	.4101	.3812	.3530
5	.8133	.7907	.7669	.7419	.7159	.6889	.6612	.6327	.6038	.5744
6	.9267	.9146	.9012	.8865	.8705	.8532	.8346	.8147	.7935	.7712
7	.9777	.9729	.9674	.9610	.9538	.9456	.9365	.9262	.9149	.9023
8	.9948	.9935	.9918	.9898	.9874	.9846	.9813	.9775	.9730	.9679
9	.9991	.9988	.9985	.9980	.9975	.9968	.9960	.9949	.9937	.9922
10	.9999	.9999	.9998	.9997	.9997	.9995	.9994	.9992	.9990	.9987
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9999
12	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0010	.0008	.0007	.0005	.0004	.0003	.0003	.0002	.0002	.0001
1	.0105	.0088	.0072	.0060	.0049	.0040	.0033	.0026	.0021	.0017
2	.0501	.0431	.0370	.0316	.0269	.0228	.0192	.0162	.0135	.0112
3	.1508	.1344	.1193	.1055	.0929	.0815	.0712	.0619	.0536	.0461
4	.3258	.2997	.2746	.2507	.2279	.2065	.1863	.1674	.1498	.1334
5	.5448	.5151	.4854	.4559	.4268	.3981	.3701	.3427	.3162	.2905
6	.7476	.7230	.6975	.6710	.6437	.6158	.5873	.5585	.5293	.5000
7	.8886	.8736	.8574	.8400	.8212	.8012	.7800	.7576	.7341	.7095
8	.9621	.9554	.9480	.9395	.9302	.9197	.9082	.8955	.8817	.8666
9	.9904	.9883	.9859	.9830	.9797	.9758	.9713	.9662	.9604	.9539
10	.9983	.9979	.9973	.9967	.9959	.9949	.9937	.9923	.9907	.9888
11	.9998	.9998	.9997	.9996	.9995	.9993	.9991	.9989	.9986	.9983
12	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9999
13	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 14$										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.8687	.7536	.6528	.5647	.4877	.4205	.3620	.3112	.2670	.2288
1	.9916	.9690	.9355	.8941	.8470	.7963	.7436	.6900	.6368	.5846
2	.9997	.9975	.9923	.9833	.9699	.9522	.9302	.9042	.8745	.8416
3	1.0000	.9999	.9994	.9981	.9958	.9920	.9864	.9786	.9685	.9559
4	1.0000	1.0000	1.0000	.9998	.9996	.9990	.9980	.9965	.9941	.9908
5	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9996	.9992	.9985
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.1956	.1670	.1423	.1211	.1028	.0871	.0736	.0621	.0523	.0440
1	.5342	.4859	.4401	.3969	.3567	.3193	.2848	.2531	.2242	.1979
2	.8061	.7685	.7292	.6889	.6479	.6068	.5659	.5256	.4862	.4481
3	.9406	.9226	.9021	.8790	.8535	.8258	.7962	.7649	.7321	.6982
4	.9863	.9804	.9731	.9641	.9533	.9406	.9259	.9093	.8907	.8702
5	.9976	.9962	.9943	.9918	.9885	.9843	.9791	.9727	.9651	.9561
6	.9997	.9994	.9991	.9985	.9978	.9968	.9954	.9936	.9913	.9884
7	1.0000	.9999	.9999	.9998	.9997	.9995	.9992	.9988	.9983	.9976
8	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9997	.9996
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.0369	.0309	.0258	.0214	.0178	.0148	.0122	.0101	.0083	.0068
1	.1741	.1527	.1335	.1163	.1010	.0874	.0754	.0648	.0556	.0475
2	.4113	.3761	.3426	.3109	.2811	.2533	.2273	.2033	.1812	.1608
3	.6634	.6281	.5924	.5568	.5213	.4864	.4521	.4187	.3863	.3552
4	.8477	.8235	.7977	.7703	.7415	.7116	.6807	.6490	.6168	.5842
5	.9457	.9338	.9203	.9051	.8883	.8699	.8498	.8282	.8051	.7805
6	.9848	.9804	.9752	.9690	.9617	.9533	.9437	.9327	.9204	.9067
7	.9967	.9955	.9940	.9921	.9897	.9868	.9833	.9792	.9743	.9685
8	.9994	.9992	.9989	.9984	.9978	.9971	.9962	.9950	.9935	.9917
9	.9999	.9999	.9998	.9998	.9997	.9995	.9993	.9991	.9988	.9983
10	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9998	.9998
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

<i>n</i> = 14 (continued)										
$\begin{array}{c} p \\ x \end{array}$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.0055	.0045	.0037	.0030	.0024	.0019	.0016	.0012	.0010	.0008
1	.0404	.0343	.0290	.0244	.0205	.0172	.0143	.0119	.0098	.0081
2	.1423	.1254	.1101	.0963	.0839	.0729	.0630	.0543	.0466	.0398
3	.3253	.2968	.2699	.2444	.2205	.1982	.1774	.1582	.1405	.1243
4	.5514	.5187	.4862	.4542	.4227	.3920	.3622	.3334	.3057	.2793
5	.7546	.7276	.6994	.6703	.6405	.6101	.5792	.5481	.5169	.4859
6	.8916	.8750	.8569	.8374	.8164	.7941	.7704	.7455	.7195	.6925
7	.9619	.9542	.9455	.9357	.9247	.9124	.8988	.8838	.8675	.8499
8	.9895	.9869	.9837	.9800	.9757	.9706	.9647	.9580	.9503	.9417
9	.9978	.9971	.9963	.9952	.9940	.9924	.9905	.9883	.9856	.9825
10	.9997	.9995	.9994	.9992	.9989	.9986	.9981	.9976	.9969	.9961
11	1.0000	.9999	.9999	.9999	.9999	.9998	.9997	.9997	.9995	.9994
12	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
13	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{array}{c} p \\ x \end{array}$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0006	.0005	.0004	.0003	.0002	.0002	.0001	.0001	.0001	.0001
1	.0066	.0054	.0044	.0036	.0029	.0023	.0019	.0015	.0012	.0009
2	.0339	.0287	.0242	.0203	.0170	.0142	.0117	.0097	.0079	.0065
3	.1095	.0961	.0839	.0730	.0632	.0545	.0468	.0399	.0339	.0287
4	.2541	.2303	.2078	.1868	.1672	.1490	.1322	.1167	.1026	.0898
5	.4550	.4246	.3948	.3656	.3373	.3100	.2837	.2585	.2346	.2120
6	.6645	.6357	.6063	.5764	.5461	.5157	.4852	.4549	.4249	.3953
7	.8308	.8104	.7887	.7656	.7414	.7160	.6895	.6620	.6337	.6047
8	.9320	.9211	.9090	.8957	.8811	.8652	.8480	.8293	.8094	.7880
9	.9788	.9745	.9696	.9639	.9574	.9500	.9417	.9323	.9218	.9102
10	.9951	.9939	.9924	.9907	.9886	.9861	.9832	.9798	.9759	.9713
11	.9992	.9990	.9987	.9983	.9978	.9973	.9966	.9958	.9947	.9935
12	.9999	.9999	.9999	.9998	.9997	.9997	.9996	.9994	.9993	.9991
13	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
14	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>n</i> = 15										
$\begin{array}{c} p \\ x \end{array}$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.8601	.7386	.6333	.5421	.4633	.3953	.3367	.2863	.2430	.2059
1	.9904	.9647	.9270	.8809	.8290	.7738	.7168	.6597	.6035	.5490
2	.9996	.9970	.9906	.9797	.9638	.9429	.9171	.8870	.8531	.8159
3	1.0000	.9998	.9992	.9976	.9945	.9896	.9825	.9727	.9601	.9444
4	1.0000	1.0000	.9999	.9998	.9994	.9986	.9972	.9950	.9918	.9873
5	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9997	.9993	.9987	.9978
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9997
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 15$ (continued)

$x \backslash p$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.1741	.1470	.1238	.1041	.0874	.0731	.0611	.0510	.0424	.0352
1	.4969	.4476	.4013	.3583	.3186	.2821	.2489	.2187	.1915	.1671
2	.7762	.7346	.6916	.6480	.6042	.5608	.5181	.4766	.4365	.3980
3	.9258	.9041	.8796	.8524	.8227	.7908	.7571	.7218	.6854	.6482
4	.9813	.9735	.9639	.9522	.9383	.9222	.9039	.8833	.8606	.8358
5	.9963	.9943	.9916	.9879	.9832	.9773	.9700	.9613	.9510	.9389
6	.9994	.9990	.9985	.9976	.9964	.9948	.9926	.9898	.9863	.9819
7	.9999	.9999	.9998	.9996	.9994	.9990	.9986	.9979	.9970	.9958
8	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9997	.9995	.9992
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$x \backslash p$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.0291	.0241	.0198	.0163	.0134	.0109	.0089	.0072	.0059	.0047
1	.1453	.1259	.1087	.0935	.0802	.0685	.0583	.0495	.0419	.0353
2	.3615	.3269	.2945	.2642	.2361	.2101	.1863	.1645	.1447	.1268
3	.6105	.5726	.5350	.4978	.4613	.4258	.3914	.3584	.3268	.2969
4	.8090	.7805	.7505	.7190	.6865	.6531	.6190	.5846	.5500	.5155
5	.9252	.9095	.8921	.8728	.8516	.8287	.8042	.7780	.7505	.7216
6	.9766	.9702	.9626	.9537	.9434	.9316	.9183	.9035	.8870	.8689
7	.9942	.9922	.9896	.9865	.9827	.9781	.9726	.9662	.9587	.9500
8	.9989	.9984	.9977	.9969	.9958	.9944	.9927	.9906	.9879	.9848
9	.9998	.9997	.9996	.9994	.9992	.9989	.9985	.9979	.9972	.9963
10	1.0000	1.0000	.9999	.9999	.9999	.9998	.9998	.9997	.9995	.9993
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999
12	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$x \backslash p$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.0038	.0031	.0025	.0020	.0016	.0012	.0010	.0008	.0006	.0005
1	.0296	.0248	.0206	.0171	.0142	.0117	.0096	.0078	.0064	.0052
2	.1107	.0962	.0833	.0719	.0617	.0528	.0450	.0382	.0322	.0271
3	.2686	.2420	.2171	.1940	.1727	.1531	.1351	.1187	.1039	.0905
4	.4813	.4477	.4148	.3829	.3519	.3222	.2938	.2668	.2413	.2173
5	.6916	.6607	.6291	.5968	.5643	.5316	.4989	.4665	.4346	.4032
6	.8491	.8278	.8049	.7806	.7548	.7278	.6997	.6705	.6405	.6098
7	.9401	.9289	.9163	.9023	.8868	.8698	.8513	.8313	.8098	.7869
8	.9810	.9764	.9711	.9649	.9578	.9496	.9403	.9298	.9180	.9050
9	.9952	.9938	.9921	.9901	.9876	.9846	.9810	.9768	.9719	.9662
10	.9991	.9988	.9984	.9978	.9972	.9963	.9953	.9941	.9925	.9907
11	.9999	.9998	.9997	.9996	.9995	.9994	.9991	.9989	.9985	.9981
12	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9998	.9998	.9997
13	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 15$ (continued)										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0004	.0003	.0002	.0002	.0001	.0001	.0001	.0001	.0000	.0000
1	.0042	.0034	.0027	.0021	.0017	.0013	.0010	.0008	.0006	.0005
2	.0227	.0189	.0157	.0130	.0107	.0087	.0071	.0057	.0046	.0037
3	.0785	.0678	.0583	.0498	.0424	.0359	.0303	.0254	.0212	.0176
4	.1948	.1739	.1546	.1367	.1204	.1055	.0920	.0799	.0690	.0592
5	.3726	.3430	.3144	.2869	.2608	.2359	.2125	.1905	.1699	.1509
6	.5786	.5470	.5153	.4836	.4522	.4211	.3905	.3606	.3316	.3036
7	.7626	.7370	.7102	.6824	.6535	.6238	.5935	.5626	.5314	.5000
8	.8905	.8746	.8573	.8385	.8182	.7966	.7735	.7490	.7233	.6964
9	.9596	.9521	.9435	.9339	.9231	.9110	.8976	.8829	.8667	.8491
10	.9884	.9857	.9826	.9789	.9745	.9695	.9637	.9570	.9494	.9408
11	.9975	.9968	.9960	.9949	.9937	.9921	.9903	.9881	.9855	.9824
12	.9996	.9995	.9993	.9991	.9989	.9986	.9982	.9977	.9971	.9963
13	1.0000	1.0000	.9999	.9999	.9999	.9998	.9998	.9997	.9996	.9995
14	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 16$										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.8515	.7238	.6143	.5204	.4401	.3716	.3131	.2634	.2211	.1853
1	.9891	.9601	.9182	.8673	.8108	.7511	.6902	.6299	.5711	.5147
2	.9995	.9963	.9887	.9758	.9571	.9327	.9031	.8688	.8306	.7892
3	1.0000	.9998	.9989	.9968	.9930	.9868	.9779	.9658	.9504	.9316
4	1.0000	1.0000	.9999	.9997	.9991	.9981	.9962	.9932	.9889	.9830
5	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9995	.9990	.9981	.9967
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9997	.9995
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.1550	.1293	.1077	.0895	.0743	.0614	.0507	.0418	.0343	.0281
1	.4614	.4115	.3653	.3227	.2839	.2487	.2170	.1885	.1632	.1407
2	.7455	.7001	.6539	.6074	.5614	.5162	.4723	.4302	.3899	.3518
3	.9093	.8838	.8552	.8237	.7899	.7540	.7164	.6777	.6381	.5981
4	.9752	.9652	.9529	.9382	.9209	.9012	.8789	.8542	.8273	.7982
5	.9947	.9918	.9880	.9829	.9765	.9685	.9588	.9473	.9338	.9183
6	.9991	.9985	.9976	.9962	.9944	.9920	.9888	.9847	.9796	.9733
7	.9999	.9998	.9996	.9993	.9989	.9984	.9976	.9964	.9949	.9930
8	1.0000	1.0000	.9999	.9999	.9998	.9997	.9996	.9993	.9990	.9985
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9998
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

<i>n</i> = 16 (<i>continued</i>)										
$\begin{matrix} p \\ x \end{matrix}$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.0230	.0188	.0153	.0124	.0100	.0081	.0065	.0052	.0042	.0033
1	.1209	.1035	.0883	.0750	.0635	.0535	.0450	.0377	.0314	.0261
2	.3161	.2827	.2517	.2232	.1971	.1733	.1518	.1323	.1149	.0994
3	.5582	.5186	.4797	.4417	.4050	.3697	.3360	.3041	.2740	.2459
4	.7673	.7348	.7009	.6659	.6302	.5940	.5575	.5212	.4853	.4499
5	.9008	.8812	.8595	.8359	.8103	.7831	.7542	.7239	.6923	.6598
6	.9658	.9568	.9464	.9342	.9204	.9049	.8875	.8683	.8474	.8247
7	.9905	.9873	.9834	.9786	.9729	.9660	.9580	.9486	.9379	.9256
8	.9979	.9970	.9959	.9944	.9925	.9902	.9873	.9837	.9794	.9743
9	.9996	.9994	.9992	.9988	.9984	.9977	.9969	.9959	.9945	.9929
10	.9999	.9999	.9999	.9998	.9997	.9996	.9994	.9992	.9989	.9984
11	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9998	.9997
12	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{matrix} p \\ x \end{matrix}$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.0026	.0021	.0016	.0013	.0010	.0008	.0006	.0005	.0004	.0003
1	.0216	.0178	.0146	.0120	.0098	.0079	.0064	.0052	.0041	.0033
2	.0856	.0734	.0626	.0533	.0451	.0380	.0319	.0266	.0222	.0183
3	.2196	.1953	.1730	.1525	.1339	.1170	.1018	.0881	.0759	.0651
4	.4154	.3819	.3496	.3187	.2892	.2613	.2351	.2105	.1877	.1666
5	.6264	.5926	.5584	.5241	.4900	.4562	.4230	.3906	.3592	.3288
6	.8003	.7743	.7469	.7181	.6881	.6572	.6254	.5930	.5602	.5272
7	.9119	.8965	.8795	.8609	.8406	.8187	.7952	.7702	.7438	.7161
8	.9683	.9612	.9530	.9436	.9329	.9209	.9074	.8924	.8758	.8577
9	.9908	.9883	.9852	.9815	.9771	.9720	.9659	.9589	.9509	.9417
10	.9979	.9972	.9963	.9952	.9938	.9921	.9900	.9875	.9845	.9809
11	.9996	.9995	.9993	.9990	.9987	.9983	.9977	.9970	.9962	.9951
12	1.0000	.9999	.9999	.9999	.9998	.9997	.9996	.9995	.9993	.9991
13	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999
14	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 16$ (continued)										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0002	.0002	.0001	.0001	.0001	.0001	.0000	.0000	.0000	.0000
1	.0026	.0021	.0016	.0013	.0010	.0008	.0006	.0005	.0003	.0003
2	.0151	.0124	.0101	.0082	.0066	.0053	.0042	.0034	.0027	.0021
3	.0556	.0473	.0400	.0336	.0281	.0234	.0194	.0160	.0131	.0106
4	.1471	.1293	.1131	.0985	.0853	.0735	.0630	.0537	.0456	.0384
5	.2997	.2720	.2457	.2208	.1976	.1759	.1559	.1374	.1205	.1051
6	.4942	.4613	.4289	.3971	.3660	.3359	.3068	.2790	.2524	.2272
7	.6872	.6572	.6264	.5949	.5629	.5306	.4981	.4657	.4335	.4018
8	.8381	.8168	.7940	.7698	.7441	.7171	.6889	.6596	.6293	.5982
9	.9313	.9195	.9064	.8919	.8759	.8584	.8393	.8186	.7964	.7728
10	.9766	.9716	.9658	.9591	.9514	.9426	.9326	.9214	.9089	.8949
11	.9938	.9922	.9902	.9879	.9851	.9817	.9778	.9732	.9678	.9616
12	.9988	.9984	.9979	.9973	.9965	.9956	.9945	.9931	.9914	.9894
13	.9998	.9998	.9997	.9996	.9994	.9993	.9990	.9987	.9984	.9979
14	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9999	.9998	.9997
15	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$n = 17$										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.8429	.7093	.5958	.4996	.4181	.3493	.2912	.2423	.2012	.1668
1	.9877	.9554	.9091	.8535	.7922	.7283	.6638	.6005	.5396	.4818
2	.9994	.9956	.9866	.9714	.9497	.9218	.8882	.8497	.8073	.7618
3	1.0000	.9997	.9986	.9960	.9912	.9836	.9727	.9581	.9397	.9174
4	1.0000	1.0000	.9999	.9996	.9988	.9974	.9949	.9911	.9855	.9779
5	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9993	.9985	.9973	.9953
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9996	.9992
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.1379	.1138	.0937	.0770	.0631	.0516	.0421	.0343	.0278	.0225
1	.4277	.3777	.3318	.2901	.2525	.2187	.1887	.1621	.1387	.1182
2	.7142	.6655	.6164	.5676	.5198	.4734	.4289	.3867	.3468	.3096
3	.8913	.8617	.8290	.7935	.7556	.7159	.6749	.6331	.5909	.5489
4	.9679	.9554	.9402	.9222	.9013	.8776	.8513	.8225	.7913	.7582
5	.9925	.9886	.9834	.9766	.9681	.9577	.9452	.9305	.9136	.8943
6	.9986	.9977	.9963	.9944	.9917	.9882	.9837	.9780	.9709	.9623
7	.9998	.9996	.9993	.9989	.9983	.9973	.9961	.9943	.9920	.9891
8	1.0000	.9999	.9999	.9998	.9997	.9995	.9992	.9988	.9982	.9974
9	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9997	.9995
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

<i>n</i> = 17 (<i>continued</i>)										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.0182	.0146	.0118	.0094	.0075	.0060	.0047	.0038	.0030	.0023
1	.1004	.0849	.0715	.0600	.0501	.0417	.0346	.0286	.0235	.0193
2	.2751	.2433	.2141	.1877	.1637	.1422	.1229	.1058	.0907	.0774
3	.5073	.4667	.4272	.3893	.3530	.3186	.2863	.2560	.2279	.2019
4	.7234	.6872	.6500	.6121	.5739	.5357	.4977	.4604	.4240	.3887
5	.8727	.8490	.8230	.7951	.7653	.7339	.7011	.6671	.6323	.5968
6	.9521	.9402	.9264	.9106	.8929	.8732	.8515	.8279	.8024	.7752
7	.9853	.9806	.9749	.9680	.9598	.9501	.9389	.9261	.9116	.8954
8	.9963	.9949	.9930	.9906	.9876	.9839	.9794	.9739	.9674	.9597
9	.9993	.9989	.9984	.9978	.9969	.9958	.9943	.9925	.9902	.9873
10	.9999	.9998	.9997	.9996	.9994	.9991	.9987	.9982	.9976	.9968
11	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9998	.9997	.9995	.9993
12	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999
13	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.0018	.0014	.0011	.0009	.0007	.0005	.0004	.0003	.0002	.0002
1	.0157	.0128	.0104	.0083	.0067	.0054	.0043	.0034	.0027	.0021
2	.0657	.0556	.0468	.0392	.0327	.0272	.0225	.0185	.0151	.0123
3	.1781	.1563	.1366	.1188	.1028	.0885	.0759	.0648	.0550	.0464
4	.3547	.3222	.2913	.2622	.2348	.2094	.1858	.1640	.1441	.1260
5	.5610	.5251	.4895	.4542	.4197	.3861	.3535	.3222	.2923	.2639
6	.7464	.7162	.6847	.6521	.6188	.5848	.5505	.5161	.4818	.4478
7	.8773	.8574	.8358	.8123	.7872	.7605	.7324	.7029	.6722	.6405
8	.9508	.9405	.9288	.9155	.9006	.8841	.8659	.8459	.8243	.8011
9	.9838	.9796	.9746	.9686	.9617	.9536	.9443	.9336	.9216	.9081
10	.9957	.9943	.9926	.9905	.9880	.9849	.9811	.9766	.9714	.9652
11	.9991	.9987	.9983	.9977	.9970	.9960	.9949	.9934	.9916	.9894
12	.9998	.9998	.9997	.9996	.9994	.9992	.9989	.9985	.9981	.9975
13	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9998	.9998	.9997	.9995
14	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
15	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 17$ (continued)

$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0001	.0001	.0001	.0001	.0000	.0000	.0000	.0000	.0000	.0000
1	.0016	.0013	.0010	.0008	.0006	.0004	.0003	.0002	.0002	.0001
2	.0100	.0080	.0065	.0052	.0041	.0032	.0025	.0020	.0015	.0012
3	.0390	.0326	.0271	.0224	.0184	.0151	.0123	.0099	.0080	.0064
4	.1096	.0949	.0817	.0699	.0596	.0505	.0425	.0356	.0296	.0245
5	.2372	.2121	.1887	.1670	.1471	.1288	.1122	.0972	.0838	.0717
6	.4144	.3818	.3501	.3195	.2902	.2623	.2359	.2110	.1878	.1662
7	.6080	.5750	.5415	.5079	.4743	.4410	.4082	.3761	.3448	.3145
8	.7762	.7498	.7220	.6928	.6626	.6313	.5992	.5665	.5333	.5000
9	.8930	.8764	.8581	.8382	.8166	.7934	.7686	.7423	.7145	.6855
10	.9580	.9497	.9403	.9295	.9174	.9038	.8888	.8721	.8538	.8338
11	.9867	.9835	.9797	.9752	.9699	.9637	.9566	.9483	.9389	.9283
12	.9967	.9958	.9946	.9931	.9914	.9892	.9866	.9835	.9798	.9755
13	.9994	.9992	.9989	.9986	.9981	.9976	.9969	.9960	.9950	.9936
14	.9999	.9999	.9998	.9998	.9997	.9996	.9995	.9993	.9991	.9988
15	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9999
16	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 18$

$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.8345	.6951	.5780	.4796	.3972	.3283	.2708	.2229	.1831	.1501
1	.9862	.9505	.8997	.8393	.7735	.7055	.6378	.5719	.5091	.4503
2	.9993	.9948	.9843	.9667	.9419	.9102	.8725	.8298	.7832	.7338
3	1.0000	.9996	.9982	.9950	.9891	.9799	.9667	.9494	.9277	.9018
4	1.0000	1.0000	.9998	.9994	.9985	.9966	.9933	.9884	.9814	.9718
5	1.0000	1.0000	1.0000	.9999	.9998	.9995	.9990	.9979	.9962	.9936
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9994	.9988
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.1227	.1002	.0815	.0662	.0536	.0434	.0349	.0281	.0225	.0180
1	.3958	.3460	.3008	.2602	.2241	.1920	.1638	.1391	.1176	.0991
2	.6827	.6310	.5794	.5287	.4797	.4327	.3881	.3462	.3073	.2713
3	.8718	.8382	.8014	.7618	.7202	.6771	.6331	.5888	.5446	.5010
4	.9595	.9442	.9257	.9041	.8794	.8518	.8213	.7884	.7533	.7164
5	.9898	.9846	.9778	.9690	.9581	.9449	.9292	.9111	.8903	.8671
6	.9979	.9966	.9946	.9919	.9882	.9833	.9771	.9694	.9600	.9487
7	.9997	.9994	.9989	.9983	.9973	.9959	.9940	.9914	.9880	.9837
8	1.0000	.9999	.9998	.9997	.9995	.9992	.9987	.9980	.9971	.9957
9	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9996	.9994	.9991
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

<i>n</i> = 18 (<i>continued</i>)										
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.0144	.0114	.0091	.0072	.0056	.0044	.0035	.0027	.0021	.0016
1	.0831	.0694	.0577	.0478	.0395	.0324	.0265	.0216	.0176	.0142
2	.2384	.2084	.1813	.1570	.1353	.1161	.0991	.0842	.0712	.0600
3	.4586	.4175	.3782	.3409	.3057	.2728	.2422	.2140	.1881	.1646
4	.6780	.6387	.5988	.5586	.5187	.4792	.4406	.4032	.3671	.3327
5	.8414	.8134	.7832	.7512	.7174	.6824	.6462	.6093	.5719	.5344
6	.9355	.9201	.9026	.8829	.8610	.8370	.8109	.7829	.7531	.7217
7	.9783	.9717	.9637	.9542	.9431	.9301	.9153	.8986	.8800	.8593
8	.9940	.9917	.9888	.9852	.9807	.9751	.9684	.9605	.9512	.9404
9	.9986	.9980	.9972	.9961	.9946	.9927	.9903	.9873	.9836	.9790
10	.9997	.9996	.9994	.9991	.9988	.9982	.9975	.9966	.9954	.9939
11	1.0000	.9999	.9999	.9998	.9998	.9997	.9995	.9993	.9990	.9986
12	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9998	.9997
13	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{smallmatrix} p \\ x \end{smallmatrix}$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.0013	.0010	.0007	.0006	.0004	.0003	.0002	.0002	.0001	.0001
1	.0114	.0092	.0073	.0058	.0046	.0036	.0028	.0022	.0017	.0013
2	.0502	.0419	.0348	.0287	.0236	.0193	.0157	.0127	.0103	.0082
3	.1432	.1241	.1069	.0917	.0783	.0665	.0561	.0472	.0394	.0328
4	.2999	.2691	.2402	.2134	.1886	.1659	.1451	.1263	.1093	.0942
5	.4971	.4602	.4241	.3889	.3550	.3224	.2914	.2621	.2345	.2088
6	.6889	.6550	.6202	.5849	.5491	.5133	.4776	.4424	.4079	.3743
7	.8367	.8122	.7859	.7579	.7283	.6973	.6651	.6319	.5979	.5634
8	.9280	.9139	.8981	.8804	.8609	.8396	.8165	.7916	.7650	.7368
9	.9736	.9671	.9595	.9506	.9403	.9286	.9153	.9003	.8837	.8653
10	.9920	.9896	.9867	.9831	.9788	.9736	.9675	.9603	.9520	.9424
11	.9980	.9973	.9964	.9953	.9938	.9920	.9898	.9870	.9837	.9797
12	.9996	.9995	.9992	.9989	.9986	.9981	.9974	.9966	.9956	.9942
13	.9999	.9999	.9999	.9998	.9997	.9996	.9995	.9993	.9990	.9987
14	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9998	.9998
15	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 18$ (continued)										
$\begin{matrix} p \\ x \end{matrix}$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0001	.0001	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
1	.0010	.0008	.0006	.0004	.0003	.0002	.0002	.0001	.0001	.0001
2	.0066	.0052	.0041	.0032	.0025	.0019	.0015	.0011	.0009	.0007
3	.0271	.0223	.0182	.0148	.0120	.0096	.0077	.0061	.0048	.0038
4	.0807	.0687	.0582	.0490	.0411	.0342	.0283	.0233	.0190	.0154
5	.1849	.1628	.1427	.1243	.1077	.0928	.0795	.0676	.0572	.0481
6	.3418	.3105	.2807	.2524	.2258	.2009	.1778	.1564	.1368	.1189
7	.5287	.4938	.4592	.4250	.3915	.3588	.3272	.2968	.2678	.2403
8	.7072	.6764	.6444	.6115	.5778	.5438	.5094	.4751	.4409	.4073
9	.8451	.8232	.7996	.7742	.7473	.7188	.6890	.6579	.6258	.5927
10	.9314	.9189	.9049	.8893	.8720	.8530	.8323	.8098	.7856	.7597
11	.9750	.9693	.9628	.9551	.9463	.9362	.9247	.9117	.8972	.8811
12	.9926	.9906	.9882	.9853	.9817	.9775	.9725	.9666	.9598	.9519
13	.9983	.9978	.9971	.9962	.9951	.9937	.9921	.9900	.9875	.9846
14	.9997	.9996	.9994	.9993	.9990	.9987	.9983	.9977	.9971	.9962
15	1.0000	.9999	.9999	.9999	.9999	.9998	.9997	.9996	.9995	.9993
16	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999
17	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 19$										
$\begin{matrix} p \\ x \end{matrix}$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.8262	.6812	.5606	.4604	.3774	.3086	.2519	.2051	.1666	.1351
1	.9847	.9454	.8900	.8249	.7547	.6829	.6121	.5440	.4798	.4203
2	.9991	.9939	.9817	.9616	.9335	.8979	.8561	.8092	.7585	.7054
3	1.0000	.9995	.9978	.9939	.9868	.9757	.9602	.9398	.9147	.8850
4	1.0000	1.0000	.9998	.9993	.9980	.9956	.9915	.9853	.9765	.9648
5	1.0000	1.0000	1.0000	.9999	.9998	.9994	.9986	.9971	.9949	.9914
6	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9996	.9991	.9983
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9997
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{matrix} p \\ x \end{matrix}$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.1092	.0881	.0709	.0569	.0456	.0364	.0290	.0230	.0182	.0144
1	.3658	.3165	.2723	.2331	.1985	.1682	.1419	.1191	.0996	.0829
2	.6512	.5968	.5432	.4911	.4413	.3941	.3500	.3090	.2713	.2369
3	.8510	.8133	.7725	.7292	.6841	.6380	.5915	.5451	.4995	.4551
4	.9498	.9315	.9096	.8842	.8556	.8238	.7893	.7524	.7136	.6733
5	.9865	.9798	.9710	.9599	.9463	.9300	.9109	.8890	.8643	.8369
6	.9970	.9952	.9924	.9887	.9837	.9772	.9690	.9589	.9468	.9324
7	.9995	.9991	.9984	.9974	.9959	.9939	.9911	.9874	.9827	.9767
8	.9999	.9998	.9997	.9995	.9992	.9986	.9979	.9968	.9953	.9933
9	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9996	.9993	.9990	.9984
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9997
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 19$ (continued)										
$\begin{array}{c} p \\ x \end{array}$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.0113	.0089	.0070	.0054	.0042	.0033	.0025	.0019	.0015	.0011
1	.0687	.0566	.0465	.0381	.0310	.0251	.0203	.0163	.0131	.0104
2	.2058	.1778	.1529	.1308	.1113	.0943	.0795	.0667	.0557	.0462
3	.4123	.3715	.3329	.2968	.2631	.2320	.2035	.1776	.1542	.1332
4	.6319	.5900	.5480	.5064	.4654	.4256	.3871	.3502	.3152	.2822
5	.8071	.7749	.7408	.7050	.6677	.6295	.5907	.5516	.5125	.4739
6	.9157	.8966	.8751	.8513	.8251	.7968	.7664	.7343	.7005	.6655
7	.9693	.9604	.9497	.9371	.9225	.9059	.8871	.8662	.8432	.8180
8	.9907	.9873	.9831	.9778	.9713	.9634	.9541	.9432	.9306	.9161
9	.9977	.9966	.9953	.9934	.9911	.9881	.9844	.9798	.9742	.9674
10	.9995	.9993	.9989	.9984	.9977	.9968	.9956	.9940	.9920	.9895
11	.9999	.9999	.9998	.9997	.9995	.9993	.9990	.9985	.9980	.9972
12	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9998	.9997	.9996	.9994
13	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999
14	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{array}{c} p \\ x \end{array}$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.0009	.0007	.0005	.0004	.0003	.0002	.0002	.0001	.0001	.0001
1	.0083	.0065	.0051	.0040	.0031	.0024	.0019	.0014	.0011	.0008
2	.0382	.0314	.0257	.0209	.0170	.0137	.0110	.0087	.0069	.0055
3	.1144	.0978	.0831	.0703	.0591	.0495	.0412	.0341	.0281	.0230
4	.2514	.2227	.1963	.1720	.1500	.1301	.1122	.0962	.0821	.0696
5	.4359	.3990	.3634	.3293	.2968	.2661	.2373	.2105	.1857	.1629
6	.6294	.5927	.5555	.5182	.4812	.4446	.4087	.3739	.3403	.3081
7	.7909	.7619	.7312	.6990	.6656	.6310	.5957	.5599	.5238	.4878
8	.8997	.8814	.8611	.8388	.8145	.7884	.7605	.7309	.6998	.6675
9	.9595	.9501	.9392	.9267	.9125	.8965	.8787	.8590	.8374	.8139
10	.9863	.9824	.9777	.9720	.9653	.9574	.9482	.9375	.9253	.9115
11	.9962	.9949	.9932	.9911	.9886	.9854	.9815	.9769	.9713	.9648
12	.9991	.9988	.9983	.9977	.9969	.9959	.9946	.9930	.9909	.9884
13	.9998	.9998	.9997	.9995	.9993	.9991	.9987	.9983	.9977	.9969
14	1.0000	1.0000	.9999	.9999	.9999	.9998	.9998	.9997	.9995	.9994
15	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999
16	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 19$ (continued)										
$\begin{matrix} p \\ x \end{matrix}$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
1	.0006	.0005	.0004	.0003	.0002	.0001	.0001	.0001	.0001	.0000
2	.0043	.0033	.0026	.0020	.0015	.0012	.0009	.0007	.0005	.0004
3	.0187	.0151	.0122	.0097	.0077	.0061	.0048	.0037	.0029	.0022
4	.0587	.0492	.0410	.0340	.0280	.0229	.0186	.0150	.0121	.0096
5	.1421	.1233	.1063	.0912	.0777	.0658	.0554	.0463	.0385	.0318
6	.2774	.2485	.2213	.1961	.1727	.1512	.1316	.1138	.0978	.0835
7	.4520	.4168	.3824	.3491	.3169	.2862	.2570	.2294	.2036	.1796
8	.6340	.5997	.5647	.5294	.4940	.4587	.4238	.3895	.3561	.3238
9	.7886	.7615	.7328	.7026	.6710	.6383	.6046	.5701	.5352	.5000
10	.8960	.8787	.8596	.8387	.8159	.7913	.7649	.7369	.7073	.6762
11	.9571	.9482	.9379	.9262	.9129	.8979	.8813	.8628	.8425	.8204
12	.9854	.9817	.9773	.9720	.9658	.9585	.9500	.9403	.9291	.9165
13	.9960	.9948	.9933	.9914	.9891	.9863	.9829	.9788	.9739	.9682
14	.9991	.9988	.9984	.9979	.9972	.9964	.9954	.9940	.9924	.9904
15	.9999	.9998	.9997	.9996	.9995	.9993	.9990	.9987	.9983	.9978
16	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9999	.9998	.9997	.9996
17	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 20$										
$\begin{matrix} p \\ x \end{matrix}$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.8179	.6676	.5438	.4420	.3585	.2901	.2342	.1887	.1516	.1216
1	.9831	.9401	.8802	.8103	.7358	.6605	.5869	.5169	.4516	.3917
2	.9990	.9929	.9790	.9561	.9245	.8850	.8390	.7879	.7334	.6769
3	1.0000	.9994	.9973	.9926	.9841	.9710	.9529	.9294	.9007	.8670
4	1.0000	1.0000	.9997	.9990	.9974	.9944	.9893	.9817	.9710	.9568
5	1.0000	1.0000	1.0000	.9999	.9997	.9991	.9981	.9962	.9932	.9887
6	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9997	.9994	.9987	.9976
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9996
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

<i>n</i> = 20 (<i>continued</i>)										
$\begin{matrix} p \\ x \end{matrix}$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.0972	.0776	.0617	.0490	.0388	.0306	.0241	.0189	.0148	.0115
1	.3376	.2891	.2461	.2084	.1756	.1471	.1227	.1018	.0841	.0692
2	.6198	.5631	.5080	.4550	.4049	.3580	.3146	.2748	.2386	.2061
3	.8290	.7873	.7427	.6959	.6477	.5990	.5504	.5026	.4561	.4114
4	.9390	.9173	.8917	.8625	.8298	.7941	.7557	.7151	.6729	.6296
5	.9825	.9740	.9630	.9493	.9327	.9130	.8902	.8644	.8357	.8042
6	.9959	.9933	.9897	.9847	.9781	.9696	.9591	.9463	.9311	.9133
7	.9992	.9986	.9976	.9962	.9941	.9912	.9873	.9823	.9759	.9679
8	.9999	.9998	.9995	.9992	.9987	.9979	.9967	.9951	.9929	.9900
9	1.0000	1.0000	.9999	.9999	.9998	.9996	.9993	.9989	.9983	.9974
10	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9996	.9994
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999
12	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{matrix} p \\ x \end{matrix}$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.0090	.0069	.0054	.0041	.0032	.0024	.0018	.0014	.0011	.0008
1	.0566	.0461	.0374	.0302	.0243	.0195	.0155	.0123	.0097	.0076
2	.1770	.1512	.1284	.1085	.0913	.0763	.0635	.0526	.0433	.0355
3	.3690	.3289	.2915	.2569	.2252	.1962	.1700	.1466	.1256	.1071
4	.5858	.5420	.4986	.4561	.4148	.3752	.3375	.3019	.2685	.2375
5	.7703	.7343	.6965	.6573	.6172	.5765	.5357	.4952	.4553	.4164
6	.8929	.8699	.8442	.8162	.7858	.7533	.7190	.6831	.6460	.6080
7	.9581	.9464	.9325	.9165	.8982	.8775	.8545	.8293	.8018	.7723
8	.9862	.9814	.9754	.9680	.9591	.9485	.9360	.9216	.9052	.8867
9	.9962	.9946	.9925	.9897	.9861	.9817	.9762	.9695	.9615	.9520
10	.9991	.9987	.9981	.9972	.9961	.9945	.9926	.9900	.9868	.9829
11	.9998	.9997	.9996	.9994	.9991	.9986	.9981	.9973	.9962	.9949
12	1.0000	1.0000	.9999	.9999	.9998	.9997	.9996	.9994	.9991	.9987
13	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9997
14	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 20$ (continued)										
$\begin{matrix} p \\ x \end{matrix}$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.0006	.0004	.0003	.0002	.0002	.0001	.0001	.0001	.0001	.0000
1	.0060	.0047	.0036	.0028	.0021	.0016	.0012	.0009	.0007	.0005
2	.0289	.0235	.0189	.0152	.0121	.0096	.0076	.0060	.0047	.0036
3	.0908	.0765	.0642	.0535	.0444	.0366	.0300	.0245	.0198	.0160
4	.2089	.1827	.1589	.1374	.1182	.1011	.0859	.0726	.0610	.0510
5	.3787	.3426	.3082	.2758	.2454	.2171	.1910	.1671	.1453	.1256
6	.5695	.5307	.4921	.4540	.4166	.3803	.3453	.3118	.2800	.2500
7	.7409	.7078	.6732	.6376	.6010	.5639	.5265	.4892	.4522	.4159
8	.8660	.8432	.8182	.7913	.7624	.7317	.6995	.6659	.6312	.5956
9	.9409	.9281	.9134	.8968	.8782	.8576	.8350	.8103	.7837	.7553
10	.9780	.9721	.9650	.9566	.9468	.9355	.9225	.9077	.8910	.8725
11	.9931	.9909	.9881	.9846	.9804	.9753	.9692	.9619	.9534	.9435
12	.9982	.9975	.9966	.9955	.9940	.9921	.9898	.9868	.9833	.9790
13	.9996	.9994	.9992	.9989	.9985	.9979	.9972	.9963	.9951	.9935
14	.9999	.9999	.9999	.9998	.9997	.9996	.9994	.9991	.9988	.9984
15	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9998	.9997
16	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{matrix} p \\ x \end{matrix}$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
1	.0004	.0003	.0002	.0002	.0001	.0001	.0001	.0000	.0000	.0000
2	.0028	.0021	.0016	.0012	.0009	.0007	.0005	.0004	.0003	.0002
3	.0128	.0102	.0080	.0063	.0049	.0038	.0029	.0023	.0017	.0013
4	.0423	.0349	.0286	.0233	.0189	.0152	.0121	.0096	.0076	.0059
5	.1079	.0922	.0783	.0660	.0553	.0461	.0381	.0313	.0255	.0207
6	.2220	.1959	.1719	.1499	.1299	.1119	.0958	.0814	.0688	.0577
7	.3804	.3461	.3132	.2817	.2520	.2241	.1980	.1739	.1518	.1316
8	.5594	.5229	.4864	.4501	.4143	.3793	.3454	.3127	.2814	.2517
9	.7252	.6936	.6606	.6264	.5914	.5557	.5196	.4834	.4474	.4119
10	.8520	.8295	.8051	.7788	.7507	.7209	.6896	.6568	.6229	.5881
11	.9321	.9190	.9042	.8877	.8692	.8489	.8266	.8024	.7762	.7483
12	.9738	.9676	.9603	.9518	.9420	.9306	.9177	.9031	.8867	.8684
13	.9916	.9893	.9864	.9828	.9786	.9735	.9674	.9603	.9520	.9423
14	.9978	.9971	.9962	.9950	.9936	.9917	.9895	.9867	.9834	.9793
15	.9996	.9994	.9992	.9989	.9985	.9980	.9973	.9965	.9954	.9941
16	.9999	.9999	.9999	.9998	.9997	.9996	.9995	.9993	.9990	.9987
17	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9999	.9998
18	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 25$										
$x \backslash p$	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0	.7778	.6035	.4670	.3604	.2774	.2129	.1630	.1244	.0946	.0718
1	.9742	.9114	.8280	.7358	.6424	.5527	.4696	.3947	.3286	.2712
2	.9980	.9868	.9620	.9235	.8729	.8129	.7466	.6768	.6063	.5371
3	.9999	.9986	.9938	.9835	.9659	.9402	.9064	.8649	.8169	.7636
4	1.0000	.9999	.9992	.9972	.9928	.9850	.9726	.9549	.9314	.9020
5	1.0000	1.0000	.9999	.9996	.9988	.9969	.9935	.9877	.9790	.9666
6	1.0000	1.0000	1.0000	1.0000	.9998	.9995	.9987	.9972	.9946	.9905
7	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9995	.9989	.9977
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9995
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$x \backslash p$	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
0	.0543	.0409	.0308	.0230	.0172	.0128	.0095	.0070	.0052	.0038
1	.2221	.1805	.1457	.1168	.0931	.0737	.0580	.0454	.0354	.0274
2	.4709	.4088	.3517	.3000	.2537	.2130	.1774	.1467	.1204	.0982
3	.7066	.6475	.5877	.5286	.4711	.4163	.3648	.3171	.2734	.2340
4	.8669	.8266	.7817	.7332	.6821	.6293	.5759	.5228	.4708	.4207
5	.9501	.9291	.9035	.8732	.8385	.7998	.7575	.7125	.6653	.6167
6	.9844	.9757	.9641	.9491	.9305	.9080	.8815	.8512	.8173	.7800
7	.9959	.9930	.9887	.9827	.9745	.9639	.9505	.9339	.9141	.8909
8	.9991	.9983	.9970	.9950	.9920	.9879	.9822	.9748	.9652	.9532
9	.9998	.9996	.9993	.9987	.9979	.9965	.9945	.9917	.9878	.9827
10	1.0000	.9999	.9999	.9997	.9995	.9991	.9985	.9976	.9963	.9944
11	1.0000	1.0000	1.0000	1.0000	.9999	.9998	.9997	.9994	.9990	.9985
12	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9996
13	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
14	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 25$ (continued)

$\begin{matrix} p \\ x \end{matrix}$	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30
0	.0028	.0020	.0015	.0010	.0008	.0005	.0004	.0003	.0002	.0001
1	.0211	.0162	.0123	.0093	.0070	.0053	.0039	.0029	.0021	.0016
2	.0796	.0640	.0512	.0407	.0321	.0252	.0196	.0152	.0117	.0090
3	.1987	.1676	.1403	.1166	.0962	.0789	.0642	.0519	.0417	.0332
4	.3730	.3282	.2866	.2484	.2137	.1826	.1548	.1304	.1090	.0905
5	.5675	.5184	.4701	.4233	.3783	.3356	.2956	.2585	.2245	.1935
6	.7399	.6973	.6529	.6073	.5611	.5149	.4692	.4247	.3817	.3407
7	.8642	.8342	.8011	.7651	.7265	.6858	.6435	.6001	.5560	.5118
8	.9386	.9212	.9007	.8772	.8506	.8210	.7885	.7535	.7162	.6769
9	.9760	.9675	.9569	.9440	.9287	.9107	.8899	.8662	.8398	.8106
10	.9918	.9883	.9837	.9778	.9703	.9611	.9498	.9364	.9205	.9022
11	.9976	.9964	.9947	.9924	.9893	.9852	.9801	.9736	.9655	.9558
12	.9994	.9990	.9985	.9977	.9966	.9951	.9931	.9904	.9870	.9825
13	.9999	.9998	.9996	.9994	.9991	.9986	.9979	.9970	.9957	.9940
14	1.0000	1.0000	.9999	.9999	.9998	.9997	.9995	.9992	.9988	.9982
15	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9997	.9995
16	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999
17	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$\begin{matrix} p \\ x \end{matrix}$	.31	.32	.33	.34	.35	.36	.37	.38	.39	.40
0	.0001	.0001	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
1	.0011	.0008	.0006	.0004	.0003	.0002	.0002	.0001	.0001	.0001
2	.0068	.0051	.0039	.0029	.0021	.0016	.0011	.0008	.0006	.0004
3	.0263	.0207	.0162	.0126	.0097	.0074	.0056	.0043	.0032	.0024
4	.0746	.0610	.0496	.0400	.0320	.0255	.0201	.0158	.0123	.0095
5	.1656	.1407	.1187	.0994	.0826	.0682	.0559	.0454	.0367	.0294
6	.3019	.2657	.2321	.2013	.1734	.1483	.1258	.1060	.0886	.0736
7	.4681	.4253	.3837	.3439	.3061	.2705	.2374	.2068	.1789	.1536
8	.6361	.5943	.5518	.5092	.4668	.4252	.3848	.3458	.3086	.2735
9	.7787	.7445	.7081	.6700	.6303	.5896	.5483	.5067	.4653	.4246
10	.8812	.8576	.8314	.8025	.7712	.7375	.7019	.6645	.6257	.5858
11	.9440	.9302	.9141	.8956	.8746	.8510	.8249	.7964	.7654	.7323
12	.9770	.9701	.9617	.9515	.9396	.9255	.9093	.8907	.8697	.8462
13	.9917	.9888	.9851	.9804	.9745	.9674	.9588	.9485	.9363	.9222
14	.9974	.9964	.9950	.9931	.9907	.9876	.9837	.9788	.9729	.9656
15	.9993	.9990	.9985	.9979	.9971	.9959	.9944	.9925	.9900	.9868
16	.9998	.9998	.9996	.9995	.9992	.9989	.9984	.9977	.9968	.9957
17	1.0000	1.0000	.9999	.9999	.9998	.9997	.9996	.9994	.9992	.9988
18	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9999	.9998	.9997
19	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999
20	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

$n = 25$ (continued)										
$\begin{matrix} p \\ x \end{matrix}$	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50
0	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
1	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
2	.0003	.0002	.0002	.0001	.0001	.0000	.0000	.0000	.0000	.0000
3	.0017	.0013	.0009	.0007	.0005	.0003	.0002	.0002	.0001	.0001
4	.0073	.0055	.0042	.0031	.0023	.0017	.0012	.0009	.0006	.0005
5	.0233	.0184	.0144	.0112	.0086	.0066	.0050	.0037	.0028	.0020
6	.0606	.0495	.0401	.0323	.0258	.0204	.0160	.0124	.0096	.0073
7	.1308	.1106	.0929	.0773	.0639	.0523	.0425	.0342	.0273	.0216
8	.2407	.2103	.1823	.1569	.1340	.1135	.0954	.0795	.0657	.0539
9	.3849	.3465	.3098	.2750	.2424	.2120	.1840	.1585	.1354	.1148
10	.5452	.5044	.4637	.4235	.3843	.3462	.3098	.2751	.2426	.2122
11	.6971	.6603	.6220	.5826	.5426	.5022	.4618	.4220	.3829	.3450
12	.8203	.7920	.7613	.7285	.6937	.6571	.6192	.5801	.5402	.5000
13	.9059	.8873	.8664	.8431	.8173	.7891	.7587	.7260	.6914	.6550
14	.9569	.9465	.9344	.9203	.9040	.8855	.8647	.8415	.8159	.7878
15	.9829	.9780	.9720	.9647	.9560	.9457	.9337	.9197	.9036	.8852
16	.9942	.9922	.9897	.9866	.9826	.9778	.9719	.9648	.9562	.9461
17	.9983	.9977	.9968	.9956	.9942	.9923	.9898	.9868	.9830	.9784
18	.9996	.9994	.9992	.9988	.9984	.9977	.9969	.9959	.9945	.9927
19	.9999	.9999	.9998	.9997	.9996	.9995	.9992	.9989	.9985	.9980
20	1.0000	1.0000	1.0000	1.0000	.9999	.9999	.9998	.9998	.9997	.9995
21	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9999	.9999
22	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Table2

Cumulative Poisson Distribution $P(X \leq x|\lambda)$. 1000 Times the Probability of X or Fewer Occurrences of Event That Has Average Number of Occurrences Equal to λ

$\lambda \backslash x$	.02	.04	.06	.08	.10	.15	.20	.25
0	980	961	942	923	905	861	819	779
1	1000	999	998	997	995	990	982	974
2		1000	1000	1000	1000	999	999	998
3						1000	1000	1000
$\lambda \backslash x$	.30	.35	.40	.45	.50	.55	.60	.65
0	741	705	670	638	607	577	549	522
1	963	951	938	925	910	894	878	861
2	996	994	992	989	986	982	977	972
3	1000	1000	999	999	998	998	997	998
4			1000	1000	1000	1000	1000	999
5								1000
$\lambda \backslash x$	.70	.75	.80	.85	.90	.95	1.0	1.1
0	497	472	449	427	407	387	368	333
1	844	827	809	791	772	754	736	699
2	966	959	953	945	937	929	920	900
3	994	993	991	989	987	984	981	974
4	999	999	999	998	998	997	996	995
5	1000	1000	1000	1000	1000	1000	999	999
6							1000	1000

$\lambda \backslash x$	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
0	301	273	247	223	202	183	165	150
1	663	627	592	558	525	493	463	434
2	879	857	833	809	783	757	731	704
3	966	957	946	934	921	907	891	875
4	992	989	986	981	976	970	964	956
5	998	998	997	996	994	992	990	987
6	1000	1000	999	999	999	998	997	997
7			1000	1000	1000	1000	999	999
8							1000	1000
$\lambda \backslash x$	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4
0	135	111	091	074	061	050	041	033
1	406	355	308	267	231	199	171	147
2	677	623	570	518	469	423	380	340
3	857	819	779	736	692	647	603	558
4	947	928	904	877	848	815	781	744
5	983	975	964	951	935	916	895	871
6	995	993	988	983	976	966	955	942
7	999	998	997	995	992	988	983	977
8	1000	1000	999	999	998	997	994	992
9			1000	1000	999	999	998	997
10					1000	1000	1000	999
11								1000
$\lambda \backslash x$	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
0	027	022	018	015	012	010	008	007
1	126	107	092	078	066	056	048	040
2	303	269	238	210	185	163	143	125
3	515	473	433	395	359	326	294	265
4	706	668	629	590	551	513	476	440
5	844	816	785	753	720	686	651	616
6	927	909	889	867	844	818	791	762
7	969	960	949	936	921	905	887	867
8	988	984	979	972	964	955	944	932
9	996	994	992	989	985	980	975	968
10	999	998	997	996	994	992	990	986
11	1000	999	999	999	998	997	996	995
12		1000	1000	1000	999	999	999	998
13					1000	1000	1000	999
14								1000

λ x	5.2	5.4	5.6	5.8	6.0	6.2	6.4	6.6
0	006	005	004	003	002	002	002	001
1	034	029	024	021	017	015	012	010
2	109	095	082	072	062	054	046	040
3	238	213	191	170	151	134	119	105
4	406	373	342	313	285	259	235	213
5	581	546	512	478	446	414	384	355
6	732	702	670	638	606	574	542	511
7	845	822	797	771	744	716	687	658
8	918	903	886	867	847	826	803	780
9	960	951	941	929	916	902	886	869
10	982	977	972	965	957	949	939	927
11	993	990	988	984	980	975	969	963
12	997	996	995	993	991	989	986	982
13	999	999	998	997	996	995	994	992
14	1000	999	999	999	999	998	997	997
15		1000	1000	1000	999	999	999	999
16					1000	1000	1000	999
17								1000

λ x	6.8	7.0	7.2	7.4	7.6	7.8	8.0	8.5
0	001	001	001	001	001	000	000	000
1	009	007	006	005	004	004	003	002
2	034	030	025	022	019	016	014	009
3	093	082	072	063	055	048	042	030
4	192	173	156	140	125	112	100	074
5	327	301	276	253	231	210	191	150
6	480	450	420	392	365	338	313	256
7	628	599	569	539	510	481	453	386
8	755	729	703	676	648	620	593	523
9	850	830	810	788	765	741	717	653
10	915	901	887	871	854	835	816	763
11	955	947	937	926	915	902	888	849
12	978	973	967	961	954	945	936	909
13	990	987	984	980	976	971	966	949
14	996	994	993	991	989	986	983	973
15	998	998	997	996	995	993	992	986
16	999	999	999	998	998	997	996	993
17	1000	1000	999	999	999	999	998	997
18			1000	1000	1000	1000	999	999
19							1000	999
20								1000

$\lambda \backslash x$	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5
1	001	001	000	000	000	000	000	000
2	006	004	003	002	001	001	001	000
3	021	015	010	007	005	003	002	002
4	055	040	029	021	015	011	008	005
5	116	089	067	050	038	028	020	015
6	207	165	130	102	079	060	046	035
7	324	269	220	179	143	114	090	070
8	456	392	333	279	232	191	155	125
9	587	522	458	397	341	289	242	201
10	706	645	583	521	460	402	347	297
11	803	752	697	639	579	520	462	406
12	876	836	792	742	689	633	576	519
13	926	898	864	825	781	733	682	628
14	959	940	917	888	854	815	772	725
15	978	967	951	932	907	878	844	806
16	989	982	973	960	944	924	899	869
17	995	991	986	978	968	954	937	916
18	998	996	993	988	982	974	963	948
19	999	998	997	994	991	986	979	969
20	1000	999	998	997	995	992	988	983
21		1000	999	999	998	996	994	991
22			1000	999	999	998	997	995
23				1000	1000	999	999	998
24						1000	999	999
25							1000	999
26								1000

λ x	13.0	13.5	14.0	14.5	15	16	17	18
3	001	001	000	000	000	000	000	000
4	004	003	002	001	001	000	000	000
5	011	008	006	004	003	001	001	000
6	026	019	014	010	008	004	002	001
7	054	041	032	024	018	010	005	003
8	100	079	062	048	037	022	013	007
9	166	135	109	088	070	043	026	015
10	252	211	176	145	118	077	049	030
11	353	304	260	220	185	127	085	055
12	463	409	358	311	268	193	135	092
13	573	518	464	413	363	275	201	143
14	675	623	570	518	466	368	281	208
15	764	718	669	619	568	467	371	287
16	835	798	756	711	664	566	468	375
17	890	861	827	790	749	659	564	469
18	930	908	883	853	819	742	655	562
19	957	942	923	901	875	812	736	651
20	975	965	952	936	917	868	805	731
21	986	980	971	960	947	911	861	799
22	992	989	983	976	967	942	905	855
23	996	994	991	986	981	963	937	899
24	998	997	995	992	989	978	959	932
25	999	998	997	996	994	987	975	955
26	1000	999	999	998	997	993	985	972
27		1000	999	999	998	996	991	983
28			1000	999	999	998	995	990
29				1000	1000	999	997	994
30						999	999	997
31						1000	999	998
32							1000	999
33								1000

λ x	19	20	21	22	23	24	25
6	001	000	000	000	000	000	000
7	002	001	000	000	000	000	000
8	004	002	001	001	000	000	000
9	009	005	003	002	001	000	000
10	018	011	006	004	002	001	001
11	035	021	013	008	004	003	001
12	061	039	025	015	009	005	003
13	098	066	043	028	017	011	006
14	150	105	072	048	031	020	012
15	215	157	111	077	052	034	022
16	292	221	163	117	082	056	038
17	378	297	227	169	123	087	060
18	469	381	302	232	175	128	092
19	561	470	384	306	238	180	134
20	647	559	471	387	310	243	185
21	725	644	558	472	389	314	247
22	793	721	640	556	472	392	318
23	849	787	716	637	555	473	394
24	893	843	782	712	635	554	473
25	927	888	838	777	708	632	553
26	951	922	883	832	772	704	629
27	969	948	917	877	827	768	700
28	980	966	944	913	873	823	763
29	988	978	963	940	908	868	818
30	993	987	976	959	936	904	863
31	996	992	985	973	956	932	900
32	998	995	991	983	971	953	929
33	999	997	994	989	981	969	950
34	999	999	997	994	988	979	966
35	1000	999	998	996	993	987	978
36		1000	999	998	996	992	985
37			999	999	997	995	991
38			1000	999	999	997	994
39				1000	999	998	997
40					1000	999	998
41						999	999
42						1000	999
43							1000

Table3

Normal Curve Areas $P(z \leq z_0)$. Entries in the Body of the Table Are Areas Between $-\infty$ and z

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

TABLE D (continued)

<i>z</i>	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	<i>z</i>
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, May 2023
B. Tech. (Biotechnology) – Fourth Semester
BIO SAFETY BIOETHICS AND IPR (BBT-DS-405)

Time: 3 hrs.

Max Marks:

100

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Briefly explain social and ethical issues in biotechnology. [CO-1][L-1]
- b) Explain the importance of public education in the process of biotechnology. [CO-1] [L-1]
- c) Discuss the ethical conflicts in biotechnology. [CO-1] [L-2]
- d) Elaborate the unequal distribution of risks and benefits of biotechnology. [CO-1] [L-2]
- e) Expand biosafety. [CO-2] [L-2]
- f) Correlate biosafety for human health and environment. [CO-2] [L-2]
- g) What is Cartagena protocol on biosafety? [CO-3] [L-3]
- h) Explain bioterrorism with an example. [CO-3] [L-2]
- i) What is collaborative research? [CO-3] [L-2]
- j) Define 'IPR'. [CO-4] [L-1] **2×10**

PART-A

- Q.2 a) How Biotechnology is related to social responsibility in context to bioethics? [CO-1] [L-2] **10**
b) Explain technology transfer and international relations. [CO-1] [L-2] **10**
- Q.3 a) Discuss the fear of unknown in biotechnology and bioethics. [CO-1] [L-2] **10**
b) Give an account on globalization in biotechnology. [CO-1] [L-2] **10**
- Q.4 a) What are the perceptions of risks and benefits in context of biosafety? [CO-2][L-3] **10**
b) Give a debate on GM-foods. [CO-2] [L-3] **10**

PART-B

- Q.5 a) Write a note on prudent biosafety practices in the laboratory/institution. [CO-2] [L-2] **10**
b) Give a protocol on handling of recombinant DNA processes. [CO-2] [L-2] **10**
- Q.6 Write short notes on the following:
a) Conditions for patentability.
b) Test of novelty of patents.
c) Composition of a patent.
d) Patent claims. [CO-3][L-3] **5×4**
- Q.7 a) Explain the legal implications of patent with legal decision-making process. [CO-4][L-4] **10**
b) Explain the Indian patents and foreign patents in plant biotechnology. [CO-4] [L-4] **10**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

ENGINEERING ECONOMICS (BBT-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) Discuss the advantages of socialism over capitalism. [CO-1] [L2][2]
- b) Interpret the factor effecting demand. [CO-3] [L2][2]
- c) Explain EBITDA. [CO-3] [L2][2]
- d) What is a monopolistic competition? [CO-1] [L1][2]
- e) What is price discrimination in a monopoly? [CO-1] [L1][2]
- f) Differentiate between 'oligopoly' and 'monopoly'. [CO-3] [L4][2]
- g) What are the effects of inflation on an economy? [CO-3] [L4][2]
- h) Explain quantity theory of Money. [CO-3] [L4][2]
- i) How exchange rate can be determined? [CO-3] [L4][2]
- j) What are the different phases of business cycle? [CO-3] [L4][2] **2×10**

PART-A

Q.2 An economist assumes that there is a linear relationship between the amount of funds (x in thousands) provided in for advertisement of the company products and the subsequent sales (y units). The economist had collected the data for eight such incidents.

Plant	A	B	C	D	E	F	G	H
X	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5
Y	4	5	6	8	10	15	18	20

- a) Design the equation of the least squares regression line of y on x. [CO4] [L6] **10**
- b) Estimate the unit sale with 5250 funds to the nearest unit. [CO4] [L6] **10**

Q.3 a) Draw total fixed cost, total variable cost and total cost curves in a single diagram. State the relation between total variable cost and total cost curves. [CO3] [L2] **10**
b) Differentiate between economic profit and accounting profit. [CO2] [L4] **10**

Q.4 a) Why perfect competition elevates low profit margins? [CO3] [L2] **10**
b) Explain why implementation of proper price discrimination leads to reduction in competition from the rivals. [CO2] [L3] **10**

PART-B

Q.5 a) Discuss the role of banking in economic development. [CO1][L3] **10**
b) Differentiate between GNP and GDP. [CO2] [L4] **10**

Q.6 a) What is balance of payment? Why it is important to the finance department. [CO3] [L2] **10**
b) Every nation has a distinct methodology to decide its currency's exchange. Determine how it is done using fixed exchange rate. [CO4] [L5] **10**

Q.7 What is the national income? How it helps in laying down the foundation of economic growth? Discuss how national income can be measured using expenditure method and product/ value added method? [CO4] [L4] **20**

End Semester Examination, May 2023
B. Tech. – Fifth Semester
RECOMBINANT DNA TECHNOLOGY (BBT-DS-501)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following questions in brief:

- a) How endonucleases are different from exonucleases? [CO-4][L4]
- b) What does pBR322 and pUC stand for? [CO-1][L2]
- c) Student adds Taq polymerase, nucleotides, and primer to a test tube. What procedure are they most likely going to do next? [CO-4][L4]
- d) What is the basic difference between pBR322 and pUC? [CO-1][L4]
- e) If a single piece of double stranded DNA (dsDNA) is put into a PCR machine, how many dsDNA segments will there be after 3 rounds? [CO-3][L2]
- f) Outline the basic architecture of an expression vector. [CO-4][L4]
- g) A researcher runs the gene coding for a protein 'A' and its cDNA through gel electrophoresis, Show on the gel the probable locations of the two. [CO-4][L4]
- h) Which restriction endonuclease is used to create Zinc finger nucleases and why? [CO1][L1]
- i) What will be the fate of lambda bacteriophage if its CII gene is mutated? [CO-2][L2]
- j) Which host will you opt for the production of glycosylated proteins and why? [CO-2][L2] **2×10**

PART-A

Q.2 a) Plasmid G is cut with the restriction enzymes EcoRI, BamHI, and HindIII in various combinations. The sizes of the resulting fragments are seen in the table below:

BamHI	BamHI + EcoRI	EcoRI + HindIII	BamHI + EcoRI + HindIII
14kb	3kb	5kb	3kb
20kb	5kb	13kb	4kb
	12kb	16kb	5kb
	14kb		10kb
			12kb

Draw the genetic map of the plasmid.

[CO-2][L5] **10**

- b) Explain how to find whether an E. coli bacterium has transformed or not when a recombinant DNA bearing ampicillin resistant gene is transferred into it. What does the ampicillin resistant gene act as in the above case? [CO-2][L5] **10**

Q.3 What factors govern the fate of lambda bacteriophage when it infects a bacterial cell? Explain the molecular basis of the same. [CO-3][L2] **20**

- Q.4 a) How screening of genomic DNA library can be done? [CO-2] [L4] **8**
b) Explain the different strategies to sequence the DNA. [CO-3] [L3] **12**

PART-B

Q.5 Describe the different promoter systems present in S. cerevisiae for heterologous protein production. [CO-3][L3] **20**

- Q.6 a) Explain how CRISPR-Assisted Nonhomologous End-Joining Strategy for efficient genome editing occurs. [CO-4][L2] **12**
b) Discuss nontoxic and efficient strategies to transfer therapeutic genes into target cells. [CO-3][L3] **8**
- Q.7 What technique would be followed for the: **7**
a) Detection of gene of interest. **7**
b) Quantification of the PCR product. **7**
c) Detection of protein of interest.
Enumerate the basic steps of each technique. [CO-5][L4] **6**

End Semester Examination, May 2023

B. Tech. – Fifth Semester

FOOD BIOTECHNOLOGY (BBT-DS-502)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- What are the major causes of food spoilage?
- Name two chemical compounds used as food preservatives.
- Explain the term: sterilization and pasteurization.
- Briefly discuss the food additives of fermentation origin.
- Give the effect of temperature on milk.
- How does pH effect the growth of microbes in food?
- Discuss the fermentative production of riboflavin.
- What are food additives and flavours?
- What are the functional properties of agar droplets?
- Discuss dye reduction and roll tubes.

2x10

PART-A

Q.2 What are the sources, types, incidence and behavior of microorganisms found in foods? Explain common food borne bacteria with genera of molds and yeasts that are common to foods. [CO-1] [L-2] **20**

Q.3 a) Elaborate the intrinsic and extrinsic microbial parameters of foods. **10**
b) Discuss membrane filters and microscopic colony count. [CO-2] [L-2] **10**

Q.4 Explain the spoilage of poultry and sea foods. What precautionary measures can be adopted in order to prevent these from spoilage? [CO-3] [L-3] **20**

PART-B

Q.5 List the various types of whey beverages. Discuss the pre-treatments of whey while using as a substrate. Mention the environmental conditions for yeast production from whey. [CO-4] [L-3] **20**

Q.6 a) Discuss SCPs in detail. [CO-5] [L-3] **10**
b) Explain the fermentative production of food and alcoholic beverages. [CO-5] [L-3] **10**

Q.7 Give the effect of proteolytic enzymes on protein quality of foods. Discuss some important enzymatic reactions in food fermentations. [CO-6] [L-4] **20**

End Semester Examination, May 2023

B. Tech. – Fifth Semester

ANIMAL BIOTECHNOLOGY (BBT-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) How humidity is maintained in a cell culture incubator. [CO-2] [L-2]
- b) What is the role of liquid nitrogen in cell storage? [CO-1] [L-2]
- c) How would you decontaminate a cell culture laboratory? [CO-2] [L-2]
- d) What are feeder layers? [CO-3] [L-2]
- e) What are human artificial chromosomes? [CO-4] [L-2]
- f) Expand VEGF and its role in cancer. [CO-5] [L-2]
- g) Expand FISH and its importance in animal cell culture. [CO-6] [L-2]
- h) What is cell sorting? Which instrument is used for the same? [CO-4] [L-2]
- i) Why is extent of contamination an important parameter for decontamination? [CO5] [L2]
- j) What is the role of pronase in animal cell culture? [CO-3] [L-2] **2×10**

PART-A

Q.2 Write a note on 'the three types of incubators'. Which according to you is fit to be used in the animal cell culture lab and why? [CO-1] [L-2] **20**

- Q.3
- a) Differentiate between 'natural' and 'defined media'. [CO-2] [L-2] **10**
 - b) Mention various substances and treatments used in a cell culture laboratory with their specific uses. [CO- 2] [L- 2] **10**

Q.4 Discuss the methods applied for organ culture. Enlist significant applications of organ culture. [CO-3] [L-2] **20**

PART-B

Q.5 a) How does Karyotyping plays an important role in diagnosis of genetic disorders. [CO-4] [L-3] **10**

- b) Write short notes on:
- i) Gene therapy.
 - ii) Cloning. [CO-4] [L-3] **5×2**

Q.6 How does a tumor cell is differentiated from a normal cell? What are carcinogens? Enlist some of them from routine life. [CO-5] [L-2] **20**

Q.7 Mention different types of stem cells. Differentiate amongst them and mention their various applications. [CO-6] [L-2] **20**

End Semester Examination, May 2023
B. Tech. (Biotechnology) – Fifth Semester
INTRODUCTION TO BIOMATERIALS (BBT-DS-521)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- | | |
|---|------------------------|
| a) Explain wound healing. | [CO4] [L2] |
| b) Compare in vitro and In Vivo evaluation of tissue compatibility. | [CO5] [L2] |
| c) List the various types of polymers. | [CO2] [L1] |
| d) Explain stress and strain relation with diagram. | [CO2] [L2] |
| e) Define 'cell adhesion'. | [CO1] [L1] |
| f) Explain biomaterials related infections. | [CO3] [L5] |
| g) What is tissue engineering? | [CO5] [L1] |
| h) Illustrate the biomaterial use in human body system. | [CO6] [L2] |
| i) Discuss the extracellular matrix. | [CO4] [L4] |
| j) Compare the mechanical properties of bio-ceramics with metals. | [CO5] [L6] 2×10 |

PART-A

- Q.2 What are smart materials? Compare the smart material on the basis of their properties and uses. [CO1][L4] **20**
- Q.3 Explain the different phenomena that occur when biomaterials come in contact with blood, plasma proteins, cells and tissues. [CO3][L5] **20**
- Q.4 a) Discuss different type of metal alloys used as biomaterials. [CO2][L6] **10**
b) What are different types of biomaterials? Discuss their unique properties. [CO2][L6] **10**

PART-B

- Q.5 Explain different phenomenon occurs at bio-interface. [CO4][L5] **20**
- Q.6 Explain the tissue engineering process in detail. [CO6][L5] **20**
- Q.7 Evaluate the various parameters to test the biomaterials and the compatibility in human body. [CO5][L5] **20**

End Semester Examination, May 2023

B. Tech. (Biotechnology) – 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) Which scientists made important contributions to the development of virology? What were their contributions? [CO-2][L-2]
- b) Define 'PFU'. [CO-1][L-1]
- c) Explain vertical transmission. [CO-4][L-2]
- d) What is an envelope? Why are some enveloped viruses pleomorphic? [CO-2][L-3]
- e) Explain adjuvant and its use in vaccine delivery. [CO-4][L-2]
- f) Mention the taxonomy of HIV. [CO-3][L-2]
- g) Enlist the properties of Prions. [CO-5][L-1]
- h) Outline the properties and use of binary vectors. [CO-5][L-4]
- i) Evaluate the requirements for a virology laboratory. [CO-6][L-4]
- j) What is meant by biocontainment? [CO-6][L-1] **2×10**

PART-A

- Q.2 a) Outline the ways that viruses can be cultivated by in-vivo method. [CO-1] [L-2] **10**
b) How can one find the virus concentration, both directly and indirectly? [CO-1] [L-3] **10**

- Q.3 How DNA viruses are different from RNA viruses? Explain RNA virus general strategy for positive RNA strand and negative RNA strand replication. [CO-1,CO2][L-2] **20**

Q.4 Contrast between the following:

- a) Recombinant Vaccine and DNA vaccine.
- b) Live and attenuated vaccine. [CO-6][L-4] **10×2**

PART-B

- Q.5 Discuss about Gene cloning in detail with suitable diagrams. Mention the names and the characteristics of vectors use in gene cloning. [CO-5][L-3] **20**

- Q.6 a) Outline the various processes in antiviral designing. [CO-5][L-3] **10**
b) Elaborate on the various biosafety levels adopted for virological laboratories. [CO-4][L-4] **10**

- Q.7 Discuss about the structure, diagnosis and treatment for HIV Virus. Illustrate the structure with the help of a diagram. [CO-5,CO-6][L-3] **20**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

PLANT BIOTECHNOLOGY (BBT-DS-601)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following briefly.

- a) Define the terms de-differentiation and re-differentiation in plant tissue culture. [CO1][L1]
- b) Name any two auxins. [CO1][L1]
- c) Differentiate between androgenic and gynogenic haploids. [CO1][L2]
- d) What are somatic embryos? [CO2][L1]
- e) Enumerate the importance of cybrids. [CO2][L1]
- f) Mention the uses of somaclonal variations. [CO3][L1]
- g) Identify the functions of Phosphate solubilizing bacteria. [CO3][L1]
- h) Highlight two examples of marker assisted selection in plants. [CO4][L2]
- i) What is a linkage map? [CO4][L1]
- j) Give one example of transgenic crop mentioning the type and function of transgene. [CO4] [L1] **2×10**

PART-A

- Q.2 a) Describe the broad composition and method of preparation of MS medium for plant tissue culture. [CO-1] [L-2] **10**
- b) Illustrate the process of micropropagation through direct route. [CO-1] [L-2] **10**
- Q.3 a) Appraise the hybrid selection method based on complementation of resistance markers. [CO-2] [L-5] **10**
- b) Organize the sequence of events in cybridization. [CO-2] [L-3] **10**
- Q.4 a) Demonstrate the process of nodule formation in leguminous plants. [CO-3] [L-2] **10**
- b) Discuss the mechanism of action of nitrogenase enzyme. [CO-3] [L-6] **10**

PART-B

- Q.5 a) Explain how linkage map can be constructed using molecular markers? [CO-5] [L-2] **10**
- b) Compare the top-down and bottom-up approaches of gene sequencing. [CO-5] [L-4] **10**
- Q.6 a) Identify the mechanism of vector-less gene transfer in plants. [CO-4] [L-3] **10**
- b) Illustrate a chimeric gene construct and analyze its role as a vector. [CO-4][L-4] **10**
- Q.7 a) Discuss with examples the role of transgenics in developing insect resistant crops. [CO-6] [L-6] **10**
- b) Assess the prospects of molecular farming using transgenic plants. [CO-6][L-5] **10**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
ENVIRONMENT BIOTECHNOLOGY (BBT-DS-602)

Time: 3 hrs.
100

Max Marks:

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Define 'bioaugmentation'. [CO1[L1]
- b) Define 'Co-composting'. [CO5[L1]
- c) How is biosparging different from bioventing? [CO2[L3]
- d) What do you mean by sanitary landfill? [CO2[L1]
- e) Differentiate between biological oxygen demand (BOD) and chemical oxygen demand (COD). [CO5[L3]
- f) What is the purpose of aeration in activated sludge treatment? [CO2[L1]
- g) Mention the benefits of bioplastics. [CO6[L1]
- h) Analyze vermicomposting as an ecofriendly technology. [CO4[L3]
- i) Are biodegradation, biotransformation and biomineralization different? Critically comment on the statement. [CO31[L2]
- j) What are psychrophiles? [CO1[L1] **2×10**

PART-A

- Q.2 a) What is acid rain and how is it caused? [CO-1][L-1] **5**
b) What do you mean by bad ozone? [CO-1] [L-1] **5**
c) Damage to ozone layer is a cause of concern. Justify this statement and suggest two steps to limit this damage. [CO-1] [L-2] **10**
- Q.3 a) Why is it important to maintain water quality parameters? [CO-2] [L-3] **5**
b) What is the difference between suspended-growth and attached growth (fixed-film) processes? Explain in detail the different types of bioreactors used in waste water treatment. [CO-2] [L-1] **15**
- Q.4 a) Classify the different types of hazardous wastes? [CO-3] [L-2] **5**
b) Differentiate active and passive composting. Explain the biological environment in composting. What is the fate of organic matter in compost? [CO-3][L-4] **15**

PART-B

- Q.5 a) What are xenobiotics? Give some typical features of recalcitrant organic compounds. [CO-4] [L-1] **7**
b) Explain the two phases of xenobiotic metabolism, Compare the Phase I and Phase II reactions of xenobiotic metabolism. [CO-4] [L-1] **13**
- Q.6 a) Describe the types and advantages of bioremediation using microbes with the help of a flow chart. [CO-5] [L-2] **10**
b) How is phytoremediation in constructed wetlands including wastewater stabilization domestic ponds important in waste water treatment? [CO-5][L-1] **10**
- Q.7 a) Critically evaluate the importance of biomining as an ecofriendly technology. [CO-6] [L-5] **10**
b) Justify the importance of rain water harvesting in India. [CO-6] [L-4] **10**

End Semester Examination, May 2023

B. Tech. (Biotechnology) – Sixth Semester MOLECULAR DIAGNOSTICS (BBT-DS-622)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief.

- a) Knowing normal flora is important. Comment. [CO-1] [L-2]
- b) Genetic testing refers to _____. [CO-2] [L-2]
- c) Differentiate between parasitism and mutualism. [CO-2] [L-2]
- d) The ultimate goal of molecular diagnostics is _____. [CO-3] [L-2]
- e) Justify the role of mutations in human evolution. [CO-3] [L-2]
- f) Immunodiagnostics refers to _____. [CO-4] [L-2]
- g) Differentiate between prenatal and postnatal. [CO-5] [L-2]
- h) What is hybridization? [CO-5] [L-2]
- i) What is DGGE? [CO-6] [L-2]
- j) Name two markers used in triple screen. [CO-6] [L-2] **2×10**

PART-A

- Q.2 a) Give a detailed overview of sample collection and processing details before diagnosis. [CO-1] [L-2] **10**
- b) Normal flora of human body affects molecular diagnosis. How? [CO-1, CO-2] [L-3] **10**

- Q.3 a) Mutations have added a great knowledge to our diagnostic methods. Explain with examples. [CO-2] [L-3] **10**
- b) Design primers for the given sequence
5'TAGCTGCTAATGCCCGTAATCCTTGGGCTGCAATGCAGCCTTTGGCCTAAG3'
[CO-3, CO-4] [L-3] **10**

- Q.4 Elaborate on the principle and applications of nucleic acid hybridization. [CO-4] [L-2] **20**

PART-B

- Q.5 a) How SSCP has proven to be important tool for disease diagnosis. [CO-5][L-2] **10**
- b) Genetic testing explains predictions and carrier testing. How? [CO-6][L-2] **10**
- Q.6 a) Discuss in detail the principles of various tests available to diagnose viral infections. [CO-6][L-2] **20**
- Q.7 Explain in detail the background and advancements of genetic testing. Give an example to illustrate its utility in present times of diagnosis. [CO-5] [L-3] **20**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

CLINICAL MICROBIOLOGY (BBT-DS-623)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 significance of skin flora. [L-2]
- b) Give two example of blood parasite. [L-2]
- c) Differentiate between bacterial meningitis and viral encephalitis. [L-4]
- d) What do you mean by neurotoxins? [L-1]
- e) What are two characteristics of intermediary host? [L-2]
- f) Mention any two genera of dermatophyticfungai. [L-2]
- g) Discuss symptoms of Hepatitis B. [L-2]
- h) How transient flora is different from resident flora. [L-4]
- i) What are the three characteristics of a molecular detection system? [L-1]
- j) Name some targets for diagnostics monoclonal antibodies. [L-2]

[CO-1,2,3,4,5,6] **2×10**

PART-A

- Q.2 a) Evaluate the role of exotoxins in bacterial pathogenesis by giving suitable example. [CO-1][L5] **15**
b) Explain the effect of endotoxins on human body. Explain with the help of the diagram. [CO-1] [L2] **5**

- Q.3 Discuss the morphology, physiology, life cycle and pathogenesis of Tapeworm. Also critically analyze various diagnosis methods. [CO-2,3] [L-3, L5] **20**

- Q.4 a) Critically analyze various methods to control viral diseases. [CO-3][L-5] **15**
b) Write a short note on 'aerobic non spore formation in gram positive bacilli'. [CO-2][L-2] **5**

PART-B

- Q.5 Human cancer virus is different from prion disease. Justify. [CO-5,6] [L-5] **20**

Q.6 Write short notes on:

- a) Isolation of fungi.
- b) Classification of fungi.
- c) Diagnosis of various mycosis.
- d) Blastomycosis. [CO-4] [L-2] **5×4**

- Q.7 a) Critically analyze various method of molecular diagnosis. [CO-4,5][L-5] **15**
b) What do you mean by pre implantation diagnosis? [CO-5] [L-2] **5**

End Semester Examination, May 2023

B. Tech. – Eighth 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 'totipotent stem cell'. State the characteristics of stem cells. [CO-1] [L-1]
- b) Illustrate the effects of hypoxia in regulation of cancer stem cell niche. [CO-2] [L-5]
- c) Enlist some embryonic stem cell markers. [CO-3] [L-2]
- d) Enlist the ion channels in stem cell. [CO-2] [L-2]
- e) Determine the significance of WNT pathway. [CO-4] [L-2]
- f) Illustrate the purpose of Notch signalling. [CO-5] [L-1]
- g) What is Somatic nuclear transfer? [CO-6] [L-3]
- h) Explain types of stem cell transplantation. [CO-6] [L-2]
- i) Analyze the sources for stem cell therapy for diabetes. [CO-5] [L-2]
- j) Evaluate the complications associated with stem cell therapy. [CO-4][L-5] **2×10**

PART-A

- Q.2 a) Explain the difference between embryonic stem cells and adult stem cells. [CO-1] [L-2] **10**
b) Determine the role of micro-RNA in stem cell differentiation. [CO-2] [L-2] **10**
- Q.3 Describe different types of epigenetic modifications that have impact on the molecular basis of pluripotency. [CO-2] [L-3] **20**
- Q.4 a) Outline notch signalling and its functions in determining the cell fate. [CO-3] [L-4] **10**
b) Discuss the significance of hedge -hog signalling pathway. [CO-3] [L-3] **10**

PART-B

- Q.5 Evaluate the procedure and applications of somatic cell nuclear transfer with an example. [CO-4] [L-5] **20**
- Q.6 a) Discuss how therapeutic cloning is used with an example. [CO-5] [L-2] **10**
b) Illustrate Gene therapy and discuss its applications. [CO-5] [L-4] **10**
- Q.7 a) Evaluate the different sources and requirements for the stem cell therapy in nervous system repair. [CO-6] [L-5] **10**
b) Discuss intellectual property right in stem cell therapy. [CO-6] [L-3] **10**

End Semester Examination, May 2023

B. Tech. – Seventh Semester

MOLECULAR THERAPEUTICS (BBT-DS-722)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- | | |
|---|--------------------------|
| a) Define gene therapy and its significance. | [CO-1] [L-1] |
| b) Why Adeno virus is used in gene therapy? | [CO-1] [L-4] |
| c) Compare adult stem cells and embryonic stem cells. | [CO-2] [L-5] |
| d) Enlist some properties of stem cells. | [CO-2] [L-1] |
| e) Discuss how recombination therapy works. | [CO-3] [L-2] |
| f) Contrast streptokinase and urokinase. | [CO-3] [L-3] |
| g) Outline the significance of MHC in organ transplant. | [CO-4] [L-4] |
| h) Evaluate the applications of gene silencing technology. | [CO-5] [L-5] |
| i) Illustrate ethical issues associated with molecular therapies. | [CO-6] [L-3] |
| j) Explain the clinical use of recombinant vaccine. | [CO-6] [L-2] 2×10 |

PART-A

- Q.2 a) Explain the cell specific barrier to deliver the therapeutic gene by liposome mediated gene delivery. [CO-1] [L-2] **10**
b) Illustrate how retro virus gene transfer technology works. [CO-1] [L-4] **10**
- Q.3 a) Evaluate the sources for stem cells and their potency. Mention some stem cells markers also. [CO-2] [L-5] **10**
b) Illustrate the meaning, purpose and components of tissue engineering. [CO-2] [L-4] **10**
- Q.4 a) Compare type I and type II diabetes. Explain the insulin analogues and their uses. [CO-3] [L-5] **10**
b) Discuss the production and need for recombinant human growth hormone and coagulation factors. [CO-3] [L-2] **10**

PART-B

- Q.5 a) How vaccine works? Contrast DNA vaccine and mRNA vaccine. [CO-4] [L-3] **10**
b) Discuss the role of cytokine therapy in the treatment of cancer. [CO-4] [L-2] **10**
- Q.6 a) Define 'antisense therapy'. Explain the gene silencing mechanism by using Si RNA. [CO-4] [L-2] **15**
b) What is transgenic? Analyze the uses of transgenic animal and plants. [CO-4] [L-2] **5**
- Q.7 a) Outline the need and clinical uses of recombinant erythropoietin. [CO-4] [L-2] **5**
b) Explain the monoclonal antibodies and their application in the treatment of cancer. [CO-4] [L-2] **15**

End Semester Examination, May 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) What is the role of Omics in bioremediation?
- b) Differentiate between 'biotransformation' and 'biomineralization'.
- c) Discuss the complex nature of PCBs.
- d) How is intradiol cleavage different from extradiol cleavage pathway of dioxygenase enzyme?
- e) Nitroaromatics are highly toxic. Comment.
- f) Summarize the low cost adsorbents for waste water treatment.
- g) Illustrate the Fenton's reaction.
- h) What do you mean by incineration?
- i) Define 'Mycoremediation'.
- j) Highlight the importance of high octanol-water partition coefficients (K_{ow}). **2×10**

PART-A

- Q.2 a) Critically analyze and discuss the physicochemical techniques for the removal for toxic substances from soil. [CO-1][L-2] **15**
b) Differentiate between 'dissimilarly metal reduction' and 'indirect metal reduction'. [CO-3][L-3] **5**
- Q.3 a) Dissimilarly metal reduction has the potential to be a helpful mechanism for both intrinsic and engineered bioremediation of contaminated environments. Justify the statement with proper examples. [CO1][L-5] **10**
b) How is the mechanism of dissimilarly metal reduction different from indirect metal reduction? [CO3][L-1] **10**
- Q.4 a) Discuss the mechanism of degradation of alkanes by bioremediation. [CO-4] [L-2] **10**
b) What do you understand by ex situ technologies of Bioremediation. [CO-5] [L-1] **10**

PART-B

- Q.5 Explain in detail the microbial pathway for biodegradation of polychlorinated biphenyls. [CO-2] [L-2] **20**
- Q.6 a) Outline the importance of Meisenheimer complexes. [CO-5] [L-1] **10**
b) Write the detailed mechanism for a nucleophilic aromatic substitution reaction. [CO-3] [L-1] **10**
- Q.7 There are different strategies of microbial remediation of Nitroaromatics. Justify with suitable diagram, flow chart and examples. [CO-6] [L-3] **20**

End Semester Examination, May 2023
B. Tech. – Third Semester
ENGINEERING MECHANICS FOR CIVIL ENGINEERS
(BCE-DS-302/BCE-DS-302A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

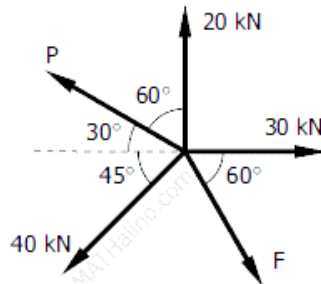
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following in brief:

- a) What are the different types of supports as idealized in the analysis of structures. [CO-2][L-1]
- b) What is shear force and bending moment? [CO-2][L-1]
- c) Give an example of a parallel force system. [CO-1][L-1]
- d) What are the different assumptions in the analysis of trusses? [CO-2][L-2]
- e) Why are zero force members required in a truss? [CO-3][L-1]
- f) State De Alembert's principle. [CO-5][L-1]
- g) Find the Centroid of a triangle. [CO-2][L-3]
- h) State principle of virtual work. [CO-4][L-1]
- i) Give a practical example of general plane motion. [CO-6][L-2]
- j) What are forced vibrations? [CO-6][L-1] **2×10**

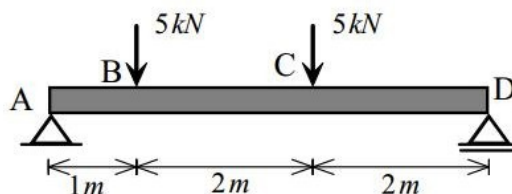
PART-A

Q.2 a) The five forces shown in the figure below are in equilibrium. Compute the values of P and F.



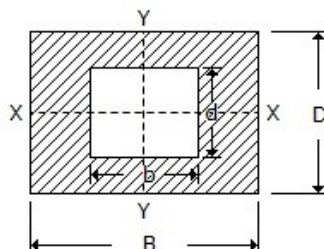
[CO-1][L-3] **10**

b) Find the reactions at A and D where A is a hinged support and D is a roller support:



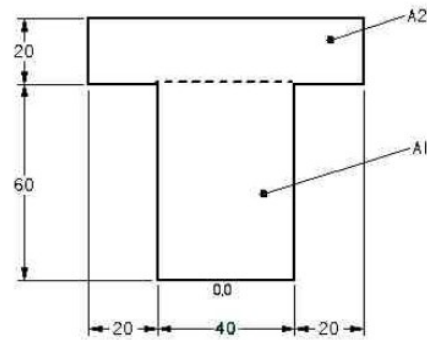
[CO-2][L-4] **10**

Q.3 a) Determine the moment of inertia of a hollow section, as shown in the below figure about Z-axis perpendicular to the plane of the paper.



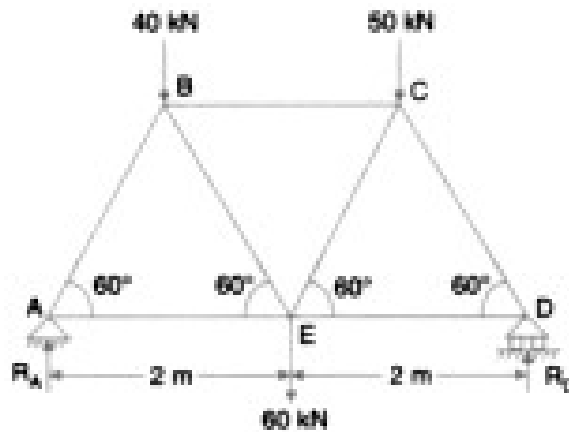
[CO-4][L-3] **10**

b) Find the centroid of the following figure.



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

Q.4 Determine the nature and magnitude of forces in the members BC, BE and AE in the truss given below:



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

PART-B

Q.5 A motorcyclist travels along a straight road at a speed of 27 m/s. When the brakes are applied, the motorcycle decelerates at a rate of $-6t$ m/s². Find the distance the motorcycle travels before it stops. [CO-4][L-3] **20**

Q.6 Derive an expression for the maximum height and range of a projectile traversed by a stone thrown with an initial velocity of u and an inclination of θ . [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, May 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** questions from **PART-B**. Marks are indicated against each question.

- Q.1 Answer the following in brief:
- a) Describe "Risk". [CO-3][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) Differentiate between a physical and socio-economic vulnerability. [CO-2][L-2]
 - d) List the impacts of flooding on housing and small buildings. [CO-4][L-3]
 - e) Give any two advantages of early warning system. [CO-5][L-3]
 - f) List a few causes of flooding. [CO-3][L-2]
 - g) The main purpose of disaster management efforts is to _____. [CO-4][L-1]
 - h) Activities which take place following a disaster are part of _____. [CO-6][L-1]
 - 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 'disaster and hazard'. Give any two examples of hazard. [CO-1][L-3] **20**
- Q.3 Differentiate between natural and man-made disasters citing relevant examples. The Chernobyl disaster will be grouped in which of these categories. Discuss the reasons of same and give an over-view of the extent of damage inflicted onto the system during this catastrophe. [CO-2][L-4] **20**
- Q.4 Discuss the general 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 state disaster management authority. [CO-6][L-3] **20**
- Q.7 Outline the points to be considered for reconstruction of housing after a disaster citing relevant examples. [CO-4,][L-3] **20**

End Semester Examination, May 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) When was geological survey of India established? [CO-1][L-1]
- b) What is eon? [CO-3][L-2]
- c) Give the average radius of earth. [CO-2][L-1]
- d) Give atleast one direct source of information which helps us to understand the interior of earth. [CO-4][L-2]
- e) Give the range of thickness of earth's crust. [CO-1][L-1]
- f) List the different stages of rock deformation. [CO-4][L-1]
- g) Compile a list of any two minor tectonic plates. [CO-5][L-1]
- h) List any two natural causes of a landslide. [CO-6][L-3]
- i) Draw a neat sketch showing different components of a fault. [CO-4][L-2]
- j) Give atleast two requirements rendering a site suitable for development of a dam. [CO-6][L-3] **2×10**

PART-A

- Q.2 Describe the physical properties of rocks. [CO-1][L-3] **20**
- Q.3 Draw a neat sketch of the rock cycle and explain it in detail. [CO-2][L-3] **20**
- Q.4 Explain the process and different types of weathering. [CO-3][L-3] **20**

PART-B

- Q.5 Discuss folds in detail including their classification, mechanism and causes. [CO-3][L-3] **20**
- Q.6 Discuss the effects of an earthquake and the precautions to be exercised for construction in seismic areas. [CO-5][L-3] **20**
- Q.7 You have been entrusted the job for finalizing the site for locating a reservoir. Prepare a detailed write up comprising of considerations you will cover. [CO-6][L-4] **20**

End Semester Examination, May 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) What is the role of electrons in an atom? [CO-1] [L-1]
- b) Describe 'primitive cell'. [CO-3] [L-2]
- c) What is the coordination number for the simple-cubic crystal structure? [CO-3] [L-1]
- d) What types of defects exist in solid materials? [CO-2] [L-2]
- e) Enlist the types of volume defects. [CO-2] [L-2]
- f) Enumerate the types of phase transformations. [CO-2] [L-2]
- g) What is the difference between self-diffusion and inter diffusion? [CO-2] [L-2]
- h) Do all materials have elastic deformation? Explain. [CO-4] [L-2]
- i) Explain proportional limit. [CO-4] [L-2]
- j) What is electric polarization in dielectrics? [CO-5] [L-2] **2×10**

PART-A

- Q.2 a) What are the differences between metallic, covalent and secondary types of bonding? Explain in detail. [CO-1] [L-2] **12**
b) Explain why covalently bonded materials are generally less dense than ionically or metallically bonded ones. [CO-1] [L-2] **8**
- Q.3 a) Draw sketches illustrating Miller indices (200), (110) and (111). [CO-3] [L-3] **6**
b) Show that the atomic packing factor for the FCC crystal structure is 0.74. [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) Differentiate among point, linear and interfacial defects. [CO-2] [L-2] **6**
b) Write short note on Schottky defects. [CO-2] [L-2] **6**
c) Describe the atomic structure within the vicinity of twin boundary. [CO-2] [L-2] **8**

PART-B

- Q.5 a) Describe Fick's laws of diffusion. [CO-2] [L-2] **6**
b) Write short note on Gibbs phase rule. [CO-2] [L-2] **6**
c) With the help of a diagram, explain the mechanism of diffusion. [CO-2] [L-4] **8**
- Q.6 a) State Hooke's law and note the conditions under which it is valid. [CO-4] [L-3] **6**
b) How is the stress-strain diagram useful in understanding the mechanical behavior of a metal? Explain in details. [CO-4] [L-4] **6**
c) Name the two hardness-testing techniques and differentiate between them. [CO-4] [L-2] **8**
- Q.7 a) Write a short note on: 'heat capacity and thermal stresses'. [CO-5] [L-2] **8**
b) Plot the hysteresis curve for a magnetic material. Label and explain the important features of the curve. [CO-5] [L-4] **8**

- c) In a LED the active material used is AlGaIn with a band gap of 4.5 eV. Find out the wavelength of light emitted. [CO-5] [L-4] **4**

End Semester Examination, May 2023
 B. Tech. – Fourth Semester
INTRODUCTION TO FLUID MECHANICS (BCE-DS-401)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following:

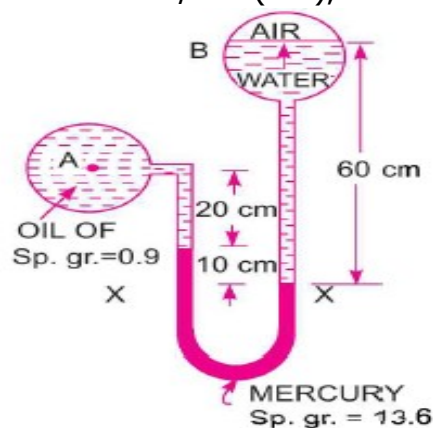
- | | |
|--|----------------|
| a) Define centre of pressure and centre of buoyancy. | [CO-2] [L-2] |
| b) What is orifice and mouthpiece? | [CO-4] [L-2] |
| c) What is a Newtonian fluid? | [CO-2] [L-1] |
| d) What is equivalent pipe and write its expression? | [CO-3] [L-3] |
| e) Define the centre of pressure and centre of buoyancy. | [CO-2] [L-2] |
| f) Define 'vena-contracta'. | [CO-5] [L-2] |

[CO-2] [L-2]

- | | |
|---|----------------------------|
| g) Define stability of floating and submerged bodies with the help of neat and clean diagram. | [CO-3] [L-1] |
| h) What is a flow net? | [CO-4] [L-3] |
| i) What do you understand by the terms circulation and vorticity? | [CO-5] [L-2] |
| j) State Buckingham's π -theorem. | [CO-6] [L-2] 2×10 |

PART-A

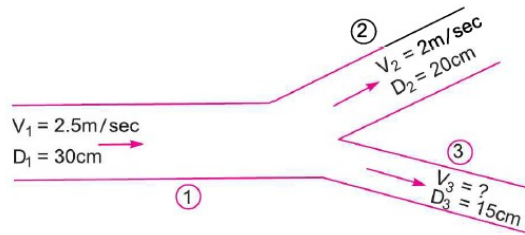
- Q.2 a) Explain the phenomenon of capillarity. Obtain an expression for capillarity rise of a liquid. [CO-1] [L-3] **10**
- b) Find out the minimum size of glass tube that can be used to measure water level if the capillary rise in the tube is to be restricted to 2 mm. Consider surface tension of water in Contact with air as 0.073575 N/m. [CO-1] [L-3] **10**
- Q.3 a) Define pressure. Obtain an expression for the pressure intensity at a point in a fluid. [CO-2] [L-3] **10**
- b) A differential manometer is connected at two points A and B as shown in below figure At B air pressure is 9.81 N/cm² (abs), Find the absolute pressure at A.



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

- Q.4 A 30 cm diameter pipe, conveying water, branches into two pipes of diameters 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s,

find the diameter in this pipe. Also determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s.



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

PART-B

- Q.5 a) Give any two applications of Bernoulli's equation. [CO-4] [L-3] **10**
 b) Define the equation of continuity. Obtain an expression for continuity equation for a three- dimensional flow. [CO-4] [L-4] **10**
- Q.6 The head of water over an orifice of diameter 100 mm is 10 m. The water coming out from orifice is collected in a circular tank of diameter 1.5 m. The rise of water level in this tank is 1.0 m in 25 seconds. Also the co-ordinates of a point on the jet, measured from vena-contracta are 4.3 m horizontal and 0.5 m vertical. Find the co-efficient, C_d , C_v and C_c . [CO-5] [L-6] **20**
- Q.7 a) Describe any one application of Weber number in real life how problems. [CO-4] [L-3] **10**
 b) Define the following non-dimensional numbers:
 Reynold's number, Froude's number and Mach's number. What are their significances for fluid flow problems? [CO-6] [L-2] **10**

End Semester Examination, May 2023
B. Tech. – Fourth Semester
INTRODUCTION TO SOLID MECHANICS (BCE-DS-402)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following in brief:

- a) Define "*Poisson's Ratio*" and write range of value for Poisson's ratio. [CO-1] [L-1]
- b) Differentiate between lateral and longitudinal strain with appropriate figure. [CO-1] [L-2]
- c) Explain the sign convention concepts for determining Shear Forces at a section. [CO-2] [L-2]
- d) Write an expression for determining *Section Modulus* of a hollow circular section. [CO-3] [L-1]
- e) Write down any two assumptions made in the theory of pure bending. [CO-3] [L-1]
- f) Find the shear stress at a distance 30mm above the N.A. for a wooden beam 150mm wide and 200mm deep, simply supported over a span of 4 metres, if shear force at a section of the beam is 5000 N. [CO-4] [L-4]
- g) A solid circular shaft of 150 mm diameter is used to transmit torque. Find the maximum torque transmitted by the shaft if the maximum shear stress induced to the shaft is 50 N/mm² [CO-5] [L-3]

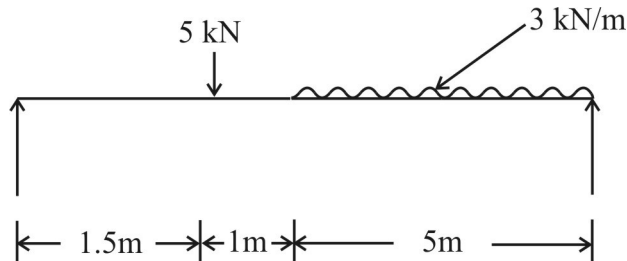
- h) List any 4 assumptions made in the derivation of shear stress produced in a circular shaft subjected to torsion. [CO-] [L-] **2**
- i) Briefly explain the term "*Thin cylinder*". [CO-6] [L-2]
- j) Explain the different stresses developed in a thin cylindrical vessel subjected to internal pressure. [CO-6] [L-2] **2×10**

PART-A

- Q.2
- a) With a proper figure, enunciate the *stress-strain curve of mild steel*. [CO1][L3] **8**
 - b) A steel rod of 4 cm diameter and 8 cm long is connected to two grips and the rod is maintained at a temperature of 90°C. Determine the stress and pull exerted when the temperature falls to 30°C, if
 - i.) The ends do not yield

- ii.) The ends yield by 0.15 cm (Take E for steel = $2.1 \times 10^5 \text{ N/mm}^2$ and copper = $1.1 \times 10^5 \text{ N/mm}^2$) [CO-1] [L-5] **12**

- Q.3 a) Derive an expression for determining the Shear Force and Bending moment of a simply supported beam subjected to UVL (uniformly varying load) with intensity from "zero to W " kN from one end to another. [CO-2] [L-4] **10**
 b) Draw SFD and BMD for the beam given in figure below:



- Q.4 Derive an expression for determining the slope and deflections of a simply supported beam carrying point load at its mid span. [CO-2][L-3] **10**
 [CO-3] [L-5] **20**

PART-B

- Q.5 A beam of cross section of an isosceles triangle is subjected to a shear force of 40 kN at a section where base width = 150mm and height = 500mm. Determine:
 a) The horizontal shear stress at the neutral axis.
 b) The distance from the top of the beam where shear stress is maximum.
 c) Value of maximum shear stress. [CO-4] [L-5] **20**
- Q.6 Two shafts of the same material and of same lengths are subjected to the same torque, if the first shaft is of solid circular section and the second shaft is of hollow circular section, whose internal diameter is $(2/3)$ of the outside diameter and the maximum shear stress developed in each shaft is the same, compare the weights of the shafts. [CO-5] [L-4] **20**
- Q.7 A boiler shell is to be made of 20mm thick plate having a limiting tensile stress of 120 N/mm^2 . If the efficiencies of the longitudinal and circumferential joints are 70% and 30% respectively, determine:
 a) The maximum permissible diameter of the shell for an internal pressure of 2 N/mm^2 .
 b) Permissible intensity of the internal pressure when the shell diameter is 1.5m. [CO-6] [L-5] **20**

End Semester Examination, May 2023

B. Tech. – Third Semester

SURVEYING AND GEOMATICS (BCE-DS-403)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

- Q.1 Answer the following in brief:
- What do you understand by linear surveying? [CO-1][L-2]
 - State the two principles of surveying. [CO-3][L-2]
 - Differentiate between latitude and departure. [CO-1][L-2]
 - Convert $40^{\text{hrs}}35^{\text{min}}27^{\text{sec}}$ into angles. [CO-4][L-3]
 - State the rules followed for writing the data in a leveling book. [CO-2][L-1]
 - What do you understand by the term contour interval? [CO-4][L-4]
 - Define "precision" and "accuracy". [CO-2][L-1]
 - What do you understand by the term relief displacement? [CO-5][L-2]
 - If the average elevation of the terrain is 1200 m from MSL, calculate the flight height of the aircraft at the time of exposure if the focal length of the camera is 15 cm; and the vertical photograph showing a flat terrain has a line of 3.50 cm long to a corresponding line XY of length 350 m on the ground. [CO-3][L-2]
 - Describe the importance of remote sensing in GIS. [CO-6][L-2] **2×10**

PART-A

- Q.2
- Write a well explanatory note on corrections in tape surveying. [CO-1][L-3] **12**
 - Summarize the various systems of bearing with the help of a neat sketch. [CO1][L3] **8**
- Q.3 Determine the RL of different points by "Height of Instrument Method" and "Rise and Fall Method" and show arithmetic check for the following staff readings taken from an auto level with a BM of 250 m: **3.00 m, 2.95 m, 1.80 m, 2.50 m, 1.50 m, 2.40 m, 3.95 m, 1.10 m, 2.750 m, 1.5 m, 1.95 m.** [CO-2][L-3] **20**
- Q.4
- Elaborate the concept of "contours" in surveying. Support your answer by stating its various characteristics useful in determining the topography of an area. [CO-3][L-2] **12**
 - With the help of a neat sketch, explain the various components of a simple curve [CO-3][L-2] **8**

PART-B

- Q.5
- Calculate maximum error, probable error and their range in the computed value of different operations performed while calculating the magnitude of an entity.

$x = 150 \text{ m}$	$\partial x = 0.25 \text{ m}$	$e_x = 0.5 \text{ m}$
$y = 200 \text{ m}$	$\partial y = 0.025 \text{ m}$	$e_y = 0.05 \text{ m}$

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

- Explain the various methods of plane table surveying. [CO-4][L-4] **10**

- Q.6
- With the help of a neat sketch, explain the concept of "tilted photogrammetry". [CO-5][L-2] **8**
 - A section line XY 550 m long on a flat terrain measures 2.50 cm on a vertical photograph. A radio tower also appears on a photograph. If the distance from principal point to the image of top of the tower is 10 m and to the image of bottom of the tower is 8.0 m, evaluate the height of the tower if the average elevation of the terrain is 1500 m. [CO-5][L-5] **12**

- Q.7
- Elaborate "global positioning system". [CO-6][L-2] **10**
 - Compare the various forms of data structures for GIS. [CO-6][L-2] **10**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

SURVYING 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
- a) What do you understand by "Leveling"? [CO-1] [L-2]
 - b) State the importance of "scales" in surveying. [CO-3] [L-2]
 - c) Differentiate between "geodetic surveying" and "plane surveying". [CO-1] [L-2]
 - d) Represent S 35° E in whole circle system of bearing. [CO-4] [L-3]
 - e) State the rules followed for "arithmetic check". [CO-2] [L-1]
 - f) What do you understand by the term "Traverse"? [CO-4] [L-2]
 - g) Define "accumulative errors" and "compensating errors". [CO-2] [L-1]
 - g) What do you understand by the term "oblique photogrammetry"? [CO-5] [L-2]
 - i) If the average elevation of the terrain is 1200 m from MSL, calculate the flight height of the aircraft at the time of exposure if the focal length of the camera is 15 cm; and the vertical photograph showing a flat terrain has a line 3.50 cm long to a corresponding line XY of length 350 m on the ground. [CO-3] [L-2]
 - j) Elaborate the application of "Total Station" in surveying. [CO-6] [L-2] **2x10**

PART-A

- Q.2
- a) With the help of neat sketch, explain the different types of "scales". [CO-1] [L-3] **8**
 - b) The following bearings were taken for a closed traverse, determine:
 - i) Corrected bearing of the lines.
 - ii) Internal angles of the traverse.

Lines	FB	BB
AB	145°	325°
BC	23°15'	204°30'
CD	284°15'	104°30'
DE	54°30'	233°45'
EA	94°45'	276°

[CO-1] [L-4] **12**

- Q.3
- Correct the latitude and departure of the lines by transit method and evaluate the exact are as enclosed within the traverse for the following data obtained:

Lines	Length (m)	Bearings
AB	90	50°
BC	220	65°
CD	155	165°
DE	200	235°
EA	230	310°

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

- Q.4
- Explain the following in detail:
- a) Contour intervals.
 - b) Type of curves in surveying.

[CO-3] [L-2] **10x2**

PART-B

- Q.5 a) For the following measurements and weights taken for a quantity, evaluate:
- Most probable value.
 - Probable error in a single measurement of weight 1.
 - Probable error in most probable value.

Length (Km)	Weight
6.532	2
6.533	7
6.534	19
6.535	28
6.536	13
6.537	5

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

- b) Explain the following methods of plane table surveying:
- Radiation.
 - Intersection.

[CO-4] [L-2] **5×2**

- Q.6 a) With the help of a neat sketch, explain the concept of "relief displacement".

[CO-5] [L-2] **8**

- b) A vertical photograph has two points 'M' and 'N' as follows. If $H = 5500$ m and focal length is found to be 20 cm, determine the horizontal distance between M and N.

Point	Elevation above MSL	Photo Coordinates	
		x (mm)	y (mm)
M	600 m	+ 21.50	-13.25
N	750 m	-15.50	+18.60

[CO-5] [L-4] **12**

- Q.7 a) Elaborate "Remote Sensing".

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

- b) Write a well – explanatory note on "Process of Remote Sensing".

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

End Semester Examination, May 2023
B. Tech. – Fourth Semester
MATERIALS, TESTING AND EVALUATION (BCE-DS-404A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Briefly explain the manufacturing process of bitumen and asphaltic materials. [CO-1] [L-2]
- b) Explain the elastic properties of concrete. [CO-6] [L-1]
- c) What are optical properties of construction materials? [CO-5] [L-3]
- d) What is the use of frog in bricks? [CO-6] [L-2]
- e) Write a short note on 'carbocrete'. [CO-2] [L-3]
- f) Write the name of different test to be carried out on coarse aggregates. [CO-2] [L-2]
- g) What is the difference between bleeding and segregation? [CO-1] [L-2]
- h) Briefly explain the properties of bitumen and asphaltic materials. [CO-3] [L-2]
- i) Write a brief note on recycled materials. [CO-2] [L-3]
- j) Define the term 'creep'. How do you measure creep in cement concrete? [CO-4] [L-2] **2×10**

PART-A

Q.2 Describe the physical properties, mechanical properties, thermal properties, and other properties of construction materials. [CO-4] [L-3] **20**

- Q.3 a) What do you understand by "sustainable construction material"? Give some examples of "sustainable construction materials". [CO-5] [L-3] **10**
b) Describe the magnetic properties and chemical properties of construction materials. [CO-3] [L-2] **10**

- Q.4 a) What do you understand by structural steel? Explain its manufacturing process and physical properties. [CO-4] [L-3] **10**
b) Where do reinforced cement concrete and plain cement concrete differ, and what are their benefits? [CO-2] [L-2] **10**

PART-B

- Q.5 a) Describe the outline of impact-echo test and permeability test. [CO-2] [L-2] **10**
b) Describe the types of material failures and also explain in detail about "Elastic and Plastic" deformation, and tension test. [CO-3] [L-3] **10**

- Q.6 a) Explain:
i) Brick and properties of bricks.
ii) Stone and properties of stones. [CO-6] [L-2] **5×2**
b) Describe the experimental procedure for ultrasonic pulse velocity test. [CO-5] [L-3] **10**

Q.7 How is cement used in the field of civil engineering and what is the manufacturing process of cement and what are the properties of cement? Explain in detail. [CO-3] [L-3] **20**

End Semester Examination, May 2023
B. Tech. – Fourth Semester
ENERGY SCIENCE AND ENGINEERING (BCE-DS-405)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- a) Give at least two examples of fossil fuels. [CO-1][L-1]
- b) What is the purpose of an energy system? [CO-1][L-1]
- c) Write down any two advantages of windmill towers. [CO-6][L-1]
- d) Define "Carbon footprint". [CO-4][L-1]
- e) Which devices are used for generation and propagation of dust at the source?
- f) Define "Spent nuclear fuel". [CO-5][L-1]
- g) List any two intangible benefits of green buildings. [CO-6][L-1]
- h) The point required by a building to qualify for LEED's silver rating are in range of _____. [CO-6][L-1]
- i) Give at least two advantages of energy auditing. [CO-5][L-1]
- j) Give at least two examples of renewable and non-renewable energy sources each. [CO-1][L-1] **2×10**

PART-A

Q.2 "The present scenario calls for inclusion of sustainable technologies in planning and design". Make supportive justifications citing any relevant example from the perspective of civil engineering. [CO-2][L-4] **20**

Q.3 Explain the concept of environmental tradeoffs citing relevant examples. How will you relate them with sustainability? [CO-1][L-2] **20**

- Q.4
- a) How are environmental and economic outcomes linked with each other? [CO-2][L-3] **10**
 - b) How is carbon foot printing related with sustainable development? [CO-4][L-2] **10**

PART-B

Q.5 a) Discuss the best mining practices adopted by coal companies for improving the quality of coal mining. [CO-3][L-3] **10**

b) Give an overview of solar chimney and its application in buildings in detail. [CO-3][L-3] **10**

Q.6 Explain the procedure for conducting energy audit as per the BEE guidelines. Also discuss its need and advantages. [CO-5][L-3] **20**

Q.7 Discuss the salient features of a green building. How do green building help in achieving the sustainable development goals? [CO-6][L-3] **20**

End Semester Examination, May 2023
B. Tech. – Fourth Semester
TRANSPORTATION ENGINEERING (BCE-DS-406)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following in brief:

- a) Explain the uses of map study. [CO-1] [L-2]
- b) Explain classification of roads as per Nagpur road plan. [CO-1] [L-2]
- c) Define the term "sight distance" and also write down the formula for stopping sight distance. [CO-2] [L-1]
- d) Calculate the values of i) Head light sight distance and ii) Intermediate sight distance for a highway with a design speed of 80 kmph. Given reaction time is 2.5 sec and friction coefficient is 0.36. [CO-2] [L-3]
- e) Explain the various advantages and disadvantages of traffic signals. [CO-6] [L-2]
- f) Write down the name of different types of bituminous materials used in the pavement and under what circumstances each of these materials is preferred. [CO-3] [L-2]
- g) Define the following terms: modulus of subgrade reaction, radius of relative stiffness, equivalent radius of resisting section. [CO-4] [L-2]
- h) Describe the purpose of each layer of flexible pavement. [CO-4] [L-2]
- i) Explain the term "EWLF". [CO-4] [L-2]
- j) Define thirteenth highest hourly traffic volume. [CO-5] [L-1] **2×10**

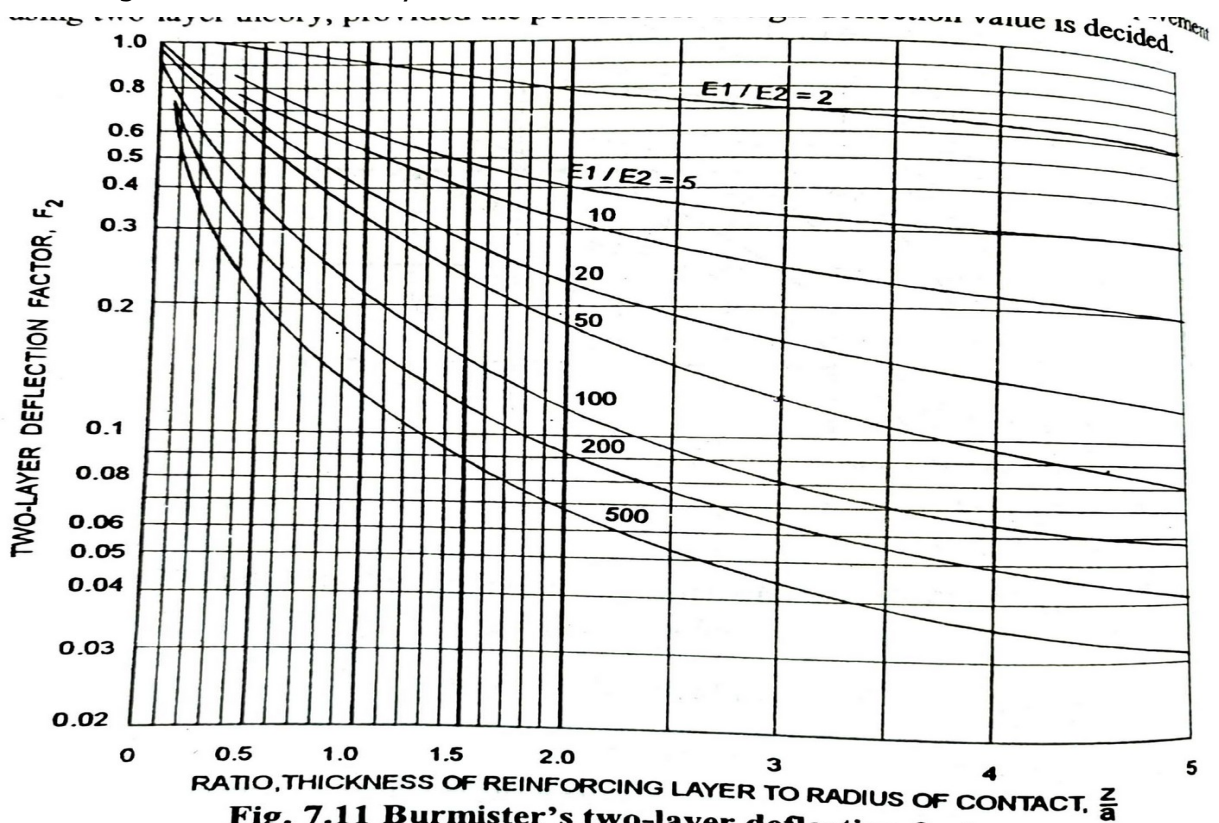
PART-A

- Q.2 a) Explain using sketches the various factor controlling the alignment of road. [CO-1] [L-2] **10**
- b) The area of a certain district in India is 13,400 sq.km and there are 12 towns as per 1981 census. Determine the lengths of different categories of roads to be provided in this district by the year 2001 as per third road development plan. [CO-1] [L-3] **10**
- Q.3 a) A vertical summit curve is formed at the intersection of two gradients, +3.0 and -5.0 percent. Design the length of summit curve to provide a stopping sight distance for a design speed of 80 kmph. Assuming $t=25\text{sec}$, $f=0.35$. [CO-2] [L-3] **10**
- b) Explain the objective of providing transition curves on the horizontal alignment of highways. [CO-2] [L-2] **10**
- Q.4 a) The traffic volume studies is necessary for design of any geometric feature of road. Justify this statement. [CO-5] [L-4] **10**
- b) With neat sketches show some of the important types of regulatory and informatory signs and mention the function of each. [CO-6] [L-2] **10**

PART-B

- Q.5 a) Explain the desirable properties of bituminous mixes. [CO-3] [L-2] **10**
- b) Explain the principle of the various tests on road stones; specify the desirable values of the test results. [CO-3] [L-2] **10**

- Q.6 a) Plate load bearing tests were conducted using 30 cm diameter plate on soil subgrade and over a base course of thickness 45 cm. The pressure yielded at 0.5 cm deflection on the subgrade and base course were 1.2 kg/cm² and 7.5 kg/cm², respectively. Design the thickness requirement of flexible pavement for a wheel load of 6000 kg with tyre pressure of 8.0 kg/cm² for an allowable deflection of 0.5 cm using Burmister's two-layer deflection factor chart.



- b) Explain the factors to be considered for the design of flexible pavements. Discuss the significance of each. [CO-4] [L-3] **10**
[CO-4] [L-2] **10**
- Q.7 a) Analyse the stresses at interior, edge and corner of a cement concrete pavement by using Westergaard's stress equations.
Modulus of elasticity of concrete = 3.0×10^5 Kg/cm²
Poisson's ratio of concrete = 0.15
Thickness of concrete pavement = 15 cm
Modulus of subgrade reaction = 6.0 Kd/cm³
Wheel load = 5100 Kg
Radius of loaded area = 15 cm. [CO-5] [L-3] **10**
- b) With sketch show the different components of a rigid pavement and mention the functions of each. [CO-4] [L-2] **10**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

BUILDING CONSTRUCTION (BCE-DS-407)

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 four requirements of a good building. [CO-1] [L-1]
- b) List the most common type of building construction you will come across in Mumbai. [CO-1] [L-1]
- c) Give the purpose of providing a partition wall. [CO-2] [L-2]
- d) Differentiate between 'shallow and deep foundations'. [CO-3] [L-2]
- e) Suggest relevant type of foundation for a building on expansive soil with justification. [CO-3] [L-3]
- f) With a neat sketch show the parts of lintel giving their technical terms. [CO-4] [L-3]
- g) Define 'spandril'. [CO-4] [L-1]
- h) Write four commonly adopted type of floorings. [CO-5] [L-2]
- i) What is lean to roof? [CO-5] [L-1]
- j) What are key components of LEED system? [CO-6] [L-3] **2×10**

PART-A

- Q.2 a) Describe the English bond used in brick masonry. Explain the advantages and disadvantages of this bond and provide examples of where it is commonly used in building construction. [CO-1] [L-2] **10**
- b) Provide the occupancy classification of the buildings as mentioned in National Building Code Part III (2005) with example of each. [CO-1] [L-2] **10**
- Q.3 a) Describe the different types of partition walls used in building construction. Discuss the advantages and disadvantages of each type and explain their uses in different types of construction projects. [CO-2] [L-2] **10**
- b) Describe different types of partition walls, giving the merits and demerits of each. [CO-2] [L-3] **10**
- Q.4 a) Sketch and explain briefly the various types of footings you consider suitable for:
i) Isolated RCC Column.
ii) Black cotton soil. [CO-3] [L-4] **10**
- b) Why soil exploration is necessary? State the different methods of exploration of sub soil conditions and describe one of the method in detail. [CO-3] [L-3] **10**

PART-B

- Q.5 a) What are functions of lintels and arches? With a neat sketch show the parts of arches giving their technical terms. [CO-4] [L-3] **10**
- b) Describe in brief various types of arches used in modern construction. [CO-4] [L-4] **10**
- Q.6 a) Describe briefly the type of floor used for different types of buildings and state the reason for their choice. [CO-5] [L-3] **10**
- b) Explain the different components of a timber pitched roof construction.

- Q.7 a) Discuss the salient features of a 'green building'. How does GRIHA compliance help the office buildings in India? [CO-6] [L-2] **10**
- b) Until recently, tall buildings have been viewed as mega-scale energy consumers with

little regard for sustainable architecture. However, this is changing with a new generation of high-rise buildings that have been designed with energy conservation and sustainability as their principal criteria.

- i) Briefly explain what is meant by a tall building?
- ii) List ecological features which can be adopted for a tall building.
- iii) Discuss possible measures available for improving water efficiency for a tall building. [CO-6] [L-2] **10**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

SMART MATERIALS (BCE-DS-421)

Time: 3 hrs.

Max Marks:

100

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Introduce to smart materials. [CO-1] [L-1]
- b) Briefly explain what is meant by non-destructive testing. [CO-2] [L-2]
- c) Explain the utility of displacement sensors. [CO-2] [L-3]
- d) How do conductometric sensors work? Write procedure. [CO-3] [L-3]
- e) Write the difference between 'absorption spectroscopy' and 'emission spectroscopy'. [CO-3] [L-2]
- f) Write the parameters of smart materials. [CO-1] [L-1]
- g) What are the measuring technique in smart materials? [CO-1] [L-2]
- h) Explain the utility of accelerometers. [CO-2] [L-3]
- i) Write the difference between bending resistance and torsional resistance. [CO-3] [L-3]
- j) Introduce the context of bio-chemical sensing in structural assessment. [CO-3] [L-3] **2×10**

PART-A

Q.2 What are the applications of smart materials in civil engineering? Explain in detail.

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

Q.3 a) Explain in detail the technique of measuring stress in civil engineering structures using electrical stress gauge. [CO-2] [L-1] **10**

b) Explain:

- i) Resistance in civil engineering.
- ii) Capacitance in civil engineering. [CO-1] [L-2] **5×2**

Q.4 a) What do you understand about sensing technology in civil engineering smart materials? [CO-1] [L-2] **10**

b) Write various types of Sensors used in civil engineering. [CO-2] [L-1] **10**

PART-B

Q.5 a) What do you understand about chemical sensing for structural assessment?

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

b) Explain in detail about spectroscopes and also throw light on the types of spectroscopes. [CO-3] [L-3] **10**

Q.6 a) Explain in detail about piezoelectric and electrostrictive materials. [CO4][L3] **10**

b) Write various types of actuator materials. [CO-4] [L-3] **10**

Q.7 What do you understand about actuator techniques? Write different types of actuators. [CO-4] [L-3] **20**

End Semester Examination, May 2023
B. Tech. – Fourth Semester
INTRODUCTION TO SUSTAINABLE DEVELOPMENT (BCE-DS-422)

Time: 3 hrs.
100

Max Marks:

No. of pages: 2

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

Q.1 Answer the following in brief:

- a) Give an example of any activity where sustainability and technology go hand in hand. [CO-2] [L-2]
- b) Write a short note on need of environment sustainability. [CO-1] [L-1]
- c) Briefly explain the importance of media in mitigation of environmental issues. [CO-1] [L-2]
- d) What should be done for the zero waste system to work more effectively? [CO-3] [L-2]
- e) List any two materials that can be green substitutes for conventional buildings materials and explain its features. [CO-4] [L-3]
- f) Explain three methods for increasing energy efficiency of buildings. [CO-4] [L-2]
- g) List out any two methods by which carbon foot print can be reduced. [CO-1] [L-1]
- h) Explain different types of renewable energy sources along with its merits. [CO-3] [L-2]
- i) Discuss any three benefits of green engineering. [CO-2] [L-2]
- j) Write down the tools that can be used for pollution reduction in industries. Explain in detail any two of them. [CO-4] [L-2] **2×10**

PART-A

- Q.2 a) Explain the impact of resource degradation and sustainability in the context of rivers and mining in Kerala. [CO-2] [L-2] **10**
b) Environmental acts and legislations are required for sustainable development. Justify this statement. [CO-3] [L-3] **10**
- Q.3 a) Explain the significance of carbon footprint. Suggest two methods for reducing carbon footprint in your house. [CO-1] [L-3] **10**
b) Densely populated areas are suffering major issues in the field of solid waste and waste water management.
i) Relate this statement with the current situation in our state.
ii) Suggest any three sustainable methods each for the solid waste and waste water management system. [CO-1][L-3] **5×2**
- Q.4 a) Explain the term LCA. Illustrate how LCA can be effectively used in the environmental management of building construction systems. [CO-4] [L-2] **10**
b) Discuss the benefits of doing an EIA study. Also, mention the purpose of the "screening step of EIA. [CO-3] [L-2] **10**

PART-B

- Q.5 a) LEED certification help a project to increase the value of its assets. Justify this statement with examples. [CO-4] [L-3] **10**

- b) A new commercial building is constructing in your city. Suggest some methods to the builder for getting a four-star GRIHA rated building. [CO-2] [L-4] **10**

Q.6 a) Comment on any one challenge experienced in the implementation of sustainable development principles. [CO-1] [L-2] **10**

- b) Compare and contrast conventional and nonconventional energy with reference to sustainability. [CO-3] [L-2] **10**

Q.7 a) How does industrial ecology help achieving sustainable development? [CO-4] [L-3] **10**

- b) Explain the various causes of rural-urban migration. How it will affect the urban area? [CO-4] [L-3] **10**

End Semester Examination, May 2023

B. Tech. – Fifth Semester

HYDRAULIC ENGINEERING (BCE-DS-501)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

- Q.1 Answer the following questions in brief:
- a) Differentiate between: i) Uniform flow and non- uniform flow. [CO-4] [L-6]
 - b) Define the term: dimensional analysis and model analysis. [CO-6] [L-1]
 - c) What is siphon? On what principle it works? [CO-5] [L-2]
 - d) What is the aim of dimensional analysis? [CO-6] [L-2]
 - e) What is angularity number? [CO-2] [L-3]
 - f) Show that ratio of inertia force to viscous force gives the Reynolds number. [CO-2] [L-2]
 - g) Define the term 'mass density'. [CO-1] [L-2]
 - h) Explain the terms: i) Dynamic viscosity, and ii) Kinematic viscosity. [CO-3] [L-2]
 - i) Write the formula of local and average skin friction coefficients? [CO-2] [L-3]
 - j) Show the equation for spatially varied unsteady flow. [CO-4] [L-5] **2×10**

PART-A

- Q.2 The dynamic viscosity of oil, used for lubrication between a shaft and sleeve is 6 poise. The shaft is of diameter 0.4 m and rotates 190 r.p.m. Calculate the power lost in the bearing for a sleeve length of 90 mm. The thickness of the oil film is 1.5 mm. [CO-1] [L-6] **20**
- Q.3 a) Derive the expression for critical depth and minimum specific energy for rectangular cross section. [CO-2] [L-5] **10**
b) Estimate the discharge and specific energy corresponding to critical depth of 1.4 m. [CO-3] [L-3] **10**
- Q.4 Derive the following conditions for most economical trapezoidal channel:
a) Half of top width is equal to one of the sloping sides of the channel. [CO-4][L-6] **10**
b) Hydraulic mean depth must be equal to half of the depth of flow. [CO-4] [L-6] **10**

PART-B

- Q.5 a) Describe the different non-dimensional number in a fluid flow system. [CO-6] [L-1] **10**
b) Give the difference between 'pipe flow' and 'open channel flow'. Also describe the different types of open channels. [CO-3] [L-3] **10**
- Q.6 a) Explain the following:
a) Total energy line.
b) Hydraulic gradient line.
c) Friction factor.
d) Shape factor. [CO-6] [L-2] **10**
b) Derive an expression for the loss of head due to: i) Sudden enlargement and ii) Sudden contraction of a pipe. [CO-5] [L-6] **10**
- Q.7 Derive the expression for loss of energy due to hydraulic jump in a open channel. [CO-6] [L-4] **20**

End Semester Examination, May 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) A wet soil sample weighing 25 N had a volume of 120 cm³. After oven drying, the weight is reduced to 20 N. Determine water content. [CO-1][L-2]
- b) Define three consistency limits in geotechnical analysis. [CO-1][L-1]
- c) What is the relation between seepage velocity and discharge velocity? [CO-2][L-2]
- d) How does presence of adsorbed water reduce permeability of the soil? [CO-2][L-2]
- e) What is compaction and how is it different from consolidation? [CO-4][L-2]
- f) Why is stress distribution studies important? [CO-3][L-2]
- g) Define over consolidated, under consolidated and normally consolidated clays. [CO-5][L-2]
- h) What do you understand by geostatic stresses? [CO-4][L-1]
- i) Explain the reason for reduction of volume of soil after achieving MDD. [CO-4][L-3]
- j) Distinguish between angle of repose and angle of internal friction. [CO-2][L-3] **2×10**

PART-A

Q.2 a) Sketch typical grading curves for

- i) Well graded soil
- ii) Gap graded soil
- iii) Uniformly graded soil
- iv) Clayey sand

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

- b) An airport runway fill needs 600,000 m³ of soil compacted to a void ratio of 0.75. There are two borrow pits A and B where soil can be taken and transported to site.

Borrow pit	In-situ void ratio	Transportation cost (Rs/m ³)
A	0.8	10
B	1.7	5

Compare both and suggest the suitable borrow pit.

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

- b) Derive expression for calculating average permeability of layered soil systems. [CO-2][L-3] **10**

Q.4 a) Discuss the factors that affect compaction. [CO-4][L-4] **10**

- b) The following data were recorded while performing the compaction test:

Water content (%):	5	10	14	20	25
Bulk density (kN/m ³):	17.7	19.8	21.0	21.8	21.6

Plot the MDD/OMC curve and obtain the optimum water content and maximum dry density. Calculate the water content necessary to completely saturate the sample at its maximum dry density, assuming no change in the volume. Also plot zero air voids

curve. Take $G = 2.68$

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

PART-B

- Q.5 a) Explain Newmark's influence chart preparation and usage. [CO-5][L-3] **10**
b) Vertical point load on surface=800 kN. Find incremental vertical pressure at depths 5m and 10m directly under the load and at a distance 5 m radially away from the load axis on these depths. [CO-5][L-4] **10**
- Q.6 a) Explain the procedure for determining pre consolidated pressure. [CO-5][L-3] **10**
b) What is coefficient of consolidation? How is it used to do settlement analysis? Explain with an example. [CO-5][L-3] **10**
- Q.7 a) Explain Mohr Coulomb's shear failure theory. [CO-6][L-3] **10**
b) Explain three drainage conditions for conducting shear testing of soils. [CO-6][L-2] **5**
c) Describe direct shear test. What are its merits and demerits? [CO-6][L-2] **5**

End Semester Examination, May 2023
B. Tech. – Fifth Semester
PROFESSIONAL PRACTICE, LAW AND ETHICS (BCE-DS-504)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

- Q.1 Answer the following in brief:
- a) Criticize the concept of 'right understanding'. [CO-2] [L-4]
 - b) Analyze the needs of Self ('I') and 'Body'. [CO-2] [L-4]
 - c) List the differences between intention and competence. [CO-3] [L-1]
 - d) List the differences between society and crowd. [CO-5] [L-1]
 - e) Analyze the need of natural acceptance of human values. [CO-2] [L-4]
 - f) Discuss the learning from the "story of stuff". [CO-6] [L-2]
 - g) What do you mean by proxemics? [CO-2] [L-2]
 - h) What is the meaning of the term "retention"? [CO-2] [L-3]
 - i) What is the difference between 'extensive' and 'intensive listening'? [CO-3] [L-3]
 - j) What is informal communication? Give one example. [CO-3] [L-3] **2×10**

PART-A

- Q.2 Discuss the basic requirements for the fulfillment of your aspirations with their correct priority in detail. [CO-1] [L-2] **20**
- Q.3 Illustrate the steps involved in correct appraisal of the physical needs in detail. [CO-2] [L-4] **20**
- Q.4 Discuss how universal order; from family to world family can be attained in detail. [CO-4] [L-2] **20**

PART-B

- Q.5 Discuss the equivalence of existence with co-existence in detail. [CO-4] [L-2] **20**
- Q.6 Illustrate the steps involved in living in harmony at all the levels of being in detail. [CO-4] [L-4] **20**
- Q.7 Reflect on your own notion of happiness and your program for happiness. Is your program similar to the program of the people shown in the video of "story of stuff"? [CO-6] [L-5] **20**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
ENGINEERING ECONOMICS ESTIMATION AND COSTING
(BCE-DS-601)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following in brief:

- a) Briefly explain the market structure. [CO1][L-2]
- b) Define elasticity of demand. Also, explain its types. [CO1][L-1]
- c) Define the term capital market and also explain the various component of capital market. [CO3][L-1]
- d) State the function of commercial bank in brief. [CO4][L-1]
- e) Classify cost according to relation with accounting period. [CO4][L-2]
- f) Differentiate among primary, secondary and tertiary sectors using examples. [CO4][L-2]
- g) Explain the terms "revised and supplementary estimate". [CO2][L-2]
- h) Explain the various factors on which rate analysis depends. [CO5][L-2]
- i) Differentiate between market value and book value. [CO6][L-1]
- j) Explain various types of contracts in brief. [CO6][L-1] **2×10**

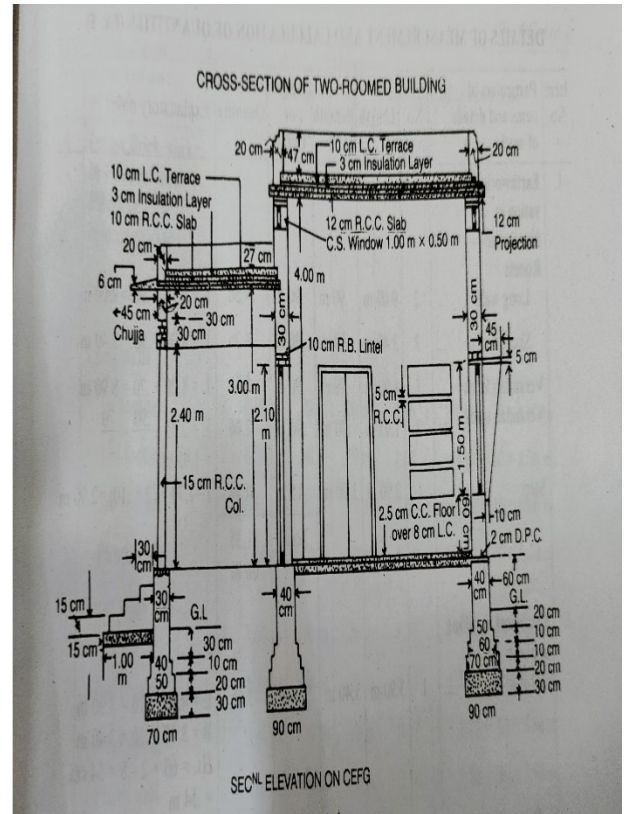
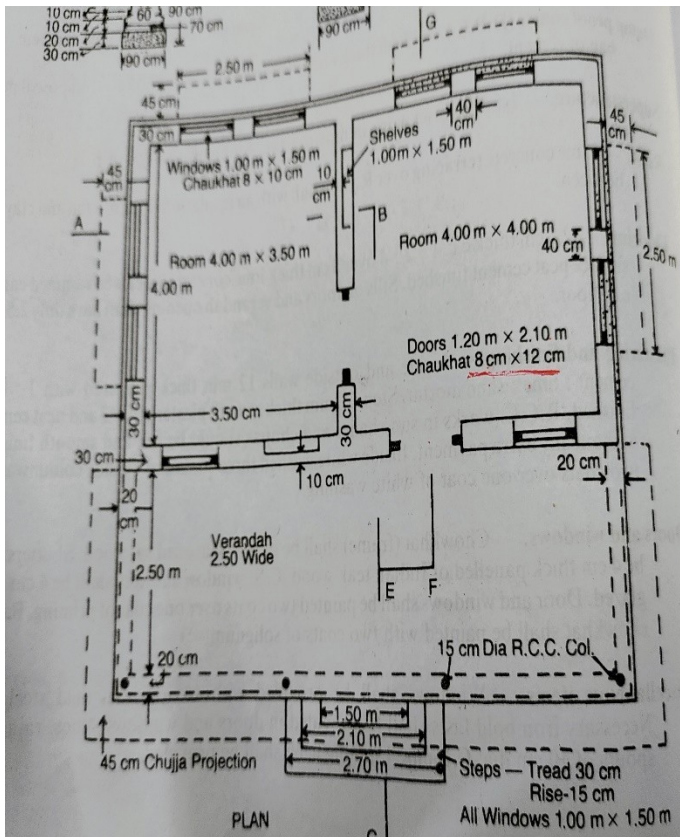
PART-A

- Q.2 a) Draw a diagram with aggregate demand, short-run aggregate supply, and long-run aggregate supply. [CO1][L-1] **10**
b) What is the difference between direct and indirect taxes and their impact on capital? [CO1][L-2] **10**
- Q.3 a) Explain the purpose and shifting of Phillips curve along with some suitable examples. [CO3][L-2] **10**
b) Differentiate between monetary and fiscal policy and also explain various instruments of fiscal policy. [CO3][L-2] **10**
- Q.4 a) A product currently sells for \$12 per unit. The variable costs are \$4 per unit, and 10,000 units are sold annually and a profit of \$30,000 is realized per year. A new design will increase the variable costs by %20 and fixed costs by %10 but sales will increase to 12,000 units per year. i) At what selling price do we break even, and ii) If the selling price is to be kept same (\$12/unit) what will the annual profit be? [CO4][L-3] **10**
b) Explain the term "capital budgeting" and also mention its process and significance. [CO4][L-2] **10**

PART-B

- Q.5 a) Explain the changes in the occupational structure in India. [CO4][L-2] **10**
b) Explain the term "Inflation". Also mention the causes of inflation in India. [CO4][L-2] **10**
- Q.6 Prepare detailed estimate of the following item of works for a two-room building with front verandah from the given drawings.

- Earthwork in excavation in foundation.
- Lime concrete in foundation.
- 1st class brick work in 1:6 cement mortar in superstructure.
- RCC work in roof slabs, columns and lintels etc.



[CO2][L-3] **20**

- Q.7
- Prepare a rate analysis for RCC work in columns (1:1.5:3) for unit cu.m. Assume all necessary details required. [CO5][L-3] **10**
 - Explain the detailed specification of cement concrete 1:2:4 in slab work. [CO6][L-2] **10**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
ENVIRONMENTAL ENGINEERING (BCE-DS-602)

Time: 3 hrs.
100

Max Marks:

No. of pages: 2

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

- Q.1
- A city is supplied water @ 280 lpcd. Compute the per capita contribution expected to reach public sewer every day. [CO:1][L:3]
 - List atleast two components of sewerage system. [CO:4][L:1]
 - Write down the formula for computing the velocity of flow using Chezy's equation. [CO:2][L:2]
 - Give the purpose of liner provided in a landfill. [CO:5][L:3]
 - Differentiate between 'a coarse screen' and 'a fine screen'. [CO:4][L:3]
 - Compute the cumulative sound level if two sources are emitting 72db each. [CO:3][L:3]
 - What do you understand by design period? [CO: 3][L:2]
 - Draw a neat sketch of an infiltration gallery. [CO:3][L:3]
 - Write an example of secondary pollutant. [CO:2][L:3]
 - Give the permissible limit of pH in drinking water as per IS:10500. [CO:5][L:2] **2×10**

PART-A

- Q.2
- Compute the water demand of a township with the following given data, also make suitable adjustments for losses and thefts:

Total population	1,25000
Number of factories with bathrooms	35 each having 180 employees
Number of day schools	4 @ 500 students/school
Number of colleges	3 @ 600 students/college
Cinema hall	2 with a seating capacity of 200
Restaurants	15 with a seating capacity of 60 each
Hospital	2 of 300 beds each
Masterplan green area	3500 sq.m

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

- Compute the fire demand for a city with a population of 2,00,000 using Kuchling's formula and National Board of Fire formula. [CO:3][L:3] **5**
- Explain the process of disinfection and enlist the requirements of a good disinfectant. [CO:2][L:4] **5**

- Q.3
- The following data is available regarding various types of area and the corresponding impermeability factor of a town:

S. No.	Type	% Area	Impermeability coefficient
1	Roofs	15	0.9
2	Pavements	20	0.8
3	Lawns, gardens, vegetation	40	0.15
4	Unpaved	15	0.20

5	Wooded	10	0.05
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Determine the average coefficient of runoff. If the area of the district is 20 hectares, determine the maximum storm water flow for a rainfall intensity of 50 mm/hour having a frequency of once in five years. Use rational formula.

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

- b) Explain the screening process and its significance in wastewater treatment. How are coarse screens different from bar screens? [CO:3][L:3] **10**

- Q.4 a) What are the possible sources of particulate matter? Why is PM_{2.5} becoming a cause of concern? [CO:2][L:3] **10**

- b) Determine the effective height of a stack, with the following given data:

- Physical stack is 180 m tall with 0.85 m inside diameter
- Wind velocity is 2.75 m/sec
- Air temperature is 20°C
- Barometric pressure is 1000 millibars
- Stack gas velocity is 11.12 m/sec
- Stack gas temperature is 160°C.

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

PART-B

- Q.5 a) Compute the number of 7.5 m³ containers required for storing the waste arising out of a community comprising of the following:

- No. of units = 400
- Family size = 4 person/unit
- Per capita waste generation rate = 1.35 kg/person/day
- Uncompacted specific volume = 100 kg/m³
- Compacted volume = 250 kg/m³

Also compute the waste quantity in terms of biodegradable, non-biodegradable and inert. [CO:3][L:5] **10**

- b) Discuss the functional elements of solid waste management system with the help of a flowchart. [CO: 3][L:3] **10**

- Q.6 Explain the following with the help of a neat sketch:

- Sluice valve.
- Water Meter.
- Fire hydrant.
- Ferrule.

[CO:5][L:3] **5×4**

- Q.7 Discuss the site selection criteria of a landfill site.

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

End Semester Examination, May 2023

B. Tech. – Sixth Semester

HYDROLOGY AND WATER RESOURCES ENGINEERING (BCE-DS-603)

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 various forms of precipitation? [CO-1][L-1]
- b) Write the factors on which network density of rain gauge is dependent? [CO-1][L-2]
- c) Write various components of the hydrograph. [CO-3][L-1]
- d) Difference between confined and unconfined aquifer. [CO-3][L-3]
- e) Define 'specific yield'. [CO-1][L-2]
- f) Mention various methods of computing average rainfall over a basin. [CO-3][L-2]
- g) State Darcy's law. [CO-4][L-1]
- h) What is formula used for the determination of "optimum number of rain gauge". [CO-3][L-2]
- i) Define 'hydrological cycle'. [CO-5][L-2]
- j) What are the various forms of precipitation? [CO-2][L-1] **2×10**

PART-A

- Q.2
- a) Give the various difference between evaporation, transpiration and evapo-transpiration. [CO-1][L-1] **5**
 - b) Explain reservoir evaporation and also enlist the various methods to evaporation measurement. [CO-1][L-2] **5**
 - c) Describe the various types of evaporimeter and also discuss factors affecting evapo – transpiration. [CO-1][L-2] **10**
- Q.3
- a) What do you understand by infiltration? [CO-2][L-1] **5**
 - b) Discuss the various factors affecting the infiltration capacity off an area. [CO-2][L-2] **5**
 - c) Describe the process of infiltration and various factors affecting infiltration. [CO-2][L-1] **10**
- Q.4
- a) Explain briefly the infiltration process and how the measurement of infiltration takes place. [CO-3][L-2] **10**
 - b) Define 'evaporation'. What are the various factors on which evaporation depends? [CO-3][L-2] **10**

PART-B

- Q.5
- a) Enlist the various methods for computation of runoff. [CO-4][L-1] **5**
 - b) Discuss the various factors affecting runoff? [CO-4][L-2] **5**
 - b) A small catchment area 150 hectares received 10 cm rainfall in 120 minutes due to storm. At the outlet of catchment, the stream draining the catchment was dry before storm and experienced a runoff lasting for 12 hours with an average discharge of $2.00 \text{ m}^3 / \text{sec}$. It went dry afterward, calculate the amount of water which was not available to run off? [CO-4][L-5] **10**

- Q.6 a) Explain in detail the components of a hydrograph. Also, discuss the various factors that affect a runoff hydrograph. [CO-5][L-1] **10**

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

- b) Given the ordinates of a 4-h unit hydrograph derive the ordinates of a 12- h unit hydrograph for the same catchment by using S-curve method:

Time (hours)	0	4	8	12	16	20	24	28	32	36	40	44
Ordinates of 4-h UH	0	20	80	130	150	130	90	52	27	15	5	0

[CO-5][L-3] **10**

- Q.7 a) Discuss the various type of aquifers. Illustrate the answer with suitable sketch. [CO-6] [L-2] **10**
- b) Derive the basic differential equation of unsteady groundwater flow in a confined aquifer. State clearly the assumptions involved. [CO-6] [L-6] **10**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
CONSTRUCTION ENGINEERING AND MANAGEMENT (BCE-DS-604)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

- Q.1
- What do you understand by "project controlling"? [CO-1] [L-2]
 - Classify the type of construction projects based on "project value". [CO-3] [L-2]
 - List the drawbacks of linked bar charts. [CO-1] [L-2]
 - With the help of neat sketch, illustrate "A-O-N" network diagram. [CO-4] [L-3]
 - State "central limit theorem". [CO-2] [L-1]
 - Evaluate the % probability, if the probability factor is 1.75. [CO-4] [L-4]
 - Define "Earliest Finish Time (EFT)" and "Latest Start Time (LST)". [CO-2] [L-1]
 - What do you infer if the magnitude of total float is positive? [CO-5] [L-2]
 - Summarize the concept of "total quality management". [CO-3] [L-2]
 - Describe the importance of "contract" in a construction management. [CO-6][L-2] **2×10**

PART-A

- Q.2
- Justify the importance of "project planning" in a construction project. [CO-1][L-3] **10**
 - Correlate the following terms with project management:
 - Project scheduling.
 - Stages of project controlling. [CO-1][L-3] **10**

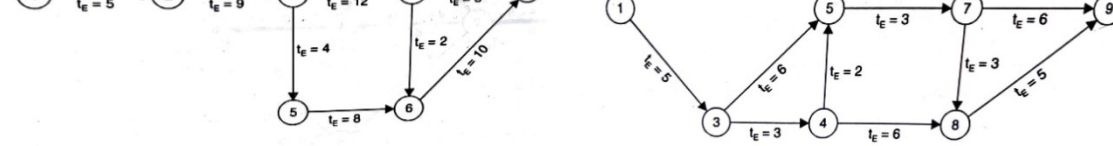
- Q.3 a) Construct a Network Diagram for the following activities in a Construction Project.

Activity	Immediate Predecessor Activity	Duration (In Days)
A	-	4
B	-	5
C	A	9
D	B	10
E	C,D	11
F	B	7
G	F	4
H	G	3
I	E	12
J	E	15
K	I	8
L	G,H	9
M	G,H	4
N	J,K,L	6
O	J,K,L	4
P	N	6
Q	O,M	10
R	P,Q	9

- b) Write a well – detailed note on "Bar Charts". [CO-2] [L-3] **10**

- Q.4 Compute T_E , T_L and Slack for each event of the given PERT – Project Network:





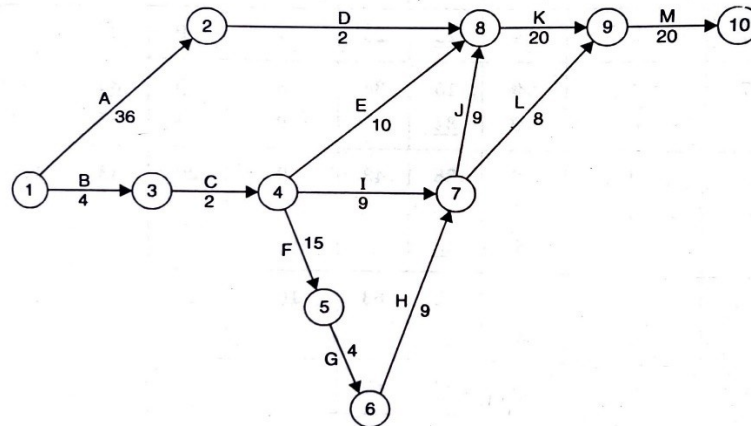
a)

b)

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

PART-B

Q.5 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).



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

Q.6 Elaborate the following:

- Earth excavation equipments.
- Building information modeling.

[CO-5] [L-2] **10×2**

Q.7 Write a well detailed – note on the following:

- Cost – crashing of a network.
- Quality control and quality assurance.

[CO-6] [L-3] **10×2**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

DESIGN OF CONCRETE STRUCTURES-I (BCE-DS-605)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question. **Use of IS 456:2000 is allowed.**

Q.1 Answer the following in brief:

- a) Find the effective span of a simply supported beam of clear span 6 m supported on walls 300 mm thick. Assume dimensions. [CO2][L-2]
- b) Find the factored max B.M. for a 10 m span beam subjected to a L.L of 5kN/m². Assume beam dimensions. [CO1][L-2]
- c) Mention designer's choice for minimum and maximum reinforcement in beams and columns as compared to BIS codes. [CO1][L-2]
- d) State the difference of one way and two-way slab with the help of a diagram. [CO2][L-3]
- e) What are the assumptions made in the working stress method? [CO1][L-1]
- f) State the formula and IS code clause for finding equivalent shear and equivalent moment for a beam subjected to torsion. [CO4][L-1]
- g) Classify columns on the basis of support conditions. [CO1][L-1]
- h) Draw stress-strain blocks as followed in limit state method. [CO2][L-2]
- i) State the limit states at which the structure ceases to function. [CO5][L-3]
- j) What are the critical sections to be taken for checking a footing in one way shear and two way shear? [CO6][L-1] **2×10**

PART-A

Q.2 Explain under reinforced, balanced and over reinforced sections as followed in working stress method with proper stress block diagrams. [CO1][L-2] **20**

Q.3 Calculate the moment of resistance of a rectangular R.C.C. beam of size B = 300 mm, D = 600 mm, effective cover = 30 mm when area of steel is:
a) 3 bars of 12 mm b) 6 bars of 25 mm
Use limit state method of structural design. [CO2][L-3] **20**

- Q.4 a) A rectangular beam of size 300 mm × 600 mm is subjected to a load of 60 kN/m over a simply supported span of 6.5 m. Design the beam for shear if % tension reinforcement is 1.2%. Use M20 Fe 415 and LSM of design. Mention BIS clauses wherever applicable [CO3][L-5] **15**
b) Explain the concept of development length for flexural bond with mention of BIS clause. [CO-5][L-2] **5**

PART-B

Q.5 Design a one way slab of dimensions 4m X 10m clear span and supported on 300mm thick walls and is supposed to carry a live load of 4kN/m². Use LSM and specify BIS provisions wherever used. Check the design for shear, bond and development length. [CO4][L-5] **20**

Q.6 Design the spiral reinforcements in a column of 400 mm dia subjected to a factored load of 1500 kN. The column has an unsupported length of 3.4 m and is braced against sides way. Use M25 concrete and Fe415 steel. Draw the detailing of reinforcement. [CO3][L5] **20**

Q.7 Design an isolated footing for a square column, 500 mm x 500 mm with 12-20 mm diameter longitudinal bars carrying service loads of 1000 kN with M 20 and Fe 415. The safe bearing capacity of soil is 250 kN/m² at a depth of 1 m below the ground level. Use M 20 and Fe 415. Apply checks for one way shear and two way shear. [CO-6][L-6] **20**

End Semester Examination, May 2023

B. Tech – Sixth Semester

RAILWAY ENGINEERING (BCE-DS-626)

Time: 3 hrs.
100

Max Marks:

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) What is the standard gauge in Indian Railways? [CO1] [L-1]
- b) What is meant by wear of rails? [CO1] [L-1]
- c) Give specific reasons for the necessity of regular maintenance of the ballast. [CO2] [L-2]
- d) When does creep take place? [CO2] [L-2]
- e) Name the different types of track fittings. [CO2] [L-2]
- f) Differentiate between Stud switch and split switch. [CO3] [L-2]
- g) List the methods used for the maintenance of high-speed tracks. [CO4] [L-2]
- h) What do you mean by Flag station and block station? [CO5] [L-1]
- i) List the factors contributing towards success of a ballastless track. [CO5] [L-1]
- j) Describe the advantages and disadvantages of constructing a tunnel. [CO6][L-3] **2×10**

PART-A

- Q.2 a) State and discuss briefly the factors that control the alignment of a railway track. [CO1] [L-2] **10**
- b) List the various types of sleepers used on Indian Railways. Which one would you consider to be the best for modern tracks and why? [CO1] [L-2] **10**
- Q.3 a) Differentiate between the following:
- i) Dog spike and screw spike.
 - ii) Ordinary fish plate and combination fish plate. [CO2] [L-2] **10**
- b) Describe various measures adopted to reduce creep. Which portions of the track are more susceptible to creep? [CO2] [L-3] **10**
- Q.4 a) Describe any one method of designing a turnout and give the detailed procedure for calculating the i) lead, ii) radius, and iii) heel divergence. [CO3] [L-4] **10**
- b) Draw a neat sketch of a diamond crossing and list its important features. [CO3][L3] **10**

PART-B

- Q.5 a) What are the requirements of a good track drainage system? How can a good drainage systems be provided on railway tracks? [CO4] [L-3] **10**
- b) What do you understand by modern methods of track maintenance? Why are modern methods of track maintenance required? [CO4] [L-4] **10**
- Q.6 What are the functions of a railway station? Explain briefly the various requirements of a railway station at an important city. [CO5] [L-3] **20**
- Q.7 a) 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. [CO6][L-3] **10**

- b) Enumerate all the important work which may have to be undertaken for strengthening and improving an existing track so that higher speeds are permissible on it. [CO6][L-3] **10**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
DESIGN OF STEEL STRUCTURES (BCE-DS-627)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

- Use of IS 800:2007 and Steel table is allowed.

Q.1 Answer the following in brief:

- a) Find the FOS in the following design of a tie bar of 60 mm x 10 mm, to carry a load of 8 kN. A specimen of the same quality steel of c/s area 220 mm² was tested in the laboratory. The maximum load carried by the specimen was 100 kN. [CO-1] [L-5]
- b) Briefly explain the criteria for the choice of a section in design. [CO-2] [L-2]
- c) Explain the term "splicing" with regards to tension members. [CO- 5] [L-2]
- d) What are built-up sections? When will you consider the use of built-up section? [CO-3] [L-3]
- e) Explain "effective length" as per different boundary conditions. [CO-4] [L-2]
- f) What do you understand by "radius of gyration"? [CO-5] [L-1]
- g) For a fixed beam loaded with UDL throughout its entire span, what will be the maximum deflection? [CO-6] [L-2]
- h) What are the provisions for defining pitch of trusses as per IS codal provision? [CO-6] [L-2] 2
- i) Briefly elaborate the various additional loads and impact allowances for design of gantry girders. [CO-1] [L-2]
- j) Explain the different components of a gantry girder with a proper diagram. [CO-5] [L-2] **2×10**

PART-A

- Q.2 a) Write detailed notes on the different types of bolts. [CO-1] [L-2] **8**
b) Using LSM, design for efficiency of a butt joint to connect 2-12mm thick plates for a tie member to transmit a working load of 400 kN. [CO-1] [L-4] **12**

- Q.3 Using ISMB 450, design a simply supported beam of 10 m effective span carrying a total factored load of 50kN/m. The compression flange of the beam is laterally supported to floor constructions. Assume stiff end bearing as 75 mm. [CO-2] [L-6] **20**

- Q.4 a) As per IS coral provisions, explain the classifications of cross-sections. [CO-3] [L-2] **8**
b) A column 4 m long has to support a factored load of 6000 kN. The column is effectively held at both ends and restrained in direction at one of the end. Design the column using beam sections and plates. [CO-3] [L-5] **12**

PART-B

- Q.5 a) Diagrammatically explain the terms "web", "flanges" and "stiffeners" with regards to plate girders. [CO-4] [L-2] **8**
b) Define a detailed stepwise procedure for the design of plate girders with appropriate design formulae. [CO-4] [L-3] **12**

P. T. O.

- Q.6 a) Write detailed notes on different sheeting used in industrial structures. [CO-5] [L-2] **8**
b) Determine the design loads on the purlins of an industrial building near Visakhapatnam (basic wind speed= 50 m/sec), given
- Class of building: general with life of 50 years
 - Maximum dimensions: 40 m
 - Width of building: 1.5 m
 - Height at eave level: 8m
 - Topography: slope less than 3°
- [CO-5] [L-5] **12**
- Q.7 Design a simply supported gantry girder to carry an electric overhead travelling crane, given:
- Span of gantry girder= 6.5 m
 - Span of crane girder= 16m
 - Crane capacity=250 kN
 - Self-weight of crane girder excluding trolley= 200kN
 - Self-weight of trolley= 50 kN
 - Minimum hook approach= 1m
 - Distance between wheels= 3.5m
 - Self-weight of rails= 0.3 m
- [CO-6] [L-6] **20**

End Semester Examination, May 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 standard 'penetration value'. [CO2, L1]
 - b) What is the effect of rise of water table on the bearing capacity and the settlement of a footing on sand? [CO1, L2]
 - c) Indicate the circumstances under which pile foundations are adopted. [CO1, L3]
 - d) What are bored piles? [CO3, L1]
 - e) Classify pile foundation on the basis of its material. [CO2, L2]
 - f) List various types of anchorages used in sheet pile walls. [CO4, L2]
 - g) What do you mean by sinking of wells? [CO5, L2]
 - h) Why retaining walls are usually designed for active earth pressure? [CO5, L2]
 - i) What are the important factors that cause instability of slopes? [CO6, L2]
 - j) What are finite and infinite slopes? [CO2, L2] **2×10**

PART-A

- Q.2
- a) To obtain a higher bearing capacity, either width of the footing or the depth of foundation can be increased. Compare relative merits and demerits for both cases. [CO1, L5] **10**
 - b) With the help of neat sketch explain different types of shallow foundations. [CO1, L3] **10**
- Q.3
- a) Explain in detail the various types of shear failure. **10**
 - b) A footing 2 m square is laid at a depth of 1.3 m below the ground surface. Determine the net ultimate bearing capacity using IS code method. Take $\gamma = 20$ kN/m³, $\phi = 30$ degree, $c' = 0$. Take $N_c = 30.14$, $N_q = 18.4$, $N_\gamma = 22.4$. [CO2, L5] **10**
- Q.4 Enumerate the various types of pile in detail. [CO3, L3] **20**

PART-B

- Q.5 Justify the different types of sheet pile walls with their suitability. Draw sketches showing pressure distribution. [CO4, L5] **20**
- Q.6
- a) Compare different types of retaining walls with the help of neat sketch. [CO5, L4] **10**
 - b) How overturning and sliding failure can be controlled for a gravity wall? Explain. [CO5, L5] **10**
- Q.7 Describe step by step procedure to find out factor of safety by friction Circle method. [CO6, L3] **20**

End Semester Examination, May 2023

B. Tech. – Seventh Semester

MASONRY STRUCTURES (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) Explain the geometry concept of Masonry. [CO-1][L-1]
- b) Write down a short note on: cellular wall systems [CO-1][L-1]
- c) What do you mean by reinforced and prestressed masonry? [CO-1][L-2]
- d) What is High fatigue resistance? Explain. [CO-3][L-2]
- e) Write down a short note on: Stiff-mud Process and soft-mud Process. [CO-3][L-2]
- f) Design a simply supported brickwork beam of span 4 m and of section 215mm×365mm to carry a moment of 24kNm assuming that the characteristic strength of the material is 19.2N/mm². Assume also that $Y_{mm}=2.0$ and $f_y=250\text{N/mm}^2$. [CO-5][L-5]
- g) What is explosive load? [CO-2][L-3]
- h) Write a short note on: 'impact load'. [CO-2][L-3]
- i) Explain about function and workability of a concrete masonry unit. [CO-3][L-2]
- j) Write a brief note on: Methods of prestressing. [CO-5][L-5] **2×10**

PART-A

Q.2 Describe the complex arrangements and double cross-wall systems with the help of a cross section channel. [CO-1] [L-3] **20**

Q.3 a) Explain the following Questions:

- i) Flexural Tensile Strength normal to bed-joint. [CO-2] [L-4] **5**
- ii) Flexural Tensile Strength parallel to bed-joint. [CO-2] [L-4] **5**
- b) What does one understand about the Flexural tensile strength of Masonry Bricks? Illustrate with a diagram. [CO-2] [L-4] **10**

Q.4 a) Write short notes on:

- i) Workability of brick clay. [CO-3] [L-1] **5**
- ii) Water retentivity. [CO-3] [L-1] **5**
- b) Describe Masonry Assemblage and effect of bed materials on brick prism strength. [CO-3] [L-2] **10**

PART-B

Q.5 A brickwork column of section 460mm×460mm is to carry an axial load of 800kN and a moment of 50kNm. Assuming that the reinforcement is placed such that $d_2=d_1=130\text{mm}$ design the column for (1) an effective height of 4.5m and (2) an effective height of 6.0m. Take $f_k=13\text{N/mm}^2$, $f_y=460\text{N/mm}^2$, $Y_{mm}=2.3$. [CO4][L5] **20**

Q.6 Describe the technique and methods of pre-stressing of masonry. [CO-5] [L-4] **20**

Q.7 Consider a cavity wall of length 5m with an inner load bearing leaf of thickness 170mm and a total thickness 272mm. Assume that the clear height between restraints is 3.0m and that the characteristic steel strength is 250N/mm². [CO-6] [L-4] **20**

End Semester Examination, May 2023
B. Tech. – Seventh Semester
HIGHWAY CONSTRUCTION AND MANAGEMENT (BCE-DS-722)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 3

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

- Q.1 Answer the following Questions in brief:
- a) Briefly outline the classification based on location and function as per Nagpur road plan. [CO1, L-1]
 - b) Write down the advantages of traffic signals. [CO3, L-1]
 - c) Define the term "superelevation" and also write down the formula for the same. [CO6, L-1]
 - d) Differentiate between angle parking and parallel parking. [CO3, L-2]
 - e) Explain the concept of level of service and its effect on capacity of road. [CO2, L-2]
 - f) Explain the uses of bitumen emulsion. How are they prepared? [CO4, L-3]
 - g) Calculate radius of relative stiffness of 15 cm thick cement concrete slab using the following data: Modulus of elasticity of cement concrete = 2.1×10^5 kg/cm², Poisson's ratio for concrete = 0.15 and modulus of subgrade reaction, $K = 3.0$ kg/cm³. [CO5, L-3]
 - h) Explain the term "radius of relative stiffness". [CO5, L-2]
 - i) The radius of a horizontal curve is 100 m. The design speed is 50 kmph and the design coefficient of lateral friction is 0.15. Calculate the superelevation required if full lateral friction is assumed to develop. [CO6, L-3]
 - j) Briefly outline the main features of various road patterns commonly in use. [CO2, L-1] **2×10**

PART-A

- Q.2
- a) Briefly explain with a sketch the Macadam's method of road construction. Why this method is considered better and more scientific compared to the previous methods? [CO1, L-2] **10**
 - b) Explain with sketches the various factors controlling the alignment of road. [CO1, L-2] **10**
- Q.3
- a) Define sight distance and factors causing restrictions to sight distance. Also explain the significance of stopping, intermediate and overtaking sight distances. [CO6, L-2] **10**
 - b) Explain the objective of providing transition curves on horizontal alignment of highways. [CO6, L-2] **10**
- Q.4
- a) The table below gives the consolidated data of spot speed studies on a section of a road. Determine the (i) speed limit for regulation (ii) the design speed for checking the geometric elements of the highway (iii) speed dispersion. [CO2, L-3] **10**

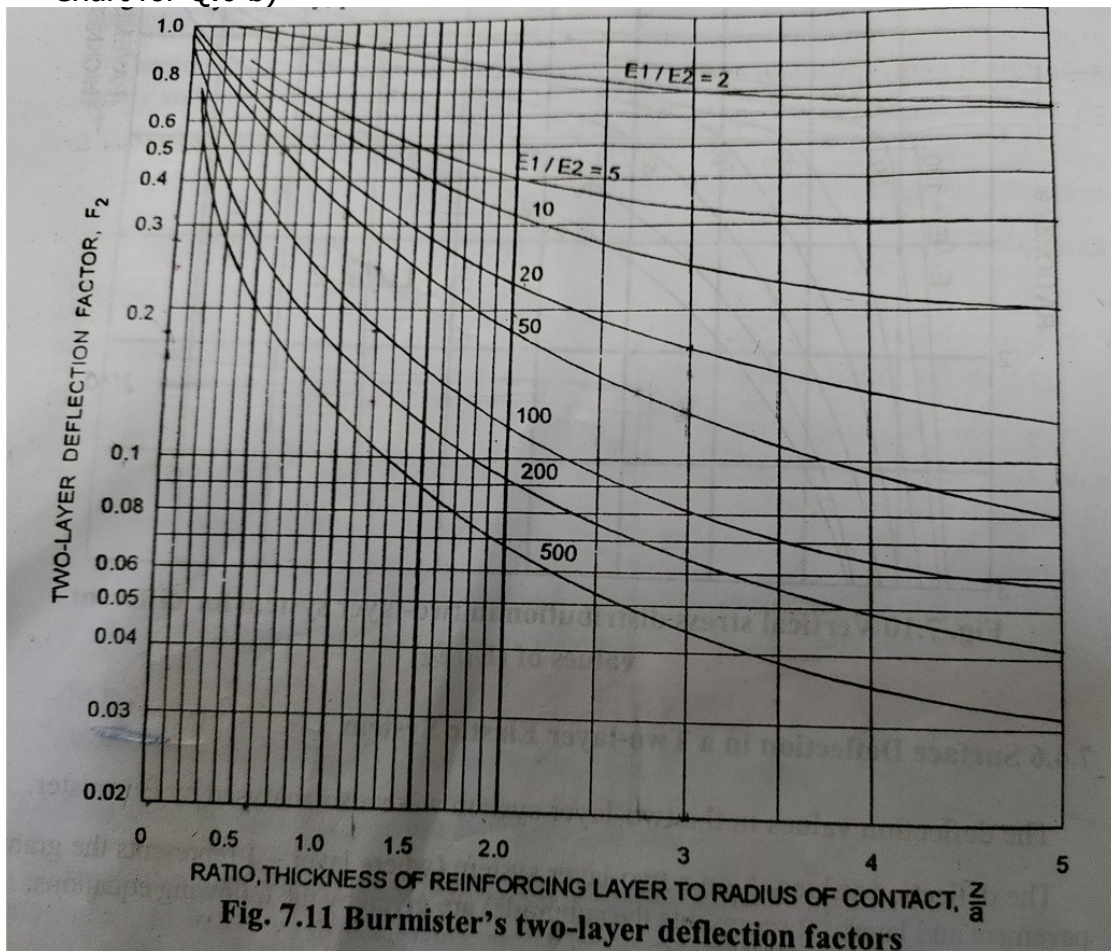
Speed range	No of vehicles
<5	65
5-10	270
10-15	425
15-20	575
20-25	720
25-30	625
30-35	470
35-40	320
40-50	130
50-60	35
60-70	10
>70	2

- b) The traffic volume study is necessary for design of any geometric feature of road. Justify this statement. [CO2, L-5] **10**

PART-B

- Q.5 a) Propose the best practicable measures for selection of highway materials for construction of dense graded bituminous mixes pavement. [CO4, L-2] **10**
b) How can you relate the results of various tests of aggregate in laboratory with their practical application? [CO4, L-5] **10**
- Q.6 a) Draw a sketch of flexible pavement cross section and show the component parts. Enumerate the functions and importance of each component of the pavement. [CO5, L-3] **10**
b) Plate bearing tests were conducted using 30 cm diameter plate on soil subgrade and over a base course of 45 cm. the pressure yielded at 0.5 cm deflection on the subgrade and base course, were 1.2 kg/cm² and 7.5 kg/cm² respectively. Design the flexible pavement for a wheel load of 6000 kg with tyre pressure of 8.0 kg/cm² for an allowable deflection of 0.5 cm using Burmister's two-layer deflection factor chart. [CO5,L-6] **10**
- Q.7 a) Calculate the wheel load stresses at interior, edge and corner of a cement concrete pavement by using Westergaard's stress equations.
Modulus of elasticity of concrete = 3.0×10^5 Kg/cm²
Poisson's ratio of concrete = 0.15
Thickness of concrete pavement = 25 cm
Modulus of subgrade reaction = 12 Kg/cm³
Wheel load = 8000 Kg
Radius of loaded area, $a = 16$ cm [CO5] [L- 3] **10**

- b) The repeated application of heavy load effects the design of rigid pavement.
Justify this statement. [CO5] [L-3] **10**
Chart for Q.6 b)



End Semester Examination, May 2023
B. Tech. – Fourth/Sixth Semester
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) How is leachate generated in a landfill? [CO:4,L:3]
- b) Give the four attributes of waste on basis of which it is classified as hazardous. [CO:2, L2]
- c) What is the objective of economically sustainable waste management system? [CO:1, L:2]
- d) Give atleast two examples of domestic waste. [CO:2,L:2]
- e) The most preferred option of waste management in Integrated solid waste management hierarchy is_____. [CO:1,L:3]
- f) Define field capacity of municipal solid waste. [CO:3,L:2]
- g) List any two advantages of waste recycling for the economy. [CO:3,L:2]
- h) Give one advantage of estimating density of waste. [CO:5,L:3]
- 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 Explain the concept of solid waste management system citing examples of best waste management practices of Sweden. [CO:1, L:3] **20**

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.

[CO:2,L:4] **12**

S. No.	Locality Name	No. of Households	Average no. of persons/household
1	A	762	4

2	B	691	3
3	C	497	5
4	D	684	4
5	E	761	5
6	F	589	3
7	G	364	4
8	H	680	5

b) Discuss the need for analysis of waste.

[CO:2,L:3] **8**

Q.4 a) Describe the waste minimization methodology with the help of a flowchart. [CO:3,L:3] **10**

b) Compute the number of 8.5 m³ containers required for storing the waste arising out of a community comprising of the following:

- No. of units = 300
- Family size = 3 person/unit
- Per capita waste generation rate = 1.35 kg/person/day
- Uncompacted specific volume – 100 kg/m³
- Compacted volume = 250 kg/m³

Also compute the waste quantity in terms of biodegradable, non-biodegradable and inert. [CO:5,L:4] **10**

PART-B

Q.5 Describe the composting 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 Describe the concept of integrated waste management system with the help of a flowchart. [CO:1,L:3] **20**

End Semester Examination, May 2023

B. Tech. – Second Semester CHEMISTRY (BCH-100)

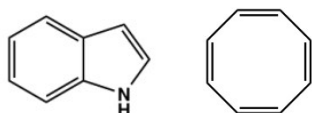
Time: 3 hrs.

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.

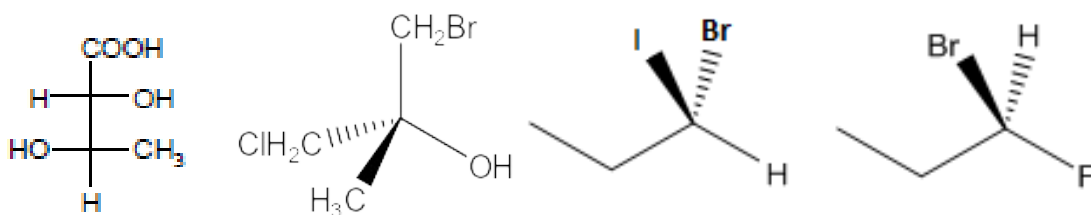
- Q.1 a) What do you mean by Lambert's Beer Law? [CO-5][L-1]
b) Differentiate enantiomers and diastereomers with suitable examples. [CO-3][L-1]
c) Identify aromatic and anti-aromatic molecules in followings: [CO-1][L-2]



- d) Define Markovnikov rule for addition reactions with an example. [CO-6][L-1]
e) Elaborate triple point with an example. [CO-4][L-2]
f) Find the energy of electron in 1st level in 1D box. [CO-1][L-2]
g) Differentiate between 'dry and wet corrosion'. [CO-4][L-1]
h) What factors cause deviations from ideal behavior? [CO-4][L-1]
i) Which of the following molecules are IR active: [CO-5][L-2]
 H_2O , NH_3 , F_2 , Cl_2
j) Identify the soft base in following: SCN^- , Al^{3+} , Cu^{2+} , F^- . [CO-2][L-2] **2×10**

PART-A

- Q.2 a) Evaluate crystal field splitting diagram of $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ and $[\text{Fe}(\text{NH}_3)_6]^{2+}$ and calculate magnetic moment of these complexes. [CO-1] [L-4] **10**
b) Draw the molecular orbital diagram of O_2 and N_2 molecules and find the magnetic moment of each molecules. [CO-1] [L-3] **10**
- Q.3 a) Calculate effective nuclear charge (Z_{eff}) of valence electron of the following:
i) C ii) P iii) Na iv) Ni [CO-2] [L-5] **10**
b) Explain following in detail:
i) Variations of s, p, d and f orbital energies of atoms in the periodic table
ii) Ionization energies, electron affinity. [CO-2] [L-3] **10**
- Q.4 a) Draw the relative potential energy diagram of cyclohexane with various conformers. Which conformer is least and most stable in cyclohexane and why? [CO-3] [L-3] **10**
b) Find the R or S configuration of following:



[CO-3] [L-5] **10**

PART-B

- Q.5 a) Calculate the emf of the electrochemical cell:
 $\text{Zn} \mid \text{Zn}^{2+} (0.1\text{M}) \parallel \text{Ag}^+ (0.1\text{M}) \mid \text{Ag}$
The standard potential of Zn/Zn^{2+} is -0.76 V and Ag/Ag^+ half-cell is $+0.80\text{ V}$.
[CO-4] [L-5] **10**
- b) Elaborate following with proper examples and diagrams:
i) Galvanic corrosion.
ii) Ellingham diagram.
[CO-4] [L-3] **5×2**
- Q.6 a) Explain principle of SEM (scanning electron microscope) and explain the disadvantage of SEM.
[CO-5] [L-4] **10**
- b) Analyze following with proper explanation:
i) UV-visible spectroscopy.
ii) AFM.
[CO-5] [L-4] **5×2**
- Q.7 a) Discuss the procedure and chemical reactions involved in the synthesis of Aspirin.
[CO-6] [L-4] **10**
- b) Elaborate Nucleophilic substitution. Differentiate between SN_1 and SN_2 reactions.
[CO-6] [L-4] **10**

End Semester Examination, May 2023

B. Tech. — Second Semester

CHEMISTRY FOR ENGINEERS (BCH-106)

Time: 3 hrs.

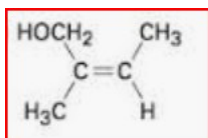
Max Marks: **100**

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:

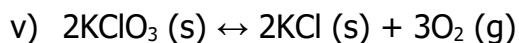
- a) Define alkaline and non alkaline hardness along with salt present in it. [CO:3] [L-2]
- b) Calculate number of phases, components and degree of freedom in mixture of NaCl and water. [CO:1] [L-4]
- c) Define the term "invariant" and "univariant" in phase rule. [CO-1] [L1]
- d) Why hardness is expressed in terms of CaCO_3 equivalent? [CO:3] [L-2]
- e) Differentiate between dry and wet batteries (2points). [CO:3] L-3]
- f) Which conformer of ethane is more stable; staggered or eclipsed and why? [CO:2] [L-3]
- g) Assign the E-Z configuration of following: [CO:1] [L-3]



- h) Draw d-orbitals splitting patterns with filling of electrons in the appropriate d orbitals in the d^6 , octahedral for low and high spin complex. [CO:1][L-3]
- i) Define auxochrome and chromophores. [CO:2][L-1]
- j) Give brief statement of Lambert Beer law. [CO:2] [L-2] **2×10**

PART-A

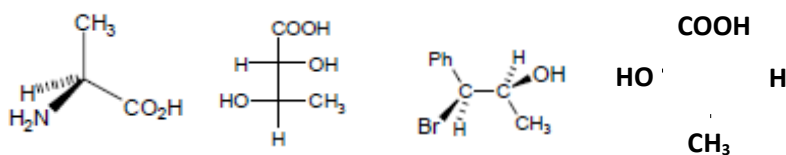
- Q.2
- a) While titrating a sample of hard water, 50ml of sample consumed 10ml of 0.01N EDTA to attain the end point. Calculate the total hardness of the water in terms of CaCO_3 . [CO:3] [L-4] **5**
 - b) Explain electro dialysis process with the help of well labeled diagram for desalination of water. [CO:3] [L-2] **10**
 - c) Which alkaline ions are present in water if $P > 1/2 M$ & $P = 1/2 M$. [CO:3][L-3] **5**
- Q.3
- a) Analyze the working of galvanic cell along with diagram. Classify the different kinds of fuels along with examples. [CO:3] [L-3,4] **10**
 - b) A sample of coal was found to contain; C=75%, H=10%, O=1%, N=2%; remaining ash. Calculate the amount of minimum air required for complete combustion of 1kg of coal. [CO:3][L-4] **10**
- Q.4
- a) Draw the well labelled phase diagram of water system and explain all 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 calcium carbonate.
 - ii) Rhombic Sulphur (S) \leftrightarrow Monoclinic Sulphur (S)
 - iii) An emulsion of oil in water.
 - iv) Saturated solution of sugar



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

PART-B

- Q.5 a) Derive an expression for the energy of the particle in a one-dimensional box in terms of the particle's mass m , the length of the box L , and Planck's constant h .
[CO:2][L-3] **10**
- b) Analyze the Crystal Field splitting in octahedral complexes along with splitting diagram of $[\text{Zn}(\text{H}_2\text{O})_6]^{2+}$ and $[\text{Co}(\text{NH}_3)_6]^{4+}$.
[CO:2][L-4] **10**
- Q.6 a) Draw all possible conformations of butane and comment on their stability. Also, draw P.E plot for various conformers of butane.
[CO:1][L-3] **10**
- b) Label each stereogenic centers as *R* or *S*.



[CO:1][L-4] **2½×4**

- Q.7 a) Illustrate the various applications of electronic spectroscopy. Discuss the spectral shifts in electronic spectroscopy in detail.
[CO:2][L-2,3] **10**
- b) Explain the principle of atomic absorption spectroscopy. Write its few applications in applied field.
[CO:2][L-2] **10**

End Semester Examination, May 2023
B. Tech. – First Semester
AI FOR ENGINEERING (BCS-100/ BCS-100A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- | | |
|--|-----------------------|
| a) Explain the importance of artificial intelligence. | [CO1][L2] |
| b) Describe the role of artificial intelligence in e-commerce. | [CO2][L3] |
| c) Discuss intelligent agents and their use in AI. | [CO3][L3] |
| d) Explain the role of natural language processing. | [CO4][L2] |
| e) Compare any two AI programming languages. | [CO1][L3] |
| f) How state-space problems are formulated? | [CO2][L4] |
| g) Explain any two agents that are used in AI. | [CO3][L2] |
| h) Discuss the working of a robot and its parts. | [CO4][L2] |
| i) Discuss about the future of AI. | [CO1][L2] |
| j) Explain any one of the searching techniques. | [CO2][L3] 2×10 |

PART-A

- Q.2 a) Illustrate the use of AI in real life. Compare supervised learning and unsupervised learning. Draw a time map of evolution of AI. [CO1] [L3] **10**
b) Explain the role AI programming languages. [CO1] [L3] **10**
- Q.3 a) Analyze any AI model and show the use of constraint satisfaction in problem solving. Comment on reward maximization technique. [CO2] [L4] **10**
b) Illustrate the process of problem formulation in AI. [CO2] [L4] **10**
- Q.4 a) Illustrate a production system. Which characteristics of it are used in AI problem solving? [CO2] [L3] **10**
b) Explain state-space problem formulation. [CO2] [L3] **10**

PART-B

- Q.5 Explain types of intelligence in AI. Evaluate which one of these must be used for a farmer who wants to grow more crops this year. Justify your results. [CO3] [L5] **20**
- Q.6 Illustrate components of an expert system. Create an expert system for medical diagnosis application. Draw all components of this system. [CO4] [L6] **20**
- Q.7 Design a robotic application for manufacturing of car parts. Evaluate the role of each part of the robot in manufacturing process. [CO4] [L5] **20**

End Semester Examination, May 2023
B. Tech. – Second Semester
PROGRAMMING FOR PROBLEM SOLVING (BCS-101A)

Time: 3 hrs.
100

Max Marks:

No. of pages: 2

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

- Q.1 a) Differentiate between algorithm and flowchart. [CO-1][L-2]
b) Find the output of following code using ternary operator:
int a=2, b=3, ans;
ans=a>b ? 2:3 > 4 ? 3:4;
printf ("%d", ans); [CO-2][L-2]
c) What are the functions of an operating system? [CO-2][L-2]
d) Define one and two dimensional arrays with example. [CO-2][L-1]
e) List out the functions of linker and loader? [CO-5][L-4]
f) Define recursive function with an example. [CO-2][L-2]
g) Define the operator precedence with an appropriate example. [CO-1][L-1]
h) Write the logic to create the Fibonacci series [CO-3][L-1]
i) Write the syntax to access the value of the variable using pointer. [CO-3][L-2]
j) Find the output of following code if value of $x=5$:
#include<stdio.h>
void fun(int x){
if (x > 0)
fun(--x);
printf ("%d\t", x);
}

[CO-3][L-3] **2×10**

PART-A

- Q.2 a) Write an algorithm and draw flowchart for finding largest among three numbers. [CO-1][L-2] **10**
b) Differentiate between i) Compiler and interpreter and ii) An Algorithm and A flowchart. [CO-1][L-2] **10**
- Q.3 a) Design the calculator with all possible operations using the switch case. [CO-2][L-2] **10**
b) Explain preprocessor directives. Write a program to print multiplication of two matrices. [CO-2][L-3] **10**
- Q.4 a) Write a program which reads a string and print it in reverse order with and without using library functions. [CO-3][L-2] **10**
b) Explain the logic for searching an element in the linear array and write the program/algorithm for the same using binary search. [CO-3][L-2] **10**

PART-B

- Q.5 a) Write a structure declaration for Employees in a company. To have employee id, employee name and employee salary as different types of data for structure

Employee. Formulate steps in the form of C code to display the data of 50 employees in a company and search a particular employee record. [CO-4][L-2] **10**

- b) Differentiate between call-by-value and call-by-reference, with appropriate examples. [CO-4][L-2] **10**

Q.6 a) Write a program to generate a Fibonacci series using recursion. [CO-3] [L-3] **10**

- b) Write a C program to print the following PASCAL triangle pattern:

```
      1
     1 1
    1 2 1
   1 3 3 1
  1 4 6 4 1
```

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

Q.7 a) Write the algorithm/program for Bubble sort. Sort the following array by using bubble sort.

10	2	20	3	7
----	---	----	---	---

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

- b) List the various modes of file opening. Write a program to copy the content of a file into another file. [CO-4] [L-3] **10**

End Semester Examination, May 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 questions:

- a) Define "Data structure". Differentiate between linear and non-linear data structure.
- b) What is the structure of a node of a doubly linked list? Give an example.
- c) Design a function to test the fullness of a circular queue.
- d) Write note on: Traversal of a tree.
- e) If the list is almost sorted, which sorting algorithm is suitable in this case to sort the list completely, justify your answer? **4×5**

PART A

- Q.2 a) Define 'Recursion'. Design a recursive function to implement the power function POW (X,Y). [CO-1][L-2] **10**
b) Design a Function to implement binary search in the list of 10 integers. [CO-1][L-3] **10**
- Q.3 a) Write a C program to create a linked list of 10 nodes. [CO-2][L-2] **10**
b) Design a function to add a node in the linked list at the head of the list. [CO-2][L-2] **10**
- Q.4 a) List out the operation over a stack. Design function for each operation [CO-3][L-3] **10**
b) Define the 'queue data structure'. What is the disadvantage of a linear queue? [CO-3][L-3] **10**

PART B

- Q.5 a) Create a binary search tree for the keys 23,89,90,23,1,34,67,4,3,78. Also, write a function to search a key in a BST. [CO-3][L-3] **10**
b) What is AVL tree? Describe all rotations in AVL tree with examples. [CO-4][L-4] **10**
- Q.6 a) Write prims algorithm to create MST from a given graph. [CO-3][L-4] **10**
b) Define the following terms wrt to following graphs:
i) Connected graph.
ii) Weighted graph.
iii) Forest.
iv) Degree of graph.
v) Pendant node. [CO-3][L-4] **2×5**
- Q.7 a) Show the steps for sorting the list: 45,6,8,9,23,34,12,10,11,2,43,89,90 by using Bubble sort. [CO-4][L-3] **10**
b) Write a programme to implement Merge Sort. [CO-4][L-3] **10**

End Semester Examination, May 2023
B. Tech. – Third Semester
OBJECT ORIENTED PROGRAMMING (BCS-DS-302/BCS-DS-302A)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

2X10

- a) Define "abstraction and encapsulation". [CO-1][L-1]
- b) List object-oriented languages. [CO-1][L-1]
- c) Define "reference variable". Give its syntax. [CO-2][L-2]
- d) Differentiate between 'a bug and an error' with examples. [CO-6][L-4]
- e) Define 'pointer'. Give syntax for declaration of pointer. [CO-4][L-1]
- f) Define "Class" with example. [CO-1][L-1]
- g) Describe derived class with example. [CO-4][L-1]
- h) Name the operators that cannot be overloaded. [CO-3][L-1]
- i) Differentiate between 'constructor' and 'destructor' with syntax. [CO-2][L-4]
- j) Define 'multilevel inheritance'. Draw the diagram to show multilevel inheritance using classes with data member and member function. [CO-4][L-2] **2×10**

PART-A

- Q.2 a) Discuss the issues of procedure oriented systems with respect to object oriented systems. Describe various applications of object oriented programming. [CO-1][L-2] **10**
b) Create a C++ program to declare a class COLLEGE with members as college code. Derive a new class as STUDENT with members as student. Accept and display details of student along with college for one object of student. [CO-1][L-5] **10**
- Q.3 a) Describe multiple constructor by giving example. [CO-2][L-1] **8**
b) Describe memory allocation for objects. [CO-2][L-1] **7**
c) State the rules for writing destructor function. [CO-2][L-3] **5**
- Q.4 a) Differentiate between 'run time' and 'compile time' polymorphism. [CO-3][L-2] **10**
b) With suitable example, describe effect of ++ and -- operators used with pointer in pointer arithmetic. [CO-3][L-3] **10**

PART-B

- Q.5 a) Create a program to declare a class 'book' containing data members as title, author-name, publication and price. Accept and display the information for one object using pointer to that object. [CO-4][L-5] **10**
b) Explain pure virtual function and when is it necessary? Also explain rules of pure virtual function. [CO-4][L-1] **6**
c) State and explain the visibility modes used in inheritance. [CO-4][L-6] **4**
- Q.6 a) Create a C++ program to append data from abc.txt to xyz.txt file. [CO-5][L-5] **10**
b) Describe various classes for file stream operations in detail. [CO-5][L-1] **10**
- Q.7 a) Compare class template and function template. Explain overloading of template function. [CO-6][L-3] **10**
b) Differentiate between 'error and exception'. Explain how an exception can be rethrown in C++ with the help of an example? [CO-6][L-3] **10**

End Semester Examination, May 2023
B. Tech. – Fourth Semester
OBJECT ORIENTED PROGRAMMING (BCS-DS-302A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Define 'pointer'. Give syntax for declaration of pointer. [CO-4] [L-1]
- b) List the features of object-oriented languages. [CO-1] [L-1]
- c) Give syntax and use of fclose () function. [CO-6] [L-1]
- d) State the use of cin and cout commands. [CO-1] [L-1]
- e) List different file operating modes and their uses. [CO-5] [L-2]
- f) Define 'class' with example. [CO-1] [L-1]
- g) Explain use of scope resolution operator. [CO-1] [L-1]
- h) Which operators cannot be overloaded and why? [CO-3] [L-1]
- i) Differentiate between 'Constructor' and 'Destructor' with syntax. [CO-2] [L-2]
- j) Explain virtual base class with suitable example. [CO-4] [L-1] **2×10**

PART-A

- Q.2 a) Discuss the issues of procedure oriented systems with respect to object oriented systems. Describe various applications of object oriented programming. [CO-1] [L-2] **10**
- b) Create a C++ program to declare a class COLLEGE with members as college-name, college code. Derive a new class as STUDENT with members as student-name, Roll No. Accept and display details of student along with college for one object of student. [CO-1] [L-5] **10**
- Q.3 a) Describe multiple constructor by giving example. [CO-2] [L-1] **8**
- b) Describe memory allocation for objects. [CO-2] [L-1] **7**
- c) State the rules for writing destructor function. [CO-2] [L-3] **5**
- Q.4 a) Differentiate between run-time and compile-time polymorphism. [CO-3] [L-2] **10**
- b) Overload the operators << and >> using the concept of overloading of operators using friend function. [CO-3] [L-3] **10**

PART-B

- Q.5 a) Create a program to declare a class 'book' containing data members as 'title', 'author-name', 'publisher', 'price'. Accept and display the information for one object using pointer to that object. [CO-4] [L-5] **8**
- b) Explain pure virtual function. When is it necessary? explain rules of pure virtual function. [CO-4] [L-1] **6**
- c) Compare various visibility modes used in inheritance. [CO-4] [L-] **6**
- Q.6 a) Describe various classes for file stream operations in detail. [CO-5] [L-1] **10**
- b) Create a C++ program to append data from abc.txt to xyz.txt file. [CO-5] [L-5] **10**
- Q.7 a) Compare class template and function template. Explain overloading of template function [CO-6] [L-3] **10**

- b) Differentiate between error and exception. Explain how an exception can be rethrown in C++ with the help of an example. [CO-6] [L-3] **10**

End Semester Examination, May 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:

- a) Explain "Authorization". [CO-1][L-1]
- b) List various attacks on application security. [CO-3][L-1]
- c) What is SAS 70 audits? [CO-5][L-1]
- d) Differentiate between active attacks and passive attacks. [CO-4][L-1]
- e) Why information classification is required? [CO-3][L-2] **4×5**

PART-A

- Q.2 a) Describe confidentiality in information security. Which category of attack is an attack against confidentiality? [CO-1][L-1] **10**
b) What do you mean by digital certificate? [CO-1][L-1] **10**
- Q.3 a) Explain in detail the physical threats faced while dealing with physical security. [CO-2][L-4] **10**
b) What is the difference between a stateful firewall and a deep packet inspection firewall? [CO-2][L-5] **10**
- Q.4 a) What are various methods to protect networks and network resources against the array of threats? [CO-3][L-2] **10**
b) Write note on different types of threats and vulnerabilities. [CO-3][L-1] **10**

PART-B

- Q.5 a) Discuss the secure software development phases. [CO-4][L-2] **10**
b) Discuss and explain operations security. [CO-4][L-2] **10**
- Q.6 a) What are the various vulnerabilities in database? Explain in detail. [CO-5][L-2] **10**
b) Define the 'log management'. Discuss different sources of log in detail. [CO-5,1][L-1] **10**
- Q.7 a) What are the various tools for GRC? [CO-5][L-2] **10**
b) Describe the GRC pillars. [CO-5][L-1] **10**

End Semester Examination, May 2023

B. Tech. – Third Semester

INTRODUCTION TO COMPUTER ANIMATION ALGORITHM, TOOLS AND TECHNIQUES (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 application of computer graphics in education and in the field of designing. [CO1] [L1]
- b) Illustrate history of typography. [CO2][L1]
- c) Differentiate three groups of color. [CO3][L3]
- d) Illustrate the use of prototyping with its advantages. [CO3] [L2]
- e) Discuss the use of translation transformation with equation in detail. [CO4][L5] **4×5**

PART-A

- Q.2 a) Discuss the history of computer graphics in detail. [CO1] [L4] **10**
b) Differentiate between interactive and non-interactive 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) Discuss in detail the application of typography. [CO2] [L2] **10**
- Q.4 Discuss in detail the polygon filling. Apply boundary fill and flood fill algorithm for filling the polygon/region. [CO3][L3] **20**

PART-B

- Q.5 What do you understand by key frame animation? Define facial animation. Explain various methods by which the facial movements are done. [CO4] [L2] **20**
- 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 Define 'animation production'. Explain various principles of animation in detail. [CO6] [L2] **20**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

DISCRETE MATHEMATICS (BCS-DS-401)

Time: 3 hrs.

Max Marks:

100

No. of pages: 2

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

Q.1 Answer the following in brief:

- Find out the number of ways that the letters of the word "DETAIL" can be arranged such that the vowels must occupy odd positions. [CO-3] [L-2]
- Simplify the expression $(x + y)(x + z)$ using the laws of Boolean Algebra. [CO-1] [L-3]
- Let R be a binary relation on a set A . Prove that If R is reflexive, then R^{-1} (Power-1) is also reflexive. [CO-2] [L-3]
- Prove that if n is an odd integer, then $n^3 + n$ is even. [CO-1] [L-3]
- How many functions are there from a set with three elements to a set with four elements? [CO-4] [L-3]
- Define $g : \mathbb{Z} \rightarrow \mathbb{Z}$ by the rule $g(n) = n^2$ for all $n \in \mathbb{Z}$. Is g one-to-one? Prove or give a counter example. [CO-2] [L-4]
- How many 2-permutations are there of $\{W, X, Y, Z\}$? Write them all. [CO-2] [L-3]
- Draw the graph of the binary relation c from R to R defined as follows: for all $(x, y) \in R \times R$, $(x, y) \in C$, st $x^2 + y^2 = 1$. [CO-5] [L-2]
- Let $f: R \rightarrow R$ be defined by $f(x) = x^3 + 5$ [CO-2] [L-4]
Show that f is one-to-one and onto. Find a formula that defines the inverse function f^{-1} (f to the power-1).
- Find the sum of first n natural numbers. [CO-3] [L-3] **2×10**

PART-A

Q.2 a) Prove that if $f: X \rightarrow Y$ and $g: Y \rightarrow Z$ be two one-to-one onto function, then $g \circ f$ is also one-to-one function. [CO1] [L3] **10**

b) Let $A = \{1, 2, 3, 4\}$ and $R = \{(2, 1), (2, 3), (3, 2), (4, 3)\}$. Find the transitive closure of R using Warshall's algorithm. [CO1][L4] **10**

Q.3 a) Prove $[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$ is a tautology. [CO-3] [L-3] **10**

b) Prove that the following is a tautology $a \vee \sim(b \wedge c) \leftrightarrow (a \vee \sim b) \vee \sim c$ [CO-3] [L-3] **10**

Q.4 a) Prove by Mathematical induction: $1/1.3 + 1/3.5 + 1/5.7 + \dots + 1/(2n-1)(2n+1) = n/(2n+1)$ [CO6] [L3] **10**

b) In a group of students, there are 6 boys and 4 girls. Out of 10 students, 4 students have to be selected. Find out how many different ways the students can be selected such that at least one boy should be selected? [CO6] [L3] **10**

PART-B

Q.5 a) Solve the recurrence relation $y_{k+1} - 5y_k = 5^k$, satisfying the initial condition

$$y_0=3.$$

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

b) Solve the recurrence equation by method of generating function:

$$a_r - 7a_{r-1} + 10a_{r-2} = 3^r, r \geq 2 \quad \text{with initial conditions} \quad a_0 = 0, a_1 = 1.$$

[CO2][L5] **10**

Q.6 Consider the set Q of rational numbers, and let * be the operation on Q defined by:

$$a * b = a + b - ab$$

a) Find: i) $3 * 4$ ii) $2 * (-5)$ iii) $7 * (1/2)$.

b) Is $(Q, *)$ a semigroup? Is it commutative?

c) Find the identity element for *.

d) Does any of the elements in Q have an inverse? If yes, list them.

[CO-4][L-5] **5×4**

Q.7 Discuss the following with example each:

a) Hamiltonian graphs.

b) Isomorphic graphs.

c) Euler's formula.

d) Four-color theorem.

e) Bipartite graphs.

[CO1] [L2] **4×5**

End Semester Examination, May 2023

B. Tech. - 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) Illustrate the simplest way to organize a computer system. [CO1][L1]
- b) Describe the hardware implementation for T: $R2 \leftarrow R1, R1 \leftarrow R2$ [CO2][L3]
- c) Perform the arithmetic operation $(+42) + (-13)$ in binary using signed 2's complement representation for negative numbers. [CO3][L2]
- d) Differentiate between direct and indirect addressing. [CO2][L2]
- e) Discuss control unit and control memory. [CO3][L3]
- f) Differentiate between burst mode and cycle stealing mode. [CO3][L2]
- g) Define throughput and speedup in Pipelining. [CO6][L1]
- h) Explain ROM organization with the help of chip diagram. [CO4][L2]
- i) What is the need of memory hierarchy? [CO4][L1]
- j) Explain locality of reference principle. [CO5][L2] **2×10**

PART A

- Q.2 a) What do you mean by addressing modes? Explain any 6 addressing modes with suitable examples. [CO2] [L3] **10**
b) What do you mean by instruction execution cycle? Discuss its execution with respect to timing signals, with a brief explanation. [CO3][L2] **10**
- Q.3 a) Design a 4 bit arithmetic circuit, performing basic arithmetic operations like add, add with carry, subtract with borrow, transfer the content of register, increment and decrement operation. [CO1][L3] **8**
b) Explain different CPU organizations in detail. [CO2][L2] **12**
- Q.4 a) What do you mean by instruction set architecture of a computer system? Explain the instruction formats of a computer architecture, on the basis of no. of operands supplied to the instruction (showcase with the help of suitable example). [CO3][L2] **10**
b) Discuss control units in detail with a suitable block diagram and its explanation. [CO3][L2] **10**

PART-B

- Q.5 a) Explain the role of interrupts in process state transitions. [CO4][L2] **10**
b) Write a short note on I/O device interfaces – SCSI and USB. [CO4][L1] **10**
- Q.6 a) Draw and explain the block diagram of memory hierarchy in computer system? Also explain Locality of Reference principle. [CO6][L1] **10**
b) Explain associative, direct and cache mapping organizations. [CO6][L2] **10**
- Q.7 a) Demonstrate pipelining with the help of block diagram. [CO5][L2] **10**
b) Formulate Instruction level parallelism using three- segment pipeline. [CO5][L3] **10**

End Semester Examination, May 2023
B. Tech. — Fourth Semester
COMPUTER ORGANISATION & 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) Difference between 'computer architecture and organization'. [CO-1][L-1]
 - b) Design the block diagram of the hardware that implements the following register transfer statement:
P: R2 ← R1 [CO-2][L-6]
 - c) Create the sequence of register transfer corresponding to memory read. [CO-2][L-6]
 - d) Describe the basic functionalities of CPU. [CO-3][L-2]
 - e) What do you understand by pipelining? [CO-6][L-1]
 - f) Describe addition instruction (ADD) with the help of two- address and two- address instructions. [CO-4][L-1]
 - g) Describe three types of interrupts. [CO-3][L-1]
 - h) What is the role of BR and BG pins in DMA? [CO-6][L-3]
 - i) Explain cache coherence. [CO-5][L-4]
 - j) Describe the goals of parallel processing. [CO-6][L-1] **2×10**

PART-A

- Q.2 a) Explain the working of 4×1 multiplexer with the help of block diagram. Also differentiate between de-multiplexer and decoder. [CO-1][L-1] **10**
b) Demonstrate structured organization of a computer system with the help of block diagram. [CO-1][L-2] **10**
- Q.3 a) Draw a flow chart for add and subtract operation. [CO-2][L-6] **10**
b) Explain different types of addressing modes with the help of an example. [CO-2][L-2] **10**
- Q.4 a) Demonstrate FETCH-DECODE-EXECUTE cycle with the help of block diagram using register transfer language. [CO-3][L-3] **10**
b) Illustrate the detailed data path of typical register based CPU architecture. [CO-3][L-6] **10**

PART-B

- Q.5 a) Differentiate between micro-operations, micro-instructions, micro-program and micro-code. [CO-4][L-1] **5**
b) Briefly explain the DMA architecture with the help of diagram. [CO-4][L-3] **15**
- Q.6 a) What is the need for memory hierarchy? Draw and explain the block diagram of memory hierarchy in computer system. [CO-5][L-1] **10**
b) Explain different memory mapping techniques used in cache organization. [CO-5][L-3] **10**
- Q.7 a) Demonstrate Flynn's classification of computer system with the help of a block diagram. [CO-6][L-2] **10**
b) Formulate instruction level parallelism using four- segment pipeline. [CO-6][L-5] **10**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

OPERATING SYSTEMS (BCS-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) Differentiate between 'multitasking' and 'multiprogramming'. [CO1][L2]
- b) Compare system programs and application programs. [CO1][L2]
- c) Illustrate the various storage devices. [CO1][L2]
- d) Explain critical section problem. [CO4][L2]
- e) Illustrate importance of semaphores. [CO4][L2]
- f) Draw state transition diagram. [CO5][L2]
- g) Differentiate 'internal Fragmentation' and 'external Fragmentation'. [CO5][L2]
- h) List necessary and sufficient conditions for a deadlock. [CO3][L2]
- i) What are various disk allocation methods? [CO6][L1]
- j) Explain the graph directory structure in detail. [CO6][L2] **2×10**

PART-A

- Q.2 a) Define 'operating system'. Explain the main purposes of an operating system. [CO-1] [L-2] **10**
- b) Discuss the case study of WINDOWS and LINUX Operating system. [CO-1] [L-2] **10**

- Q.3 a) Consider the set of four processes with Arrival Time and Burst time as given below:

Process ID	Arrival Time	Burst Time
P1	0	6
P2	1	7
P3	2	9
P4	3	11

Calculate the average waiting time and average turn around time for FCFS, SJF, Round Robin and SRTF scheduling algorithm. [CO-2] [L-6] **10**

- b) Consider the following processes with execution time (ET) and priority (PR) as P1 (ET= 9, PR=3), P2 (ET=2, PR=1), P3 (ET=1,PR=4), P4 (ET=3, PR=5) and P5 (ET=7, PR=2). Calculate the average turn around time and average waiting time using priority and RR scheduling algorithms. [CO-2] [L-6] **10**

- Q.4 a) Give two hardware instructions and their definitions which can be used for implementing mutual exclusion. [CO-3] [L-4] **10**
- b) Explain dining-philosopher's problem. Illustrate synchronization issues and techniques for resolving them. [CO-4][L5] **10**

PART-B

- Q.5 a) Consider a system that contains five processes P1, P2, P3, P4 and P5; three resource types A, B and C.

Processes	Allocation	Max	Available
	A, B, C	A, B, C	A, B, C
P1	0 1 0	7 5 3	3 3 2
P2	2 0 0	3 2 2	
P3	3 0 2	9 0 2	
P4	2 1 1	2 2 2	
P5	0 0 2	4 3 3	

Answer the following questions using the Banker's algorithm:

i) What is the reference of the need matrix?

ii) Determine if the system is safe or not.

iii) What will happen if the resource request (1, 0, 0) for process P1?

Can the system accept this request immediately?

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

- b) What is deadlock? Discuss various deadlock prevention methods. [CO-4] [L-2] **10**

- Q.6 a) Consider the following pages of a reference string: 1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 5, 2. Implement the FIFO, LRU and optimal page replacement algorithms and calculate the page faults taking 3 and 4 frames into consideration. [CO-5] [L-3] **10**

- b) Explain working of paging and segmentation by taking appropriate examples.

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

- Q.7 a) Suppose a disk drive have 200 cylinders numbered from 0 to 199. The disk drive is currently serving at cylinder 100. Consider the following queue for request-service. Use the FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK Disk Scheduling algorithms to calculate the total movement in number of cylinders 140, 180, 195, 55, 105, and 50. [CO-6] [L-6] **10**

- b) Explain about different directory structure available.

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

End Semester Examination, May 2023

B. Tech. – Fourth Semester

DATABASE MANAGEMENT SYSTEM (BCS-DS-404)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

- Q.1 a) Draw the symbols for following in ER diagram: [CO-1][L-2]
i) Weak entity.
ii) Derived attribute.
b) What is a checkpoint in database recovery? [CO-4][L-2]
c) What do you mean by SQL injection? [CO-5][L-2]
d) Differentiate between grant and revoke privileges. [CO-4] [L-1]
e) Define 'Normalization'. [CO-2] [L-2]
f) What do you mean by insertion anomaly in DBMS? [CO-2] [L-2]
g) List any four DML commands in SQL. [CO-1] [L-2]
h) Discuss the roles and responsibilities of Data Base Administrator (DBA). [CO-1] [L-1]
i) Write two advantages of using DBMS over file processing system. [CO-1] [L-2]
j) Discuss DAC, MAC, RBAC in brief. [CO-5] [L-1] **2×10**

PART-A

- Q.2 a) Discuss 1NF, 2NF, 3NF and BCNF with one example for each. [CO-2][L-3] **10**
b) Write SQL statements to perform the following queries on the relations given below:
BOOK (Book_ID, Title, Publisher_ID, Year_of Pub, Price)
AUTHOR (Author_ID, Book_ID, Author Name)
PUBLISHER (Publisher_ID, Book_ID, Address, Name_of Pub, No._of Copies)
i) Find the name of authors whose books are published by "ABC Press".
ii) Find the name of the author and price of the book, whose Book_ID is '100'.
iii) Find the title of the books, which are published by Publisher_ID '20' and are published in year 2011.
iv) Find the address of the publisher who has published Book_ID "500". [CO-2][L-2] **10**
- Q.3 a) What is Relational Algebra? What is the utility of relational algebra? Is SQL related to relational algebra? Comment on it. Explain the following operations in the relational algebra with the help of an example for each:
i) Select ii) Project iii) Join [CO-1][L-3] **10**
b) What is Functional Dependency (FD)? Discuss its significance and explain its types. [CO-1] [L-2] **10**
- Q.4 a) What are Indexes in DBMS? What is the utility of Indexes in DBMS? Under what situations B-tree Indexes are advantageous in DBMS? [CO-3] [L-2] **10**
b) Explain hashing. Describe in detail "collision resolving techniques". [CO-3] [L-2] **10**

PART B

- Q.5 a) Discuss transaction in detail. What are the ACID properties? Support with the help of example. [CO-5] [L-2] **10**
b) Explain any two problems of concurrent transactions with the help of an example. [CO-5] [L-2] **10**
- Q.6 a) Discuss any two levels of security mechanisms to protect database. [CO-4] [L-3] **10**
b) Explain log-based recovery technique with the help of an example. [CO-4] [L-3] **10**
- Q.7 Write short notes on (**any two**) of the following:
a) Distributed databases.
b) Object oriented databases.
c) Data warehousing and data mining. [CO-4] [L-2] **10×2**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

COMPUTER NETWORKS (BCS-DS-405)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following questions:

- a) Describe different components of data communication. [CO-1] [L-2]
- b) How many cables are required to connect 48 computers in mesh topology? [CO-1] [L-2]
- c) Discuss the main role of token in ring topology. [CO-2] [L-2]
- d) What is IEEE 802.3z also known as? [CO-2] [L-2]
- e) What is the purpose of piggybacking? [CO-3] [L-2]
- f) What is the mechanism of ENQ/ACK? [CO-3] [L-2]
- g) Convert the address 194.47.21.130 in binary address notation. [CO-4] [L-2]
- h) What problem does transmission control protocol solve? [CO-5] [L-2]
- i) Briefly discuss firewall. [CO-6] [L-2]
- j) Explain ALOHA. [CO-3] [L-2] **2×10**

PART-A

- Q.2 a) Explain different network topologies along with the advantages and disadvantages of each type. [CO-1] [L-2] **10**
b) Differentiate between the following multiplexing techniques: TDM, STDM and FDM. [CO-1] [L-2] **10**
- Q.3 a) What kind of channel access method is CSMA/CD? Explain in detail. [CO2][L-2] **10**
b) Describe three types of fast ethernet in detail, with appropriate examples. [CO2][L2] **10**
- Q.4 a) How does the checksum checker knows that the received data unit is undamaged? Explain it with the help of an example. [CO-3] [L-2] **10**
b) Explain different sub-layers of data link layer. Also explain different functions of Data link layer. [CO-3] [L-2] **10**

PART-B

- Q.5 a) Illustrate different classes of IP addresses and specify the range of each class. [CO-4] [L-2] **10**
b) Explain address resolution protocol in computer networks. [CO-4] [L-2] **10**
- Q.6 a) Describe Leaky Bucket and Token Bucket algorithm used to improve QoS with suitable methods and examples. [CO-5][L-2] **10**
b) Differentiate between user datagram protocol (UDP) and transmission control protocol (TCP). [CO-5] [L-2] **10**
- Q.7 Write short notes on:
a) Domain Name Space (DNS), DDNS.
b) TELNET.
c) File Transfer Protocol (FTP).
d) Cryptography. [CO-6] [L-2] **5×4**

End Semester Examination, May 2023
B. Tech. – Fourth Semester
INTRODUCTION TO VIRTUALIZATION AND CLOUD COMPUTING
(BCS-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) State the criteria that are most important to an organization in deciding what workloads should be moved to cloud. [CO4][L2]
- b) Justify the term "Balance of CAPEX and Opex" in context with cloud computing. [CO1][L2]
- c) Differentiate between temporary workloads and mission critical workloads. [CO4][L2]
- d) "Private cloud deployment model is suitable for Large Enterprises or for Small-medium Enterprises?" Justify. [CO2][L2]
- e) Name any two private cloud vendors. [CO2][L1]
- f) State the multi tenancy with respect to cloud model? [CO1][L1]
- g) Differentiate between utility computing and cloud computing? [CO2][L4]
- h) Define BPaaS with the help of an example. [CO2][L1]
- i) Discuss the major shortcomings of the conventional storage system. [CO1][L2]
- j) Differentiate between emulation and simulation by citing an example. [CO1][L2]

2×10

PART-A

- Q.2 a) Compare the traditional IT infrastructures with virtualized IT infrastructures illustrating with some parameters. [CO1][L3] **10**
b) Draw the pre and post virtualization server stacks also discuss the server before and after virtualization, how it is helpful in cloud computing. [CO6][L2] **10**
- Q.3 a) Differentiate between 'server and storage virtualization'. [CO1][L2] **10**
b) Differentiate between 'Type-I and Type-II' hypervisor in terms of virtualization in cloud computing. [CO5][L2] **10**
- Q.4 a) Describe the application virtualization and its benefits. [CO1][L2] **10**
b) Discuss network virtualization in detail. [CO6][L2] **10**

PART-B

- Q.5 a) Discuss the anatomy of cloud with all its major components explained. [CO5][L2] **10**
b) Discuss, how cloud computing proves to be benefit are for end user, administrator and cloud provider? Explain with respect to each of them. [CO5][L2] **10**
- Q.6 Differentiate between pros and cons of public cloud, private cloud and hybrid cloud. [CO2][L2] **20**
- Q.7 Compare all types of workloads that are part of cloud computing environment. [CO4][L2] **20**

End Semester Examination, May 2023

B. Tech. – Fourth 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 in brief:

- a) Explain the terms - Data breach and spamming. [CO-1] [L-2]
- b) Describe the term - malware. [CO-2] [L-3]
- c) Discuss the impact of Distributed (Denial of Service) attack [CO-3] [L-3]
- d) Explain the significance of disk encryption [CO-4] [L-2]
- e) Compare any two data masking techniques. [CO-5] [L-3]
- f) How database activity is monitored? [CO-6] [L-2]
- g) Explain the role of social engineering in security [CO-3] [L-2]
- h) Discuss any one hardware based security technique [CO-4] [L-2]
- i) Explain any two ways to identity theft. [CO-1] [L-2]
- j) Write any one of the mechanisms for digital theft. [CO-2] [L-3] **2×10**

PART-A

- Q.2 a) Illustrate data security threats based on data breach, identity theft and frauds. Compare the impacts of these threats. Draw a comparison table for it. [CO-] [L-] **10**
b) Explain the various bank fraud techniques and how to avoid them? [CO-1] [L-3] **10**
- Q.3 a) Analyze the techniques that are employed for SQL injection. Comment on the use of wildcards in this technique [CO-] [L-] **10**
b) Differentiate between malware and a virus. Do they have the same impact in system? Justify your statement. [CO-2] [L-4] **10**
- Q.4 a) Illustrate different phishing techniques. Can these be prevented? Comment. [CO-3] [L-3] **10**
b) Explain the significance of social engineering in preventing frauds. [CO-3] [L-3] **10**

PART-B

- Q.5 Explain types of countermeasures that are used in data security. Evaluate any one such technique that can be used for bank data security. [CO-4] [L-5] **20**
- Q.6 Illustrate data backup and data masking techniques. Create a masking system for medical data privacy. What are the components of this system? [CO-5] [L-6] **20**
- Q.7 Design a system to monitor database activity. Evaluate the role of such softwares that have been used for this purpose. [CO-6] [L-5] **20**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

IT SERVICE MANAGEMENT (BCS-DS-425)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 some of the IT service management tools. [CO-2] [L-1]
- b) Describe the various activities of service desk. [L-4][CO-3]
- c) Differentiate between service portfolio and service pipeline. [L-1][CO-1]
- d) What is the significance of services in IT industry? [L-1][CO-1]
- e) Why do we need financial management? [L-3][CO-3]
- f) Write any two responsibilities of release and control management. [L-1][CO-4]
- g) Why do we need change management? [L-2][CO-2]
- h) What is the difference between problem and incident? [L-2][CO-5]
- i) Discuss key activities of change evaluation. [L-6][CO-5]
- j) Quote the various steps for financial management process. [L-1][CO-4] **2×10**

PART-A

- Q.2 a) Discuss strategic demand and tactical demand with example. [CO-2][L-2] **10**
b) What are the different ITSM tools? Explain in detail various capabilities of ITSM. [CO-1][L-1] **10**
- Q.3 Write the classification of capacity management. Explain component capacity management, service capacity management and business capacity management [CO-3][L-4] **20**
- Q.4 a) Explain the scope of information technology service continuity management. List out the main activities involved in it. [CO-2][L-3] **10**
b) Classify information security management in detail. [CO-1][L-6] **10**

PART-B

- Q.5 a) Suppose a service level manager requires confirmation wherein the internal service desk can answer a certain percentage of calls within 10 seconds. In what document would the service desk's agreement to this requirement be recorded? Explain in detail this particular agreement. [CO-4][L-4] **10**
b) Discuss service portfolio management and service catalogue management. [CO-4][L-3] **10**
- Q.6 a) A service was accidentally hosted on the test server. Which process is responsible for it? [CO-5][L-2] **10**
b) What is change management? Explain the step of change evaluation with examples. [CO-6][L-1] **10**
- Q.7 Write short notes on the following:
 - a) Incident management. [CO-6][L-1] **10**
 - b) Problem management. [CO-4][L-4] **10**

End Semester Examination, May 2023

B. Tech. – Fourth Semester PYTHON-I (BCS-DS-427A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

- Q.1
- a) Differentiate between list and tuples. [CO-1][L2]
 - b) What are modules and packages in Python? [CO-1][L2]
 - c) Illustrate runtime error with an example. [CO-3][L-2]
 - d) Write any eight string functions/methods/operations. [CO-1][L1]
 - e) Explain the concept of slicing and indexing in a list. Create a 4X2 integer array and print its attributes. [CO-4][L3]
 - f) What is the purpose of 'r' as prefix in the given statement?
f = open(r, "d:\color\flower.txt") [CO-5][L2]

- g) How to use the __init__() method to assign values to data attributes in Python? [CO-5][L-2]
- h) Explain the following file built-in functions with clear syntax, description and illustration: i) open() ii) seek(). [CO-1][L2]

- i) What are the uses of file object? [CO-4][L3]
 - j) Explain various numpy array attributes. [CO-4][L-2]
- [CO-5][L2] **2×10**

PART-A

- Q.2
- a) Explain the objective of IF statement in Python? How do you stop multiple if-else in Python? [CO-1] [L-3] **10**
 - b) Write a program to prompt for a score between 0.0 and 1.0. If the score is out of range print an error. If the score is between 0.0 and 1.0, print a grade using the following table:
Score Grade
>= 0.9 A
>= 0.8 B
>= 0.7 C
>= 0.6 D
<0.6 F [CO-1] [L-3] **10**

- Q.3
- a) Find the area and perimeter of a circle using functions. Prompt the user for input.

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

- b) Differentiate between args and Kwargs? Can you have Kwargs without args?
Justify with the help of an example. [CO-2] [L-2] **10**

Q.4 Create three dictionaries: lloyd, alice, and tyler.

```
lloyd = {  
    "name": "Lloyd",  
    "homework": [90.0,97.0,75.0,92.0],  
    "quizzes": [88.0,40.0,94.0],  
    "tests": [75.0,90.0]  
}  
alice = {  
    "name": "Alice",  
    "homework": [100.0, 92.0, 98.0, 100.0],  
    "quizzes": [82.0, 83.0, 91.0],  
    "tests": [89.0, 97.0]  
}  
tyler = {  
    "name": "Tyler",  
    "homework": [0.0, 87.0, 75.0, 22.0],  
    "quizzes": [0.0, 75.0, 78.0],  
    "tests": [100.0, 100.0]  
}
```

Create a list called students that contains lloyd, alice, and `tyler.

- for each student in your students list, print out that student's data, as follows:
- print the student's name
- print the student's homework
- print the student's quizzes
- print the student's tests

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

PART-B

Q.5 a) Write Python code that implements and returns the functionality of histogram using dictionaries. Also, write the function print_hist to print the keys and their values in alphabetical order from the values returned by the histogram function.

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

- b) Write Python code to create a function called most_frequent that takes a string and prints the letters in decreasing order of frequency, using dictionaries.

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

Q.6 a) Describe the different access modes of the files with an example.

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

- b) Discuss the following methods associated with the file object
i) read() ii) readline() iii) readlines() iv) tell() v) seek(). [CO-5] [L-2] **10**

Q.7 a) Write Python program to demonstrate multiple inheritances. [CO-2] [L-3] **10**

- b) Program to demonstrate the overriding of the base class method in the derived class. [CO- 2] [L- 3] **10**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

BLOCKCHAIN TECHNOLOGY (BCS-DS-428)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

- Q.1 Answer the following in brief
- a) Define 'blockchain'.
 - b) Discuss the significance of hash function in blockchain technology.
 - c) What is double spending? How can it be avoided?
 - d) State the basic requirements for the consensus protocols in blockchain technology.
 - e) What is hyper ledger?
 - f) Discuss fabric SDK and front end.
 - g) State the components of hyperledger fabric.
 - h) What is cryptocurrency?
 - i) What is POW?
 - j) What do you mean by smart contracts in blockchain?
- 2×10**

PART-A

- Q.2 Explain the architecture and design of Blockchain technology in detail, with suitable examples. [CO-1] [L-2] **20**
- Q.3 Discuss the concept of proof of Work (PoW) in blockchain technology? Also discuss the scalability aspects of blockchain consensus protocol. [CO-2] [L-2] **20**
- Q.4 Explain the concept of P2P payment gateway and wallet in detail along with its architecture layout. [CO-3] [L-2] **20**

PART-B

- Q.5 Discuss the design and implementation of chain code in blockchain technology. [CO-4] [L-2] **20**
- Q.6 Discuss the use case of blockchain in financial software and systems (FSS) with respect to settlements, KYC, capital markets and insurance. [CO-5] [L-2] **20**
- Q.7 Write short notes on:
- a) Blockchain cryptography.
 - b) Significance of blockchain in digital identity and land records maintenance for government.
- [CO-6] [L-2] 10×2**

End Semester Examination, May 2023

B. Tech. – Fourth Semester EXPERT SYSTEMS (BCS-DS-438)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 'procedural and non-procedural language'. [CO-1][L-2]
- b) What do you mean by knowledge elicitation? [CO-1][L-1]
- c) Which are the essential features and capabilities in any tool of expert system? [CO-1][L-1]
- d) Name the types of problems solved by the existing expert systems. [CO-1][L-1]
- e) Illustrate forward reasoning by a neat and clean diagram. [CO-3][L-2]
- f) Discuss major components of an expert system. [CO-2][L-2]
- g) Define AND-OR tree with a suitable example. [CO-3][L-1]
- h) Discuss fuzzy logic with an example. [CO-4][L-1]
- i) Explain the real time expert system. [CO-4][L-2]
- j) If two dices rolled then what is the probability of getting a sum of 5? [CO-4][L-2] **2×10**

PART-A

- Q.2 Write a note on the various tools for making an expert system. [CO-4] [L-1] **20**
- Q.3 Discuss the knowledge representation and types of knowledge used in ES (expert system). [CO-2] [L-1] **20**
- Q.4 Illustrate lattice with an example and prove that D18 is a bounded lattice. [CO3][L1] **20**

PART-B

Q.5 Discuss inference rule with example and show that the following argument is not valid:

$$\left[\begin{array}{ccc} p & \vee & r \\ p & \vee & q \\ \hline q & \vee & r \end{array} \right]$$

Verify it.

∴

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

- Q.6 Illustrate the Dempster-Shafer theory with suitable example. [CO-4] [L-4] **20**
- Q.7 Discuss various learning, planning and exploration methods in expert systems. [CO-4] [L-1] **20**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

NETWORK SECURITY (BCS-DS-444)

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 'confidentiality and Integrity'. [CO1][L2]
 - b) Define block cipher with an example. [CO1][L1]
 - c) Define three states of data in security. [CO2][L2]
 - d) What are laws of operations security? [CO2][L1]
 - e) What are the major network security tools? [CO3][L1]
 - f) Differentiate between 'worms and virus'. [CO4][L2]
 - g) Define 'log management'. [CO5][L1]
 - h) What do you mean by network traffic management? [CO4][L1]
 - i) Differentiate between 'public and private key cryptography'. [CO2][L2]
 - j) What do you mean by IT Audits? [CO5][L1] **2×10**

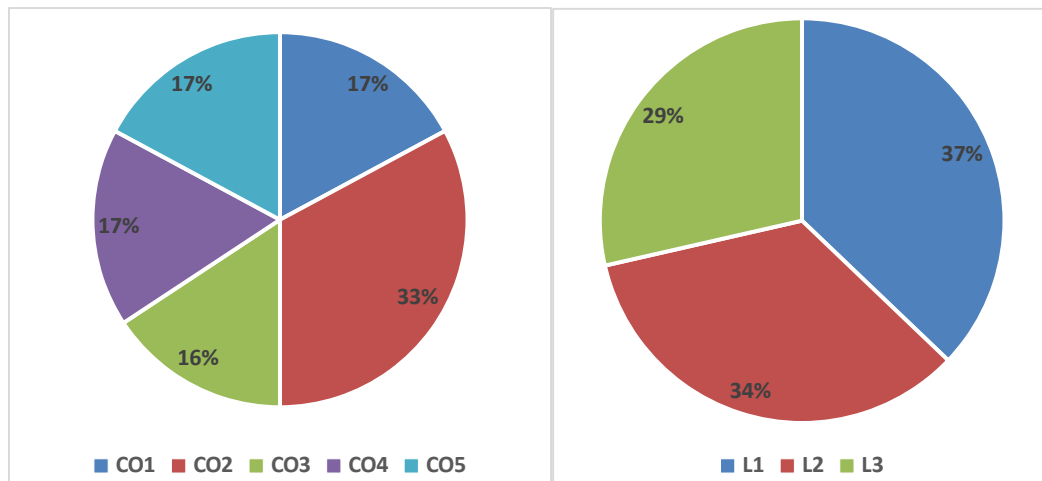
PART-A

- Q.2 a) How does access control works and why it is important in network security? [CO1] [L1] **10**
b) Explain CIA triad with examples. [CO1] [L2] **10**
- Q.3 a) Write the steps involved in play fair cipher. Construct a table for the play fair cipher with the keyword EFFECTIVENESS. Encrypt the following phrase: "EXAMFORINFORMATIONSECURITY". [CO2] [L3] **10**
b) Explain the laws of operations security in details. [CO2] [L1] **10**
- Q.4 a) Explain the different categories of security issues associated with network security. [CO3] [L2] **10**
b) What are the strength and weakness of security controls and what are the benefits of physical security. [CO3] [L1] **10**

PART-B

- Q.5 a) Discuss operating system hardening in the context of protection control for operating system. [CO4] [L3] **10**
b) What do you mean by Malwares and explain how to protect against Malwares? [CO4] [L1] **10**
- Q.6 a) What do you mean by security audit? What are the management standards of an organization that implemented for its information security? [CO5] [L3] **10**
b) What do you mean by Log management? Explain various types of sources of logs. [CO5] [L2] **10**
- Q.7 a) Explain the working process of DES encryption technique with a neat sketch. [CO2] [L2] **10**

b) Perform encryption and decryption using RSA algorithm with $p=3$, $q=11$, and $M=5$
[CO2] [L5] **10**



End Semester Examination, May 2023
B. Tech. - Fourth Semester
INTRUSION DETECTION SYSTEM (BCS-DS-445)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 different ways to intrude a network? [CO1][L1]
 - b) How we can classify an IDS? [CO2][L1]
 - c) What is the major drawback of anomaly detection in IDS? [CO2][L2]
 - d) Define the characteristics of host based IDS. [CO2][L2]
 - e) Discuss briefly the need of IDS. [CO3][L2]
 - f) What attacks can be detected in a short? [CO4][L2]
 - g) What are various internal and external threats to data? [CO5][L2]
 - h) What are the similarities between IPS and IDS? [CO5][L2]
 - i) Why both IDS and IPS solutions are critical for cybersecurity? [CO5][L2]
 - j) What is the use of honey pot and diamond model for threat analysis? [CO6][L2] **2×10**

PART-A

- Q.2 a) List the types of attacks in network and explain the importance of IDS. [CO1][L2] **10**
b) Explain the diamond model of intrusion analysis in detail. [CO2][L1] **10**
- Q.3 a) Compare credential analysis with respect to non credential analysis. [CO1][L2] **10**
b) Examine the model for intrusion analysis terms of performance and security. [CO4][L1] **10**
- Q.4 a) Differentiate between 'snort command line options' and 'snort alert modes'. [CO2][L3] **10**
b) Review the running snort on multiple network interfaces. [CO3][L2] **10**

PART-B

- Q.5 a) Differentiate between 'rule headers' and 'rule options'. [CO5][L3] **10**
b) Elaborate preprocessors and output modules in IDS. [CO3][L2] **10**
- Q.6 a) Compare various models of IDS and IPS. [CO4][L3] **10**
b) Explain agent development for intrusion detection. [CO6][L2] **10**
- Q.7 a) Analyze the database activity monitoring. [CO2][L4] **10**
b) Evaluate step-by-step procedure to compile and install snort location of snort files. [CO5][L5] **10**

End Semester Examination, May 2023

B. Tech. – Fifth Semester

JAVA PROGRAMMING (BCS-DS-474)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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:

- Explain the following line used under Java Program :public static void main (String args [])
- What is dynamic method dispatch?
- Given that Thing is a class, how many objects and how many reference variables are created by the following code?
Thing item, stuff;
item = new Thing();
Thing entity = new Thing();
- Differentiate between abstract classes and interface in java.
- How is a vector different from an array?
- "Swing components are light weight". Justify.
- How does java support type casting? Give an example.
- List checked exceptions of java.
- Explain Result set with a suitable example.
- Explain the reason to implement a corba application with multi-threading. **2×10**

PART-A

- Q.2
- Explain applets and describe the Applet Life Cycle. What are the requirements for creating an Applet? [CO-2] [L-2] **10**
 - Write a Program using the concept of Inheritance, to set, to get and compare the features of different vehicles. Create different methods for each feature. [CO-1] [L-6] **10**
- Q.3
- Illustrate how packages are created and accessed in Java. Briefly explain the naming convention in packages. [CO-1] [L-1] **10**
 - Explain in detail about JAR files. How can you create them? Where do we use them? [CO- 2] [L-6] **10**
- Q.4
- Write a Java code that generates custom exception if any value from its command line arguments is negative. [CO-3][L-1] **10**
 - Describe event and delegation event model with a suitable example. [CO-3] [L-2] **10**

PART-B

- Q.5
- What is SOAP? How do users utilize the facilities provided by SOAP? Give example. [CO-4] [L-3] **10**
 - Differentiate between thread and a process. What are the two ways of implementing thread in java. Give suitable examples for both. [CO-5] [L-2] **10**
- Q.6
- Explain 'stored procedure'. What are the parameter types in stored procedure? Give example. [CO-5] [L-2] **10**
 - Explain synchronization and write a program to solve producer-consumer problem using inter thread communication. [CO-5] [L-5] **10**
- Q.7
- Discuss JDBC and four types of data base drivers of JDBC with suitable examples and syntax. [CO-6] [L-2] **10**
 - Write a java program to append second file content to first file, read two file names as command line arguments. [CO-6] [L- 4] **10**

End Semester Examination, May 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) Define the term 'algorithm' and state the criteria that algorithm should satisfy. [CO-1][L1]
- b) State the best, average and worst case complexities of binary search for a successful and unsuccessful search. [CO-1][L2]
- c) Solve the recurrence relation $T(n) = T(n-1) + n$, $T(1)=1$. [CO-1][L6]
- d) Explain Network Flow Algorithm with an example. [CO-2][L2]
- e) Calculate the time complexity of Kruskal's algorithm for finding a minimum spanning tree of a weighted graph G with n vertices and m edges. [CO-2][L6]
- f) Write the applications of BFS and DFS. [CO-3][L2]
- g) List and explain the characteristic properties associated with a problem that can be solved using dynamic programming. [CO-3][L3]
- h) Write an algorithm for N-queens problem using backtracking. [CO-4][L1]
- i) Illustrate the strategy to prove that a problem is NP Hard. [CO-5][L5]
- j) Define class P and class NP. [CO-6][L1] **2×10**

PART-A

- Q.2 a) Discuss various asymptotic notations used for best case, average case and worst case analysis of algorithms. [CO-1] [L-1] **10**
- b) Solve the recurrence relation $T(n)=7T(n/2)+n^2$ using master method. [CO-1][L-4] **10**

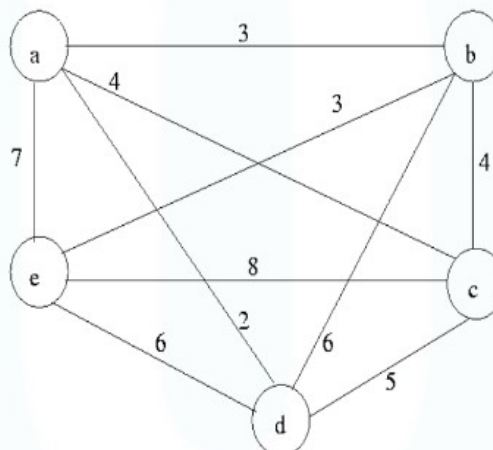
- Q.3 a) Multiply the following two matrices using Strassen's matrix multiplication algorithm:

$$A = \begin{bmatrix} 6 & 8 \\ 9 & 7 \end{bmatrix} \quad B = \begin{bmatrix} 2 & 5 \\ 3 & 6 \end{bmatrix}$$

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

- b) Find the optimal solution for the following fractional Knapsack problem:
 $n=4$, $m = 60$, $W=\{40, 10, 20, 24\}$ and $P=\{280, 100, 120, 120\}$ [CO-3][L-1] **10**

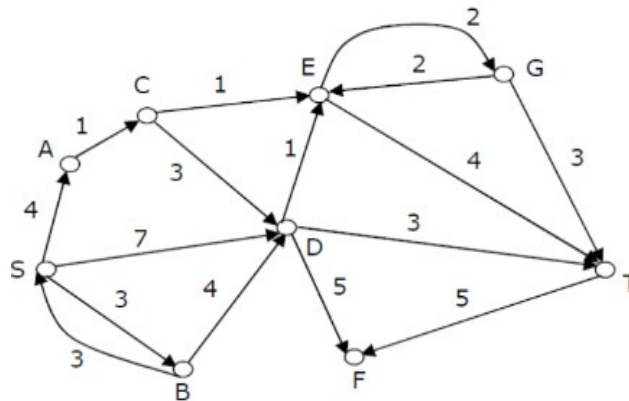
- Q.4 Solve travelling salesman problem for the following graph using branch and bound technique.



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

PART-B

- Q.5 Find the shortest path from S to all other vertices in the following graph using Dijkstra's algorithm:



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

- Q.6 a) Explain Rabin Karp algorithm for pattern searching in detail. Also illustrate its working using the following:
Text:- A A B A A C A A D A A B A A B A
Pattern: D A A B
[CO- 5] [L-5] **10**
b) Prove Hamiltonian cycle is in NP.
[CO- 5] [L-5] **10**
- Q.7 a) Explain Approximation algorithms and construct an approximate algorithm for vertex cover problem.
[CO-6] [L-6] **10**
b) Show that satisfiability is at most three literals reduces to chromatic number.
[CO-6] [L-1] **10**

End Semester Examination, May 2023
B. Tech. – Fifth Semester
FORMAL LANGUAGE AND AUTOMATA THEORY (BCS-DS-502)

Time: 3 hrs.
100

Max Marks:

No. of pages: 2

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

- Q.1 Answer the following in brief:
- Differentiate between 'Melay' and 'Moore' machine.
 - Write the statement of pumping Lemma for RE.
 - What is derivation tree in CFG? Explain with an example.
 - Explain PDA with model diagram.
 - Write a note on the 'PCP'.

4×5

PART-A

- Q.2 a) Convert following NFA in DFA:

State/ Σ	0	1
$\rightarrow q_0$	q_0	q_1
q_1	q_1	q_0, q_1

[CO-2][L4] **10**

- b) Convert the following Melay machine to Moore machine:

	Input $a = 0$		Input $a = 1$	
	state	output	state	output
$\rightarrow q_1$	q_3	0	q_2	0
q_2	q_1	1	q_4	0
q_3	q_2	1	q_1	1
q_4	q_4	1	q_3	0

[CO-1][L3] **10**

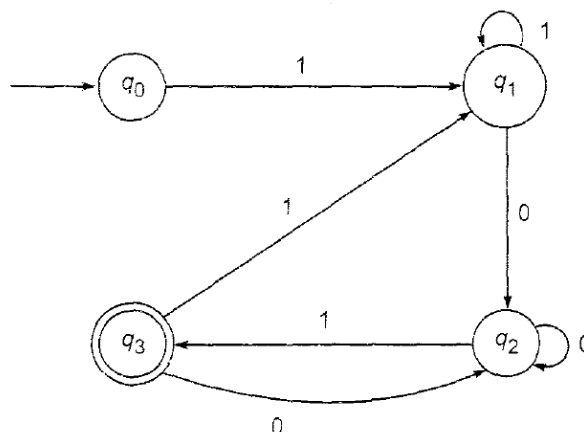
- Q.3 Explain the Chomsky classification of formal languages with an example. Also, draw the diagram of the inclusion of formal language with their corresponding automata.

[CO-2][L2] **20**

- Q.4 a) Convert the following regular expression into a corresponding transition diagram:
 $1011+1^*(1+11)$

[CO-4][L4] **10**

- b) Find the regular expression corresponding to the following machine:



PART-B

- Q.5 a) Remove the UNIT productions from the given CFG.
 $S \rightarrow AB, A \rightarrow a, B \rightarrow C|b, C \rightarrow D, D \rightarrow E$ and $E \rightarrow a$.
[CO-4][L3] **10**
b) Design a PDA to accept all string over $\{a,b\}$, $L=an b^{2n} \mid n>0$ [CO-3][L4] **10**
- Q.6 a) Design a Turing machine for $L= an bncn \mid n \geq 1$ [CO-5][L4] **10**
b) Draw the model of Turing machine and explain its each component. [CO-3][L4] **10**
- Q.7 a) If L is recursive show that its complement is also recursive. [CO-3][L3] **10**
b) What is primitive recursive function? Give an example. [CO-3][L2] **10**

End Semester Examination, May 2023

B. Tech. – Fifth Semester

ARTIFICIAL INTELLIGENCE (BCS-DS-503)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

- Q.1
- 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]
 - g) List the four categories of production systems. [CO-4] [L-2]
 - h) List the characteristics of an intelligent agent. [CO-6] [L-3]
 - i) Given that $P(A)=0.2$, $P(B)=0.4$, $P(B|A)=0.5$. Find $P(A|B)$. [CO-4] [L-3]
 - j) Discuss the Turing test of Artificial Intelligence. [CO-1] [L-2]
 - k) Briefly discuss the concept of an intelligent agent. [CO-5] [L-2] **2x10**

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.
 - ii) Declare parent relationship in the family.

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] **3,3,4**

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, May 2023

B. Tech. – Fifth Semester / AIML-Third Semester

ARTIFICIAL INTELLIGENCE (BCS-DS-503)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

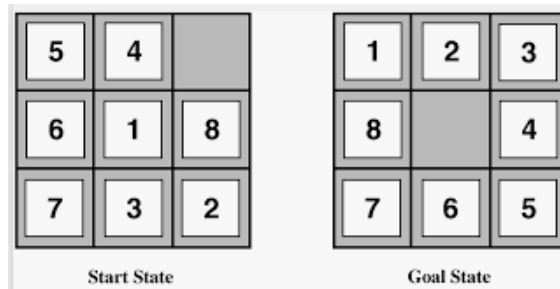
Q.1 Answer the following questions in brief:

- | | |
|---|--------------|
| a) Explain the characteristics of AI problems. | [CO-1] [L-2] |
| b) Differentiate between knowledge domain and problem domain. | [CO-5][L-2] |
| c) List the issues in knowledge representation. | [CO-3][L-2] |
| d) Briefly discuss the concept of an intelligent agent. | [CO-5][L-2] |
| e) Discuss the properties of a good control strategy. | [CO-2][L-2] |
| f) Explain the importance of heuristics in search techniques. | [CO-2][L-2] |
| g) List various applications of AI. | [CO-6][L-2] |
| h) List the four categories of production systems. | [CO-4][L-2] |
| i) Compare between human expert and an expert system. | [CO-6][L-3] |
| j) Given that $P(A)=0.35$, $P(B)=0.55$, $P(B A)=0.25$. Find $P(A B)$. | [CO-4][L-3] |

2×10

PART-A

- Q.2 a) The start and goal state of eight puzzle are shown in the diagram. Find a suitable heuristic function to reach from start state to the goal state. Design the solution of the problem using Hill Climbing algorithm. Illustrate the intermediate states.



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

- b) Consider two jugs of 4 Ltr and 3 Ltr capacity. There are no marks to measure the amount of water in unfilled jugs. Take (0, 0) as the initial state and (2, 0) as the final state. Write the production rules to solve the water jug problem. Also, write the control strategy to be followed.

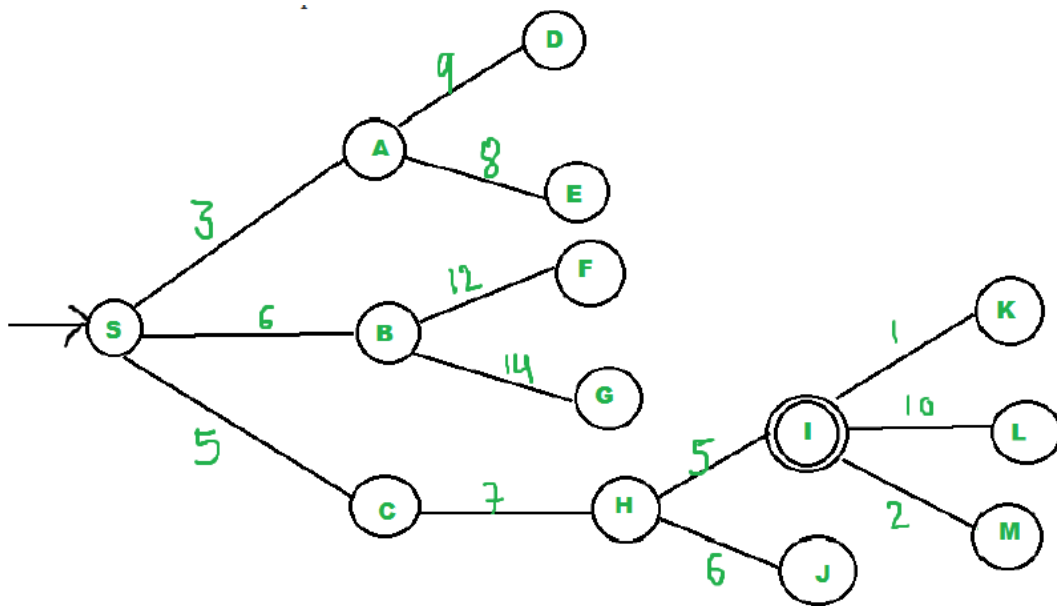
[CO-2][L-6] **10**

- Q.3 a) What is constraint satisfaction? Solve the following crypt arithmetic problem using Constraint Satisfaction algorithm. SEND + MORE=MONEY. Assign decimal digit to each of the letters in such a way that the answer to the problem is correct. If the same letter occurs more than once, it must be assigned the same digit each time and same digit cannot be assigned to two different letters.

[CO-1][L-5] **10**

P. T. O.

b) Solve the given graph problem using Best First Search algorithm:



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

- Q.4 a) Define 'semantic network'. How a semantic network is used to represent knowledge? Draw the semantic network for the statement: Every person in the town got infected with H3N2. [CO-3][L-3] **10**
- b) Create a family tree keeping in consideration of a family data and relationship.
- Declare male and female members of the family. **2**
 - Declare parent relationship in the family. **2**
 - Based on the relationships created in (i) and (ii), write down rules for the following relationships: Father(X,Y), Mother(X,Y), Sister(X,Y), Brother(X,Y), Aunt(X,Y), Cousin(X,Y) [CO-3][L-3] **6**

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 PEAS? Explain in detail the PEAS environment of taxi driver agent. [CO-6] [L-3] **8**
- b) Define 'an expert system'. Illustrate the architecture of an expert system. Construct a forward chaining inference mechanism by taking a suitable example. [CO-5] [L-4] **12**
- Q.7 a) What is alpha beta pruning? How alpha beta pruning is used to reduce the search space in a game tree? Take suitable example to support your answer. [CO-6] [L-6] **12**
- b) Explain the key components of a robot. Discuss how information is processed by a robot? [L-4][CO-2] **8**

End Semester Examination, May 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 Answer the following in brief:

- | | |
|--|------------------------|
| a) Define business intelligence (BI). | [CO1] [L2] |
| b) Write implementation of business intelligence (BI). | [CO3] [L1] |
| c) What is data warehouse? | [CO4] [L4] |
| d) How you describe business query? | [CO2] [L2] |
| e) What is metadata? | [CO5] [L1] |
| f) What is the risk in BI projects? | [CO5] [L1] |
| g) Describe drill-up and drill-down. | [CO3] [L2] |
| h) Define OLAP. | [CO3] [L2] |
| i) Briefly discuss single sign-on (SSO). | [CO3] [L2] |
| j) What is SaaS? | [CO5] [L2] 2×10 |

PART-A

- Q.2 a) Describe BI component and architecture in detail with suitable diagram. [CO-1] [L-1] **10**
b) Explain descriptive, predictive and prescriptive analytics with examples. [CO-1] [L-4] **10**
- Q.3 a) Define 'OLAP'. Explain the OLAP operations with examples. [CO-2] [L-2] **10**
b) What is DSS? Explain three tier decision support system. [CO-2] [L-2] **10**
- Q.4 a) How mobile BI is different from disconnected BI? Support your answer with examples. [CO-3] [L-2] **10**
b) Write short note on collaborative BI and real time monitoring. [CO-3] [L- 2] **10**

PART-B

- Q.5 a) Explain all the tasks of a BI project in detail. [CO- 4] [L-2] **10**
b) Explain the risk management of a BI project. [CO- 4] [L-2] **10**
- Q.6 a) What are the different types of reports? Explain with examples. [CO-5] [L-2] **10**
b) Discuss drill-up and drill-down method. How it is useful? [CO-5] [L-2] **10**
- Q.7 Explain the following terms with respect to BI:
a) Authentication and authorization. [CO- 6] [L-2] **10**
b) EPM (Enterprise performance Management) [CO- 6] [L-2] **10**

End Semester Examination, May 2023

B. Tech. – Fifth Semester

COMPUTER GRAPHICS (BCS-DS-521)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

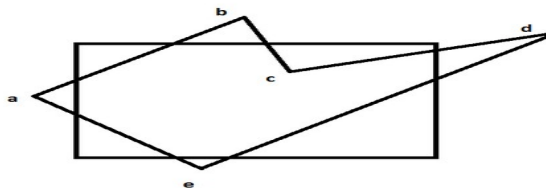
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) What is the purpose of a frame buffer in a display system? [CO1][L1]
- b) Discuss ellipse generating algorithm. [CO5][L1]
- c) A mouse is picked up and placed in another position. Whether the position of the mouse pointer will change. Justify your answer. [CO1][L1]
- d) How the cyclic overlaps of surfaces are eliminated in scan line algorithm? [CO4][L2]
- e) Discuss ellipse generating algorithm. [CO3][L1]
- f) List two polygon filling methods. [CO4][L1]
- g) Give the matrix representation for 2D scaling. [CO5][L2]
- h) Differentiate between vector scan display and Raster scan display. [CO2][L2]
- i) State the concept of interpolation. [CO2][L1]
- j) Explain the concept of point clipping in 2D. [CO3][L3] **2×10**

PART-A

- Q.2 a) Explain midpoint circle drawing algorithm. Also derive the expression for next x and next y for the curve having angle between 90 degree to 5 degree. Plot a circle whose radius is 10 units. [CO1] [L2] **10**
b) Explain DDA line drawing algorithm with derivation. What are its advantages and disadvantages? Execute Bresenham's straight line algorithm to produce a line from (0, 0) to (17, 12). [CO1] [L3] **10**
- Q.3 a) Given a triangle with points (1, 1), (0, 0) and (1, 0). Apply shear parameter 2 on X axis and 2 on Y axis and find out the new coordinates of the object. [CO2][L3] **10**
b) Consider the square ABCD A(0,0) , B(0,4) C(4,4) and D(4,0). Find the co-ordinates of the square after rotating it by 45 degrees about the point (1,0). [CO2][L5] **10**
- Q.4 a) Explain the 4-bit code clipping algorithm with a suitable example. [CO3][L2] **10**
b) Explain polygon clipping algorithm and perform clipping for the given polygon

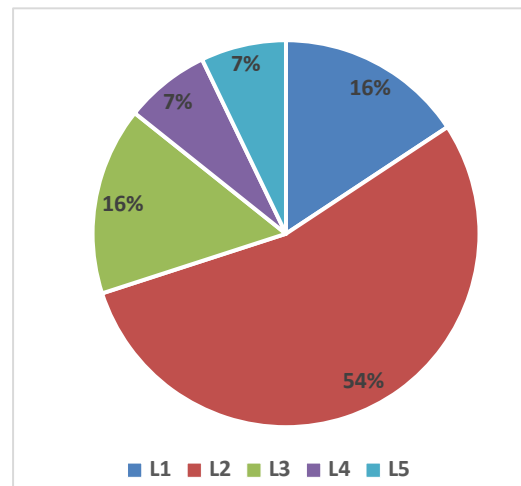
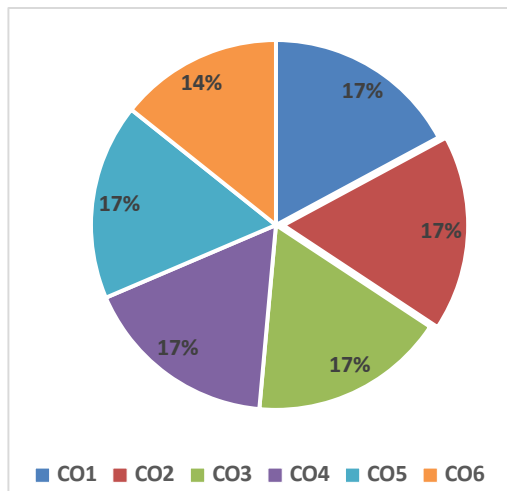


[CO3] [L2] **10**

P. T. O.

PART-B

- Q.5 a) Define projection. Explain the various types of projections. [CO4][L2] **10**
b) Briefly explain 3d transformation matrix representation with an example. [CO4][L2] **10**
- Q.6 a) Explain B-Spline curve method with a suitable example. [CO5] [L2] **10**
b) Discuss Hermite Interpolation Method with a suitable example. [CO5] [L1] **10**
- Q.7 a) What is Z-buffer technique? Discuss the use of Z-buffer algorithm for hidden surface removal. [CO6] [L4] **10**
b) Describe the various shading models for polygons.



[CO6] [L2] **10**

End Semester Examination, May 2023
B. Tech. – Fifth Semester
SOFTWARE DEVELOPMENT PROCESSES (BCS-DS-522)

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 encapsulation with the help of example.
- b) Write two capabilities of UML
- c) Explain decision points used in activity diagrams with the help of example
- d) Describe the different stereotypes of classes
- e) Describe multiplicity indicators with the help of example
- f) Differentiate between state and transitions.
- g) What is the need of scenario walk-through in model refinement?
- h) Write any two goals of iterative planning process
- i) Describe reflexive relationship with the help of an example.
- j) Explain triangle of success.

2×10

PART-A

- Q.2 a) Explain the life cycle of waterfall model. Also explain its advantages and disadvantages. [CO-1] [L-2] **10**
b) Differentiate between traditional and object oriented methodologies. [CO-1] [L-2] **10**
- Q.3 Describe use cases and activity diagram that an automated teller machine (ATM) or the automatic banking machine (ABM) provides to the bank customers in which customer uses a bank ATM to check balances of his/her bank accounts, deposit funds, withdraw cash and/or transfer funds (use cases). ATM technician provides maintenance and repairs to the ATM. [CO-3] [L-2] **20**
- Q.4 a) Draw and explain the UML class diagram representing online shopping domain customer, account, shopping cart, product, order, payment in which each customer could have some web user identity. Web user could be in one of several states and could be linked to a shopping cart. [CO-4] [L-2] **10**
b) Explain association and aggregation relationships with the help of suitable example. [CO-4] [L-2] **10**

PART-B

- Q.5 Draw and explain the sequence and collaboration diagram of university registration system as per the below problem statement:
At the beginning of each semester students may request a course catalogue containing a list of course offerings for the semester. Information about each course, such as professor, department, and prerequisites will be included to help students make informed decisions. The new on-line registration system will allow students to select four course offerings for the coming semester. In addition, each student will indicate two alternative choices in case a course offering becomes filled or canceled. No course offering will have more than ten students. No course offering will have fewer than three students. A course offering with fewer than three students will be canceled. Once the registration process is completed for a student, the registration system sends

information to the billing system, so the student can be billed for the semester. Professors must be able to access the on-line system to indicate which courses they will be teaching. They will also need to see which students signed up for their course offering. For each semester, there is a period of time that students can change their schedules. Students must be able to access the on-line system during this time to add or drop courses. The billing system will credit all students for courses dropped during this period of time. [CO-4] [L-3] **20**

Q.6 How you will make the model homogeneous? Also explain the combining classes, splitting classes, eliminating classes. [CO-5] [L-2] **20**

Q.7 a) What is the need of making the model homogeneous? How will you achieve it? [CO-5] [L-2] **10**

b) Explain designing attributes and operations and designing for inheritance. [CO-6] [L-2] **10**

End Semester Examination, May 2023
B. Tech – Fifth Semester/ Third Semester
CLOUD COMPUTING ARCHITECTURE AND DEPLOYMENT MODEL
(BCS-DS-527)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

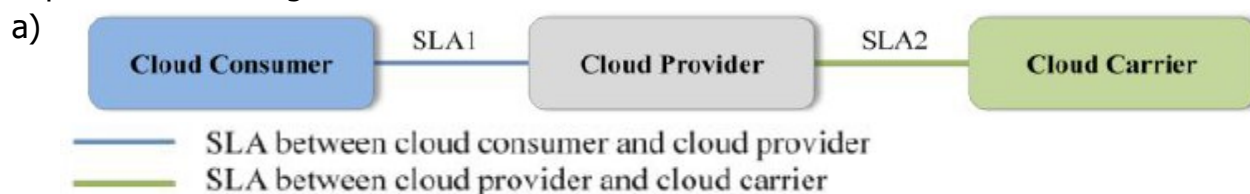
Q.1 Answer the following in brief:

- | | |
|---|-----------------------|
| a) Define 'Mashup'. | [CO1][L1] |
| b) Differentiate between 'IAAS and PAAS'. | [CO2][L4] |
| c) Differentiate between the 'cloud auditor and cloud carrier'. | [CO3][L4] |
| d) Differentiate between web1.0 and web 2.0. | [CO1][L4] |
| e) Define 'autonomic computing'. | [CO1][L1] |
| f) Explain automate phase in cloud transition. | [CO4][L2] |
| g) Define 'key features of OpenStack'. | [CO6][L1] |
| h) Discuss 'cloud computing challenges'. | [CO4][L2] |
| i) List few common cloud vendors in market. | [CO4][L1] |
| j) Elaborate challenges of hybrid cloud implementation. | [CO5][L2] 2×10 |

PART-A

- Q.2 a) Discuss the key characteristics of cloud computing. [CO1][L2] **5**
b) Differentiate between the role of KVM and Xen hypervisors in Cloud Computing. [CO1][L4] **5**
c) Discuss various deployment models with their advantages and disadvantages. [CO1] [L2] **10**
- Q.3 a) Is gmail is SaaS or PaaS? Justify with explanation. [CO2][L2] **5**
b) Discuss the properties and characteristics of IAAS cloud computing service. [CO2][L2] **10**
c) Differentiate between integrated lifecycle platform and anchored lifecycle platform in terms of PAAS. [CO2][L4] **5**

Q.4 Explain the following scenario:



[CO3][L2] **10**

b)



[CO3][L2] **10**

PART-B

- Q.5 a) Discuss the challenges faced in implementing cloud computing in an organization. [CO5][L2] **10**
b) Differentiate between the public and private cloud in terms of certain business factors:
i) Available budget.
ii) Compliance and security.
iii) Performance requirement.
iv) Scalability requirement. [CO5][L4] **10**
- Q.6 a) Discuss the need of hybrid cloud by illustrating an example. [CO6][L2] **10**
b) Discuss and justify the statement whether the following example illustrates hybrid cloud: "A retail company has online commerce support, provided through private cloud/internal datacenter. To provide good customer service and fast response during peak loads the company may leverage public cloud service." [CO6][L2] **10**
- Q.7 a) Discuss the architecture of openstack with a suitable diagram. [CO4][L2] **15**
b) Differentiate between AWS and openstack. [CO4][L4] **5**

End Semester Examination, May 2023

B. Tech. – Fifth Semester

IT APPLICATION SECURITY (BCS-DS-529)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Explain buffer overflow attack with example.
- b) Differentiate between 'threat and exploit'.
- c) What is a false positive in an intrusion detection system?
- d) Do the terms phishing and social engineering mean the same? If not then what is the difference.
- e) Explain DDOS attacks.
- f) Differentiate between a virus and a worm.
- g) Explain digital signature. How is it generated cryptographically?
- h) Discuss the use of hashing in security.
- i) What is a CSRF attack? Explain.
- j) Explain a few challenges in mobile security.

[CO1] [L1] **2×10**

PART-A

- Q.2 a) What are SQL injection attacks and how can they be prevented? [CO2] [L2] **10**
b) Differentiate between XSS and CSRF attacks. [CO2] [L2] **10**

- Q.3 a) Differentiate between authentication and authorization with examples. [CO1] [L1] **10**

- b) What is a rainbow table and what is it used for? Please explain in detail. [CO2][L1] **10**

- Q.4 a) Describe man in the middle attack with examples and diagram. [CO2] [L1] **10**
b) Explain the term access control and why is it important in application security? [CO4] [L2] **10**

PART-B

- Q.5 a) What is a DOS attack? Please explain in detail. How can DOS attacks be prevented? [CO5] [L2] **10**
b) Differentiate between the terms intrusion detection system and intrusion prevention system. [CO3][L1] **10**

- Q.6 a) What are the various ways in which we can prevent an attacker attacking an application without a trace? How does she cover her tracks? [CO3] [L1] **10**
b) Discuss auditing, logging and the difference between the two. [CO5][L2] **10**

- Q.7 a) What is meant by code analysis? Discuss code analysis using IBM rational appscan. [CO6] [L3] **10**
b) What are the different types of code analysis? Discuss with examples. [CO6][L1] **10**

End Semester Examination, May 2023

B. Tech. – Fifth Semester

WEB PROGRAMMING FOR GRAPHICS & GAMING (HTML 5 & WEB GL) (BCS-DS-530)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following:

- a) Which HTML tags are used for formatting a web page? What is DHTML? [CO-1] [L-1]
- b) Name few new elements in HTML 5. Explain each of them. [CO-2] [L-2]
- c) Which audio file formats are supported by HTML audio tag? Explain its attributes also. [CO-4] [L-2]
- d) Illustrate the events on dragover and ondrop. [CO-6] [L-3]
- e) How lighting and shading is done in WebGL? [CO-5] [L-3] **4×5**

PART-A

- Q.2 a) Which tag is used with different attributes for creating hyperlinks in HTML? [CO-1] [L-2] **10**
- b) Co-relate the tags used for embedding multimedia(like audio and video) in HTML. Write the complete code to justify and also include attributes for the tags used. [CO-1] [L-2] **10**
- Q.3 a) Compare the priority level of different style sheets used in HTML 5.0 with the help of examples. [CO-2][L-5] **10**
- b) Design a form for student feedback for this semester including different form-controls in HTML. Write the complete code. [CO-2][L-6] **10**
- Q.4 a) How to display geometry in WebGL? Explain the vertices and indices also. [CO-3][L-1] **10**
- b) What are shaders in WebGL? Explain each with a code. [CO-3][L-1] **10**

PART-B

- Q.5 a) Why we use vertex shader in WebGL? Explain with a code. [CO-4] [L-2] **10**
- b) Justify graphics pipeline in detail. [CO-4] [L-3] **10**
- Q.6 a) How to animate the cube in WebGL? Explain each of the steps in detail. [CO-5] [L-4] **15**
- b) Write the matrix representation for translation in WebGL. [CO-5] [L-2] **5**
- Q.7 a) How lighting and shading is implemented in WebGL? [CO-6][L-2] **10**
- b) Compare parallel projection and perspective projection. [CO-6][L-4] **10**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
BACKUP AND DISASTER RECOVERY (BCS-DS-601)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

- Q.1 Answer the following in brief:
- a) Describe the purpose of backup in recovery. [CO1][L3]
 - b) Define 'virtualization'. [CO2][L2]
 - c) What is the best possible means to reduce recovery time? [CO3][L1]
 - d) State the most important aspect of disaster recovery? [CO2][L3]
 - e) Discuss various ways in brief to recover from data disaster operates. [CO1][L2]
 - f) Discuss the role of business continuity planning? [CO3][L3]
 - g) List the topologies of a network. [CO2][L1]
 - h) Describe the effectiveness of effective risk management plan. [CO1][L1]
 - i) Define the important parameters of remote replication. [CO3][L2]
 - j) Explain business impact analysis. [CO2][L3] **2×10**

PART-A

- Q.2 a) Explain the process of data recovery in case of a drive failure in RAID5. [CO3][L3] **10**
b) Describe the significances of availability on virtual machines. [CO2][L4] **10**
- Q.3 a) Differentiate between incremental and differential backup techniques. Give examples for each? [CO3][L4] **10**
b) Discuss the benefits of using raid 3 in backup applications. [CO2][L3] **10**
- Q.4 a) Discuss the importance of disaster recovery. [CO3][L2] **10**
b) Illustrate the terminologies of networking and communication. [CO4][L3] **10**

PART-B

- Q.5 a) What is an automated tape library? How is it different from virtual tape library? [CO4][L3] **10**
b) Compare the business continuity and disaster recovery in terms of performance. [CO4][L3] **10**
- Q.6 a) Describe the remote replication in various operations. [CO5][L2] **10**
b) Construct the disaster recover tree in detail. [CO6][L4] **10**
- Q.7 a) Discuss in detail the concept of information availability. State various means to measure information availability? [CO6][L3] **10**
b) Differentiate between consolidation and cascade topology in detail. [CO6][L2] **10**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

MACHINE LEARNING (BCS-DS-602)

Time: 3 hrs.
100

Max Marks:

No. of pages: 2

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

- Q.1 a) Compare bias and variance in machine learning. [CO1][L1]
b) A book contains 100 misprints distributed randomly throughout its 100 pages. What is the probability that a page observed at random contains at least two misprints? Assume Poisson distribution. [CO1][L2]
c) Differentiate between 'precision' and 'recall'. [CO2][L1]
d) What are the issues in clustering techniques? [CO2][L2]
e) Compare partitional K-means clustering with hierarchical clustering. [CO3][L3]
f) Which the learning method should be used in case of training a robotic arm and why? [CO4][L2]
g) Explain the significance of weights and bias. [CO5][L1]
h) Differentiate between bagging and boosting. [CO5][L3]
i) Explain the importance of activation function. [CO6][L2]
j) Discuss hold out method. [CO6][L2] **2×10**

PART-A

- Q.2 a) Discuss various prominent data types with the help of example. [CO-1] [L-2] **10**
b) A patient takes a lab test and the result comes back positive. It is known that the test returns a correct positive result in only 98% of the cases and a correct negative result in only 97% of the cases. Furthermore, only 0.008 of the entire population has this disease.
i) What is the probability that the patient is suffering from cancer?
ii) What is the probability that he does not have cancer?
iii) What is the diagnosis? [CO- 1][L- 3] **10**

- Q.3 a) Define 'machine learning'. Briefly explain its types. [CO-2][L-1] **10**
b) Compare feature selection with feature extraction techniques. Explain how dimensionality can be reduced using PCA with the help of example. [CO-2][L-2] **10**

- Q.4 a) The sales of a company (in million dollars) for each year are shown in the table below:

x (year)	2005	2006	2007	2008	2009
y (sales)	12	19	29	37	45

- i) Find the least square regression line $y = a x + b$.
ii) Use the least squares regression line as a model to estimate the sales of the company in 2012. [CO-3][L-3] **10**
b) Distinguish supervised learning technique with reinforcement technique. Illustrate with the help of an example. [CO-3][L-2] **10**

PART-B

- Q.5 a) Calculate the dissimilarity between two data points $x_1(2,3,4)$ and $x_2(4,3,5)$ using
i) Euclidian distance ii) Manhattan distance iii) Minkowski distance with $p=3$. [CO-4][L-3] **6**

P. T. O.

- b) Consider following eight data points k-means $A_1=(2,10)$, $A_2=(2,5)$, $A_3=(8,4)$, $A_4=(5,8)$, $A_5=(7,5)$, $A_6=(6,4)$, $A_7=(1,2)$, $A_8=(4,9)$. Group these data points into three clusters using k-means. Find the number of iterations required to converge the algorithm. Find SSE after each iteration. [CO-4][L-3] **14**

Q.6 a) Explain perceptron model. Design basic logic gates AND, OR, NOT using perceptron model. [CO-5][L-2] **10**

- b) Explain gradient descent algorithm. How it is used in back propagation? Take suitable example to justify your answer. [CO-5][L-2] **10**

Q.7 Writes short notes on following:

a) Inductive learning.

b) Human cognitive learning.

[CO-6][L-2] **10×2**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
INTERNET OF THINGS (IOT) (BCS-DS-603)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Mention any two technical specifications of Bluetooth. [CO-1][L-1]
- b) Outline the implementation issues of Internet of Things (IOT). [CO-1][L-1]
- c) Differentiate between IOT and M2M. [CO-1][L-2]
- d) Discuss the reasons to select MQTT over COAP. [CO-4][L-2]
- e) Define 'gateway'. [CO-1][L-1]
- f) Explain different challenges in wireless sensor networks. [CO-2][L-2]
- g) Discuss the features of fog computing. [CO-2][L-2]
- h) Outline the principles of secure IoT communication. [CO-5][L-1]
- i) List the main components of a sensor node. [CO-1][L-1]
- j) Describe security threats in IOT. [CO-5][L-2] **2×10**

PART-A

- Q.2 a) Discuss the features of different IoT enabling technologies. [CO-1][L-2] **10**
b) Illustrate the layered architecture of IoT with the help of suitable diagram. [CO-3][L-4] **10**
- Q.3 a) Diagrammatically explain the IoT protocol stack. [CO-4][L-3] **10**
b) Elaborate the features of IEEE802.15.4 connectivity technology. [CO-1][L-3] **10**
- Q.4 a) Explain the working principle of RF wireless sensors. [CO-2][L-2] **5**
b) Demonstrate the process of node cooperation in wireless sensor networks. [CO-3][L-3] **10**
c) Differentiate between coverage and connectivity in WSN. [CO-3][L-2] **5**

PART-B

- Q.5 a) Explain the sensor cloud architecture with suitable diagram. Also mention its advantages. [CO-4][L-2] **10**
b) Demonstrate the architecture of fog computing with the help of diagram. Also explain the applications of fog computing. [CO-4][L-2] **10**
- Q.6 a) Describe the principles of secure IoT communication. [CO-5][L-2] **10**
b) Elaborate different IoT security threats. [CO-5][L-3] **10**
- Q.7 Write notes on the following applications:
a) Connected vehicles. [CO-6][L-6] **10**
b) Asset management. [CO-6][L-6] **10**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
OPERATIONS RESEARCH AND OPTIMIZATION (BCS-DS-604)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 3

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

Q.1 Answer the following in briefly:

- a) Which methods is used to solve linear programming problem (LPP) involving only two variables? [CO1][L1]
- b) When does alternative solutions exist of an LP model? [CO1][L2]
- c) When Integer Linear Programming (ILP) in practice is used? [CO2][L1]
- d) What do you mean by Assignment Problem? Is it a type of N/W flow problem? [CO2][L2]
- e) Differentiate between 'linear programming problem (LPP)' and 'dynamic programming problem (DPP)'. [CO3][L2]
- f) What is meant by queue discipline and what is the goal of many waiting line systems? [CO4][L1]
- g) Formally write and explain the Kendall's notation. [CO4][L2]
- h) What are random variables and its role in Monte Carlo simulation? [CO5][L1]
- i) What is inventory management? Which model is used by Proctor and Gamble Company? [CO6][L4]
- j) What is drawback of economic order quantity (EOQ) model and elaborate the costs are considered in the basic EOQ model? [CO6][L2] **2×10**

PART A

Q.2 The ABC Company has 40 hours of machine time available in the next working week but only 35 hours of craftsman time. Machine time is estimated at £10 per hour worked and craftsman time is estimated at £2 per hour worked. Both machine and craftsman idle times incur no costs. The revenue received for each item produced (all production is sold) is £20 for X and £30 for Y. The company has a specific contract to produce 10 items of X per week for a particular customer.

- a) Formulate the problem of deciding how much to produce per week as a linear program.
- b) Write the dual problem for same.
- c) Draw simplex table for two iterations. [CO3][L5,2] **20**

Q.3 Consider the following goal programming (GP) model of an electric company:

Minimize total deviation = $P_1 d_1^- + P_2 d_2^- + P_3 d_3^+ + P_4 d_4^-$

subject to $7X_1 + 6X_2 + d_1^- - d_1^+ = 30$ (profit)
 $2X_1 + 3X_2 + d_2^- - d_2^+ = 12$ (wiring)
 $6X_1 + 5X_2 + d_3^- - d_3^+ = 30$ (assembly)
 $X_2 + d_4^- - d_4^+ = 7$ (ceiling fans)
 All X_i, d_i variables ≥ 0 (nonnegativity)

where

X_1 = number of chandeliers produced
 X_2 = number of ceiling fans produced

- Enlist all the deviation variables, and priorities.
- Solve it graphically.

[CO3][L1,3] **20**

- Q.4
- Define an Integer Linear programming (ILP) and mention three real life applications. **5**
 - A Jewellery shop in the city specializes in ornaments and the manager has planned to limit the use of diamonds to the artistic configuration of diamond rings, diamond earrings, and diamond necklaces. The 3- items require the following specifications:

ORNAMENT	DIAMOND	
	½ Carat	¼ Carat
Ring	4	6
Earring (Pair)	3	5
Necklace	10	9
Availability	150	160

The Jeweller does not want to configure the diamond into more than 50 items. The per unit profit for the rings is Rs.1500, for earrings is 2400/- and for the necklace is 3600/-. Formulate and solve the problem as an ILP model for maximizing the profit.

[CO3][L5,3] **15**

- Q.5
- Mention any three dynamic programming problem approaches and differentiate from LPP. **6**
 - Solve the following profit maximizing problem during the game using Stage Coach Problem approach: Mr Simon has the contract for supplying protein drinks at the "Greenpark" stadium during a football match. He has 6 workers available for the task of vending protein drinks in different stands. He must employ at least one vendor in each stand. His estimates of profits (in 100s of Rs) that can be made by employing different number of vendors in different stands are given in following table:

<i>No. of persons assigned</i>	<i>East stand</i>	<i>North Stand</i>	<i>West Stand</i>
1	15	45	30
2	30	90	60
3	60	145	100
4	120	175	135

[CO4][L2,3] **14**

- Q.6
- How assignment problem is a linear programming problem (LPP)? **5**
 - Suppose we have five jobs, each of which has to be processed on two machines A & B in the order BA. Processing times are given in the following table:

Job	Machine A	Machine B
1	6	3
2	2	7
3	10	8

4	4	9
5	11	5

Determine an order in which these jobs should be processed so as to minimize the total processing time. Also, draw the Gantt chart. [CO4][L2,4] **15**

- Q.7 a) i) Differentiate between a steady-state and transient state behavior in queuing system.
ii) Cite three Queuing systems with respective characteristics in the tabular manner:

Queuing System	Customers	Server

8

- b) XYZ Pvt. Ltd. uses EOQ logic to determine the order quantity for its various components and is planning its orders. The Annual consumption is 80,000 units, cost to place one order is Rs. 1,200, cost per unit is Rs. 40 and carrying cost is 5% of unit cost.
i) Find EOQ.
ii) No. of order per year.
iii) Ordering cost, carrying cost, and total cost of inventory. [CO5][L2,3,4] **12**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

IT SYSTEMS SECURITY (BCS-DS-605)

Time: 3 hrs.
100

Max Marks:

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) What is buffer overflow attack? Explain briefly. [CO1] [L1]
- b) Discuss network eavesdropping. [CO1] [L2]
- c) Discuss 'CSRF attacks'. [CO2] [L2]
- d) Explain some threats to mobile operating systems. [CO2] [L2]
- e) Explain DOS attacks. [CO3] [L2]
- f) Explain endpoint security in BYOD. [CO3] [L3]
- g) Explain SSL including keys and certificates. [CO4] [L2]
- h) What is the need for database server security? [CO5] [L1]
- i) What is a cookie and cookie replay attack? [CO6] [L2]
- j) Explain session replay. [CO6][L1] **2×10**

PART-A

- Q.2 a) Explain SQL injection attack with examples. [CO1][L2] **10**
b) What are cross site scripting attacks? Explain with examples. [CO1][L2] **10**
- Q.3 a) Differentiate between 'authentication' and 'authorization' with examples. [CO2][L1] **10**
b) Explain brute force attack and dictionary attack. What is a rainbow table and what is its use? [CO2][L1] **10**
- Q.4 a) Explain the term operating systems security. Elaborate upon security in Windows and Linux. [CO3][L1] **10**
b) Discuss few server operating system and workstation operating system security guidelines with appropriate examples. [CO6][L2] **10**

PART-B

- Q.5 a) What are the challenges in endpoint security? Explain the pillars of end point security. [CO2][L2] **10**
b) Explain Gartner's magic quadrant in detail. [CO4][L1] **10**
- Q.6 a) Discuss oracle application server in terms of security. [CO6][L1] **10**
b) Explain mobile application server security. [CO6][L2] **10**
- Q.7 a) Elaborate upon some database attacks and discuss various ways for prevention. [CO2][L3] **10**
b) What are the best practices to secure database server. [CO6][L1] **10**

End Semester Examination, May 2023
B. Tech. – Fourth/Sixth Semester
INTRODUCTION TO GAME PROGRAMMING (BCS-DS-607)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- a) What is the use of asset bundle in unity3D? [CO2][L1]
- b) In unity3D how can you hide game object? [CO3][L2]
- c) Explain object-oriented paradigm with the help of a neat diagram. [CO1][L2]
- d) Argue on your understanding of shadows in unity. [CO4][L2]
- e) Differentiate between 'static binding' and 'dynamic binding'. [CO1][L3] **4×5**

PART-A

- Q.2 a) Identify the key components of the gaming industry value chain. [CO-1] [L-3] **10**
b) What are various kind of memory in the java heap segment? How does garbage collection works? [CO-3] [L-4] **10**

Q.3 Explain the issue in the code below and provide an alternative implementation that would correct the problem.

```
using UnityEngine;
using System.Collections;
public class TEST : MonoBehaviour {
    void Start () {
        transform.position.x = 10;
    }
}
```

[CO-4] [L-5] **20**

- Q.4 a) What are the key principles used for game design and development? [CO-2] [L-3] **10**
b) Discuss the unity interface- menus, views, and other UI elements. [CO-3] [L-4] **10**

PART-B

- Q.5 a) Discuss in detail the different kinds of input devices used in gaming. [CO-2] [L-2] **10**
b) Give the steps to import assets and create material in unity3D. [CO-3] [L-2] **10**

- Q.6 a) Discuss the key classes for scripting in unity mentioning two methods of each class. [CO-2] [L-4] **10**
b) Explain the scripting lifecycle flowchart. [CO-4] [L-3] **10**

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

- a) Animation clip.
- b) Animation state machine.
- c) Timelines.

[CO-2][L-4] **10×2**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

GAME PROGRAMMING (BCS-DS-607A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 various programming paradigms. Which is the best paradigm and why? [CO-3][L-3]
- b) Recall the concept of abstraction in game programming using one example. [CO-2][L-4]
- c) Differentiate between static binding and dynamic binding. [CO-3][L-1]
- d) Discuss cube mapping with the help of a neat diagram. [CO-2][L-3]
- e) How is sepia filter different from luminance filter? [CO-3][L-4] **4×5**

PART-A

- Q.2 a) What are different types of Inheritance in C++? Explain them with the help of neat diagrams and an example. [CO-2][L-1] **10**
b) Differentiate between call by value and call by reference. Write a program to swap two numbers using both the methods and illustrate them. [CO-1][L-2] **10**
- Q.3 a) List all the characteristics of a game. Also explain them in detail. [CO-5][L-2] **10**
b) Discuss five significant gaming engines that are very popular nowadays. [CO-3][L-2] **10**
- Q.4 a) Discuss in detail the different kinds of input devices used in gaming console. [CO-4][L-3] **10**
b) With the help of neat diagram explain unity 3D interface in detail. [CO-5][L-2] **10**

PART-B

- Q.5 a) What is ray tracing? Differentiate between forward ray tracing and backward ray tracing. [CO-4][L-2] **10**
b) Discuss rasterization primitives in detail with diagrams. [CO-2][L-2] **10**
- Q.6 a) List the various types of surface mappings. Explain them in detail. [CO-5][L-2] **10**
b) Write a pseudo code for actualizing Alpha maps in OpenGL. [CO-2][L-5] **10**
- Q.7 Write notes on the following:
a) Image filters.
b) Lighting and materials.
c) Far plane culling.
d) Scene and space partitioning. [CO-2][L-2] **5×4**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

AUGMENTED AND VIRTUAL REALITY DEVELOPMENT (BCS-DS-608)

Time: 3 hrs.

Max Marks:

100

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 virtual reality and augmented reality. [CO-1][L-2]
- b) Discuss the role of flight simulation in virtual reality. [CO-1][L-1]
- c) Outline the characteristics of real time computer graphics. [CO-1][L-1]
- d) Define scientific landmark in virtual reality. [CO-1][L-1]
- e) Illustrate the boundary representation in augmented and virtual reality. [CO-2][L-2]
- f) List the features of virtual environment. [CO-2][L-1]
- g) Differentiate between 'linear interpolation' and 'linear extrapolation'. [CO-3][L-2]
- h) Discuss the security and privacy issues with augmented reality. [CO-3][L-1]
- i) Explain head-coupled displays with an example. [CO-4][L-2]
- j) List the different steps to make a VR app. [CO-5][L-1] **2×10**

PART-A

- Q.2 Demonstrate the historical development of VR with suitable examples. Also list the benefits of virtual reality. [CO-1] [L-2] **20**
- Q.3 Diagrammatically describe the major components of stereo perspective projection and compare it with perspective projection. [CO-2] [L-3] **20**
- Q.4 Explain linear and nonlinear interpolation and evaluate the value of y at x = 4 for the given set of values (2, 4), (6, 7). [CO-3] [L-5] **20**

PART-B

- Q.5 Explain augmented reality methods and illustrate simultaneous localization and mapping (SLAM) in detail. [CO-4] [L-2] **20**
- Q.6 Elaborate key concepts used in VRML and differentiate between VRML and HTML. [CO-5] [L-2] **20**
- Q.7 Discuss the AR/VR applications in the field of engineering and entertainment with suitable examples. [CO-5] [L-2] **20**

End Semester Examination, May 2023
B. Tech. – 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 the following:

- a) How do docker and Kubernetes relate to containers? [CO-3][L-3]
- b) Explain the main components of Kubernetes. [CO-2][L-2]
- c) Why Kubernetes is so useful by going back in time? CO-3][L-1]
- d) Discuss types of Kubernetes services briefly. [CO-2][L-3]
- e) What is YAML? Explain its purpose. [CO-3][L-2] **4×5**

PART-A

Q.2 a) What are containers? Explain the importance of containers in cloud computing. Also discuss the differences between containers and virtual machines.

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

[CO-

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

b) Explain Microservices and its framework? Also discuss its benefits. [CO-1][L-2] **10**

Q.3 a) Discuss the need of container orchestration and limitations of containers without orchestration capabilities. [CO-5][L-3] **10**

b) What are building blocks of containerized applications? Discuss the benefits of implementing a containerized architecture. [CO-3][L-5] **10**

Q.4 a) State the need of Kubernetes and explain its role in detail. [CO-4][L-3] **10**

b) Containers have become popular because they provide extra benefits. Justify the statement with examples. [CO-5][L-4] **10**

PART-B

Q.5 a) Explain Kubernetes network model in detail. [CO-4][L-4] **10**

b) Discuss the DNS for services and pods. Explain with the help of an example. [CO-2][L-2] **10**

Q.6 Explain the following terms:

- a) Monitoring cluster component.
- b) Docker network.
- c) Security constant conta (SCC).
- d) Cluster role and role binding. [CO-5][L-2] **5×4**

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

- a) Models in IT system design.
- b) Information technology infrastructure library (ITIL).
- c) Complexity of current computing.
- d) Limitation of financial models. [CO-2][L-2] **10×2**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
ADVANCE DATABASE MANAGEMENT SYSTEM
(BCS-DS-622/BCS-DS-622A)

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 'Assertions'. [CO-3] [L-2]
- b) Distinguish 'strong entity set' with 'weak entity set'? Also, draw an ER diagram to illustrate weak entity set. [CO-1][L-2]
- c) Differentiate between 4NF and 5 NF. [CO-2][L-2]
- d) How can you build dynamic sql statements? [CO-4][L-3]
- e) Write any two ways to improve the performance of SQL queries. [CO-4][L-2]
- f) What is a dual table in Postgre SQL? What is the use of it? [CO-5][L-1]
- g) List different operators in Postgre SQL. [CO-5][L-2]
- h) What is the interactive shell for MongoDB called? [CO-5][L-2]
- i) Explain the term "Indexing" in MongoDB. [CO-5][L-2]
- j) How Postgre SQL implements table inheritance? [CO-4][L-3] **2×10**

PART-A

Q.2 a) Consider the following relational schemes for a library database:

Book (Title, Author, Catalog_no, Publisher, Year, Price)

Collection (Title, Author, Catalog_no).

The following are functional dependencies:

- i) Title Author --> Catalog_no
- ii) Catalog_no --> Title, Author, Publisher, Year
- iii) Publisher, Title, Year --> Price

Assume {Author, Title} is the key for both schemes. Apply the appropriate normal form for Book and Collection. [CO-1][L-3] **5**

- b) Explain the terms lossless decomposition and dependency preserving decomposition. Consider a relation R (A, B, C, D, E, F) with functional dependency set $FD = \{A \rightarrow BC, C \rightarrow A, D E, F \rightarrow A, E \rightarrow D\}$. If R is decomposed into, R1 (A, C, D); R2 (B, C, D); R3 (E, F, D), then check whether the decomposition, is both lossless and dependency preserving. [CO- 1][L-3] **15**

Q.3 a) What is the significance of creating views? How is a view created using SQL? Explain using an example. [CO-2][L-2] **5**

- b) What is SQLJ? Give requirements of SQLJ. Discuss the working of SQLJ. "Can SQLJ use dynamin SQL?" If yes, then how? Otherwise, specify the type of SQL it can use. [CO-2][L-3] **15**

Q.4 a) Consider the SQL query.

Select * from employee, department where employee.dept_id = department.dept_id
Write an efficient relational algebra expression that is equivalent to this query and JUSTIFY your choice with an explanation. [CO-3][L-3] **10**

- b) How can you estimate cost of a query plan? Explain how heuristic query optimization is performed with the help of a suitable example? [CO-3][L-3] **10**

PART-B

- Q.5 a) Describe POSTGRES user interface. Explain its architecture. [CO-4][L-2] **10**
b) How does Postgre SQL provide security? [CO-4][L-2] **10**
- Q.6 a) Describe the advantages of object oriented databases over RDBMS. [CO-5][L-2] **10**
b) How object relational databases are different from object oriented databases? [CO-5][L-2] **10**
- Q.7 a) Explain important features of MongoDB. How do you perform CRUD operations in MongoDB? [CO-4][L-2] **10**
b) Illustrate the concept of Sharding in MongoDB. Explain how MongoDB is different from RDBMS. [CO-4][L-2] **10**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

COMPLIER DESIGN (BCS-DS-624)

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 the role of lexical analyzer. Identify the lexemes and their corresponding tokens in the following statement: `printf ("Simple Interest=%f\n", si);` [CO-1][L-2]
- b) Describe briefly any three tools that help a programmer in building a compiler efficiently. [CO-1][L-2]
- c) Differentiate between 'implicit' and 'explicit' sequence control. [CO-2][L-3]
- d) Why lexical and syntax analyzer are two separate phases in compiler design? [CO-2][L-3]
- e) Differentiate between 'compiler' and 'interpreter'. [CO-4][L-3]
- f) What is meant by handle pruning? [CO-5][L-1]
- g) Differentiate between 'top down and bottom up parsing'. [CO-1][L-3]
- h) Discuss CFG with the help of an example. [CO-4][L-2]
- i) Write regular expression to describe a language consist of strings made of even numbers a and b. [CO-3] [L-1]
- j) Differentiate between sentence and sentential form. [CO-3] [L-3] **2×10**

PART-A

- Q.2 a) What are elementary data types? How are they implemented? [CO-1] [L-3] **10**
- b) Differentiate between:
- i) Static and dynamic scope.
 - ii) Syntax and semantic errors. [CO-1][L-3] **10**

- Q.3 a) Construct parsing table for the grammar given below and find the moves made by predictive parser on input `id+id*id`:
Grammar G: $E \rightarrow E+T$
 $E \rightarrow T$
 $T \rightarrow T * F$
 $T \rightarrow F$
 $F \rightarrow (E) / id$ [CO-3] [L-5] **10**
- b) Construct minimized DFA for `abb a b b (a / b) * b *` using ϵ -closure mechanism. [CO-3] [L-6] **10**

- Q.4 a) Consider the grammar given below:
 $E \rightarrow E+E$
 $E \rightarrow E * E$
 $E \rightarrow id$
Construct an LR Parsing table for above grammar. Give the moves of LR Parser on

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

- b) Explain error recovery in predictive parsing with the help of an example. [CO2][L2] **10**

PART-B

- Q.5 a) Consider the expression $a = b^* - c + b^* - c$ write the three address code for the expression and write the quadruple representation for above. [CO-4] [L-2] **10**
 b) Explain the conceptual view of syntax directed translation. What is the purpose of syntax tree in the parsing? [CO-3] [L-2] **10**
- Q.6 a) What is symbol table? Explain how it is implemented using linear list and hash tables. [CO-5] [L-2] **10**
 b) Explain in detail error recovery techniques in compiler design. [CO-3] [L-3] **10**
- Q.7 a) Explain in detail about optimization of basic blocks. [CO-6] [L-3] **10**
 b) Write short notes on:
 i) Register allocation for temporary variables.
 ii) Forms of object code. [CO-6] [L-2] **5×2**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

MANAGING THE CLOUD (BCS-DS-626)

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:

- State the governance and compliance included in service catalog of public cloud service provider. [CO5][L2]
- Differentiate between the 'deterrent controls' and 'detective controls'. [CO2][L2]
- State the difference between 'customized maintenance' and 'enhancement maintenance'. [CO1][L4]
- Illustrate how to create DAG with help of one example. [CO1][L3]
- Discuss the role of DevOps engineer. [CO-2][L2]
- State some challenges in patch management in cloud. [CO-6][L2]
- Compare 'in-place swap and in-place update in patch management'. [CO2] [L2]
- What is the difference between 'cloud users' and 'cloud operators'. [CO1] [L2]
- Differentiate between Brownfield and Greenfield in terms of service catalog. [CO5] [L2]
- Compare 'OSS and BSS in cloud management'. [CO4][L4] **2×10**

PART-A

- Q.2 a) Create a workflow process of account verification for any website. [CO1] [L6] **10**
b) Evaluate the Score of the virtual machine if the sub score of the following are as follows:

Component	What is rated	Sub score
Processor	Calculation per second(Mips)	6
Ram (memory)	Memory operation per second	5
Storage space	Disk data transfer rate	4

Also, discuss the score based workflow scheduling algorithm with its algorithmic steps and flowchart. [CO1][L5] **10**

- Q.3 a) i) Discuss various parameters that makes the computer or PC slow down. [CO2][L2] **5**
ii) Discuss how PC health check is done to enhance the computer performance. [CO2][L2] **5**
b) Create a scenario in managing the cloud, where patch management plays an important role in an enterprise. Also, state the tools for patch management. [CO2][L6] **10**
- Q.4 a) State the principles and benefits of configuration management, illustrating any one tool its in detail. [CO3][L2] **10**

- b) Discuss the five aspects of service design process. [CO3][L2] **10**

PART-B

- Q.5 a) Discuss the common integration points that make communication between the solution and these systems much easier by enabling integration with the existing systems. [CO4][L2] **10**
b) Differentiate between pure aggregation model and white label model in application hosting in cloud. [CO4][L4] **10**
- Q.6 a) Discuss the steps for designing a cloud service catalog. [CO5][L2] **10**
b) Discuss any one scenario that are based on decisions taken for addressing specific market places as a cloud service provider. [CO5][L2] **10**
- Q.7 a) Discuss the resource management functions in cloud computing. [CO6][L2] **10**
b) State the security practices for public cloud. [CO6] [L2] **10**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
BA AS SERVICE (CLOUD) (BCS-DS-627)

Time: 3 hrs.
100

Max Marks:

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Determine the need of virtualization. Also, list some of its application areas. [CO1][L1]
- b) Discuss the advantages of VLAN over LAN with respect to advent of virtualization. [CO2][L2]
- c) List some of the applications provided by SaaS component in virtualization. [CO3][L2]
- d) Discuss the impact of virtualization in today's industry. [CO4][L2]
- e) Differentiate between virtualization and cloud on the basis of common parameters. [CO5][L2] **4×5**

PART-A

- Q.2 a) Differentiate between Traditional IT infrastructure and Virtualization on the basis of common parameters. [CO-1] [L-2] **10**
b) Explain different types of virtualization with its application areas. [CO-1] [L-1] **10**
- Q.3 a) Recognize and mention the common considerations while virtualizing the server infrastructure in an organization. [CO-3] [L-2] **10**
b) Define Hypervisors and its types. Also give examples for each of its types. [CO-2] [L-1] **10**
- Q.4 a) Explain cloud deployment models in detail. [CO-3] [L-1] **10**
b) Explain Xen Virtualization Architecture and the threat model. [CO-3] [L-1] **10**

PART-B

- Q.5 a) Summarize your understanding about all the three cloud delivery models. Also, discuss their behavior in case of public, private and hybrid cloud. [CO-4] [L-3] **20**
- Q.6 a) Using a case study determine mission critical workloads. How private cloud provides solution to such workloads? [CO-5] [L-1] **10**
b) Explain the steps involved for the preparation while moving to virtualization process. [CO-5] [L-1] **10**
- Q.7 a) Write short notes on:
a) Characteristics of optimizers, innovators and disruptors.
b) The emergence of data hubs on the cloud. [CO- 6] [L-2] **10×2**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

DIGITAL FORENSICS (BCS-DS-628)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 incident verification in digital forensics?

b) Explain with example any two forensic software.

c) State the significance of "domain name ownership investigation".

d) Analyze the role of cookie storage in browser forensics.

e) State the legal aspects of digital forensics.

f) What is the need of digital camera in forensic science?

g) What are the applications of mobile forensics?

h) What are common forms of loss of data?

i) What is the purpose of polyinstantiation?

j) Discuss the working of IDS.

[CO-1] [L-3]

[CO-1] [L-2]

[CO-2] [L-2]

[CO-2] [L-2]

[CO-3] [L-2]

[CO-4] [L-3]

[CO-4] [L-2]

[CO-5] [L-2]

[CO-6] [L-2]

[CO-5] [L-2] **2×10**

PART-A

Q.2 a) Explain the techniques used to recovery the erased and damaged data?

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

b) What is Disk imaging and preservation? Explain the tools and approaches for facilitating digital preservation and curation?

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

Q.3 a) Analyze how the investigators make it possible to obtain the files in the browser cache? What data is important in browser forensics?

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

b) Discuss World Wide Web threats in detail.

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

Q.4 Explain the following steps of forensic investigation:

a) Authorization to collect the evidence.

b) Acquisition of evidence.

c) Authentication of the evidence.

d) Analysis of the evidence.

[CO-3] [L-3] **5×4**

PART-B

Q.5 a) Can we recover data from an iPhone and Android, if the police intentionally deleted the evidence from the mobile so can the forensic term recover the data?

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

b) What is steganography? Explain the various tools used in Steganography?

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

- Q.6 a) Discuss different analysis techniques to acquire and analyze volatile memory. [CO-5] [L- 3] **10**
- b) Is data collection and examination of volatile memory important? What types of data can be found there? [CO-5] [L-3] **10**
- Q.7 a) List various tools for memory data examinations. Explain any one in detail. [CO-6] [L-3] **10**
- b) How do we discover and extract malware in Linux systems? [CO-6] [L-3] **10**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
INFORMATION SECURITY AUDIT AND MONITORING
(BCS-DS-629)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

- Q.1 Answer the following in brief:
- a) Discuss the body which creates regulations for the banking sector. [CO1][L1]
 - b) Describe information security as a business enabler. [CO1][L2]
 - c) How auditing is related with security. [CO2][L1]
 - d) State roles and responsibilities of information security functions. [CO2][L2]
 - e) Explain the ISO 27001 standard with example. [CO3][L1]
 - f) Define the statement of applicability. [CO4][L2]
 - g) Explain the requirements of BISA. [CO4][L2]
 - h) Discuss the concept of 'third party audit'. [CO5][L1]
 - i) Explain briefly, why security is needed in insurance sector? [CO6][L2]
 - j) Discuss the role of cyber law in information security. [CO6][L2] **2×10**

PART-A

- Q.2 a) Explain the framework of governance risk compliance with a well labeled diagram. [CO-1] [L-2] **10**
b) Draw information security framework and discuss, why it is needed in information security? [CO-1] [L-2] **10**
- Q.3 a) Explain the ISMS framework with the help of a suitable example. [CO- 2] [L-2] **10**
b) Discuss the "Prior to employment" control objectives of ISO in detail. [CO-3] [L-2] **10**
- Q.4 a) Discuss the requirement "Encrypt transmission of cardholder data across open public network" in detail. [CO-3] [L-1] **10**
b) Discuss the implementation process of PCI-DSS. [CO-3] [L-1] **10**

PART-B

- Q.5 a) Describe IT Act of India and discuss various disadvantages of cyber law. [CO- 4] [L-2] **10**
b) Explain the concept of security regulatory requirements with proper example. [CO-4] [L-2] **10**
- Q.6 Explain communication skills, business skills and interpersonal skills for auditors. Discuss each in detail with the help of example. [CO-5] [L-2] **20**
- Q.7 a) Explain the identification of business units. Discuss their roles and legal constraints. [CO-6] [L-2] **10**
b) Discuss the identification of third party with its advantage and disadvantages using suitable examples. [CO-6] [L-2] **10**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
BUSINESS PROCESS MANAGEMENT (CC, BA) (BCS-DS-630)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 uses of dashboard and reports in BPM. [CO-6][L-2]
 - b) What are the stages of BPM life cycle? [CO-2][L-3]
 - c) Define 'process designer'. [CO-1][L-1]
 - d) State the degree of automation. [CO-1][L-1]
 - e) What is a XML? How it is used in BPM? [CO-4][L-2]
 - f) Discuss workflow diagram of BPM. [CO-3][L-2]
 - g) Describe business process modeling foundation. [CO-3][L-3]
 - h) Define 'KPI'. [CO-4][L-2]
 - i) Briefly elaborate business process. [CO-6][L-2]
 - j) Define and discuss business process management briefly. [CO1][L1] **2×10**

PART-A

- Q.2 a) Compare structured and non-structured process in detail. [CO-1][L-2] **10**
b) Explain the automation of business process in detail. [CO-2][L-3] **10**

- Q.3 Discuss various functions of products used in IBM warranty reporting solution. [CO-2][L-2] **20**

- Q.4 a) What are the advantages of defining BPM for your company? [CO-3][L-1] **10**
b) Explain abstraction in BPM. Elaborate all its types in detail. [CO-3][L-2] **10**

PART-B

- Q.5 a) What is the IBM solution for collaborative lifecycle management? [CO-6][L-2] **10**
b) Explain the factors affecting BPEL process interactions. [CO-6][L-3] **10**

- Q.6 a) What are the advantages of implementing business process management? [CO-4][L-3] **10**
b) Discuss the designing process interactions for business users. [CO-4][L-3] **10**

- Q.7 a) Explain the process of posting a message to IBM business process manager and event manager. [CO-5][L-3] **10**
b) Describe, how to pass IBM BPM structure and Date/Time types? [CO-5][L-2] **10**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
DIGITAL IMAGE PROCESSING (BCS-DS-631)

Time: 3 hrs.
100

Max Marks:

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Compare image enhancement and image restoration. [CO1][L1]
- b) Give the relation of degradation model for continuous function. [CO1][L2]
- c) What is the importance of image compression? [CO2][L1]
- d) How Fourier descriptor helps in object recognition? [CO2][L2]
- e) What is smoothing? Explain averaging filter. [CO3][L1]
- f) Explain Gaussian noise with PDF (probability distribution function). [CO3][L2]
- g) What is region growing? [CO4][L2]
- h) Differentiate between pseudo and full color image processing. [CO5][L2]
- i) Discuss and differentiate between lossy and loss less image compression methods. [CO6][L2]
- j) What are the applications of image segmentation? [CO6][L2] **2×10**

PART-A

- Q.2 a) Prove that both the 2-D continuous and discrete fourier transforms are linear operations. [CO-1] [L-3] **10**
b) Explain the components of IP systems. [CO-1] [L-2] **10**
- Q.3 a) What is the need of smoothing in image processing? Explain different image smoothing filters. [CO-2] [L-1] **10**
b) Explain how fourier transforms are useful in digital image processing? Also, discuss its properties. [CO-2] [L-2] **10**
- Q.4 a) Draw the block diagram for image restoration and also discuss its need in detail. [CO-3] [L-5] **10**
b) Explain edge detection techniques in digital image processing using first order derivatives. [CO-3] [L-2] **10**

PART-B

- Q.5 Explain chain-code in detail with the help of suitable example. And also discuss the following region descriptors:
a) Euler numbers
b) Eccentricity
c) Elongatedness
d) Rectangularity [CO-4] [L-2,4] **5×4**
- Q.6 a) Explain the concept of LZW compression and decompression techniques. [CO-5] [L-2] **10**
b) Discuss run-length encoding with suitable examples. How does it remove inter pixel redundancy? [CO-5] [L-2] **10**
- Q.7 Differentiate between region and boundary. Describe regional descriptor in detail. And also write short notes on:
a) Noise models.
b) Image restoration.
c) Denoising filters.
d) Inverse filtering. [CO-6] [L-3] **5×4**

End Semester Examination, May 2023

B. Tech. — Sixth Semester

DATA MINING (BCS-DS-632)

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:

- What are the three major types of business intelligence?
- What is the relation between data warehouse and data marts?
- What do you mean by feature scaling or data normalization? How you treat the outliers in your data?
- In data mining, what are continuous and discrete data?
- List a few areas in which data mining can be applied?
- What are the various levels of data mining analysis?
- Define "Outlier".
- What is decision tree pruning?
- What is un-supervised learning?
- What is the purpose of Apriori algorithm?

2×10

PART-A

Q.2 a) Elaborate how do the activities of data mining and predictive analytics work together? [CO-2][L-2] **10**

b) Explain any four concepts of business intelligence. [CO-2][L-2] **10**

Q.3 There is a retail store which has different departments like sales, marketing, logistics etc. Each of them is handling the customer information independently, and the way different departments store that data is quite different like sales department have stored data by customer's name, while marketing department by customer id. How the retail store checks the history of the customer and what should be the technique retail store should use to know; what were the different products he/she bought owing to different marketing campaigns? Design the ROAD MAP of the ETL process used by retail store in detail. [CO-1][L-4] **20**

Q.4 a) Based on density and grid based method describe the following clustering algorithms in term of the criteria mentioned:

- Shapes of clusters that can be determined.
- Input parameters that must be specified.
- Limitations.
- Complexity.

[CO-5][L-3] **10**

b) What kind of technologies is involved in data mining? Discuss in detail. Also explain its applications and advantages. [CO-3][L-3] **10**

PART-B

Q.5 A database has five transactions. Let min_sup = 60% and min_conf = 80 %.

	items_bought
T1	{M, O, N, K, E, Y}
T2	{D, O, N, K, E, Y}
T3	{M, A, K, E}
T4	{M, U, C, K, Y}
T5	{C, O, O, K, I, E}

a) Find all frequency item sets using Apriori algorithm.

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

- b) List all the strong association rules with support and confidence. [CO-4][L-3] **10**
- Q.6 a) Extracting knowledge from the web is achieved through web mining. Discuss in detail the various concepts that are used for web mining. [CO-3][L-4] **10**
b) Text Mining is very important concept in data mining. Justify your answer. How structural approaches are used in it? [CO-3][L-4] **10**
- Q.7 Explain the following in detail:
a) Customer profiles and feature construction using data mining.
b) Scientific applications using data mining. [CO-5][L-2] **10×2**

End Semester Examination, May 2023
B. Tech. – Seventh Semester
**INFORMATION SECURITY INTELLIGENCE AND
COMPLIANCE ANALYTICS (BCS-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) Why big data matters? [CO-1] [L- 1]
- b) Explain the statement with respect to big data "an open source brings forth tools. [CO-1] [L- 2]
- c) Differentiate between team versus culture. [CO-2] [L- 3]
- d) Explain the different teams and their goals in developing big data. [CO-2] [L- 1]
- e) What is gauging success of big data? [CO-3] [L- 2]
- f) Explain the term "the storage dilemma" with respect to big data. [CO-4] [L- 2]
- g) Differentiate between 'outsourced and hybrid approach'. [CO-5] [L- 3]
- h) Explain protecting big data analytics. [CO-5] [L- 2]
- i) Explain the big data pipeline in depth. [CO-6] [L- 3]
- j) Give various techniques of big data visualization. [CO-6] [L-4] **2×10**

PART-A

- Q.2 a) "Data and data analysis are getting more complex". Analyse this statement. [CO-1] [L-3] **10**
b) Summarize the value of big data and the business related to it. [CO-1] [L-2] **10**
- Q.3 a) Interpret the big data adoption process. [CO-2] [L-2] **10**
b) Summarize the challenge faced by the team. [CO-2] [L-3] **10**
- Q.4 a) Interpret the sentence "A wealth of public information" [CO-3][L-2] **10**
b) Explain the big data environment: ongoing growth, no end in sight. [CO3][L-1] **10**

PART-B

- Q.5 a) Analyze which is best: choosing among in-house, outsourced, or hybrid approaches, [CO-4] [L-3] **10**
b) What are the Tools used in data mining? [CO-4] [L-2] **10**
- Q.6 a) Analyze the statement big data: the modern era, today, tomorrow, and the next day. [CO-5] [L-5] **10**
b) What is the intellectual property challenge? [CO-5] [L-3] **10**
- Q.7 a) Explain big data privacy and encryption techniques in big data. [CO-6] [L-4] **10**
b) Give an introduction to SIEM tool: splunk enterprise, nagios and snort. [CO-6] [L-3] **10**

End Semester Examination, May 2023
B. Tech. – Seventh Semester
ADVANCED COMPUTER GRAPHICS (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 Answer the following in brief:

- a) Give the syntax of methods used for reading, writing and copying image pixel data in OpenGL.
- b) What do you understand by color perception in OpenGL? Summarize translation and transformation in graphics handling.
- c) List the merits of electrostatic plotters.
- d) Quote about hermite curve and its limitations.
- e) Summarize about the term: rasterization. How is it different from vector graphics?
- f) Brief about working of photon mapping.
- g) Difference between glColor3f() and glClearColor() method.
- h) Justify, why graphs are used in data structure? Define graphical data structure.
- i) Mention the method to write a parametric representation? What are voxels and cells?
- j) Can you name the OpenGL methods used in polygon tessellation? Justify. **2x10**

PART-A

- Q.2 a) With respect to coordinate transformation, explain in detail about standard matrices of linear transformation and rotation in 2D and 3D. [CO-1][L-2] **10**
b) Discuss 'illumination model'. Mention the factors on which lightning effect depends. Summarize about various types of illumination. [CO-1][L-2] **10**
- Q.3 a) Discuss modeling techniques in details. Also define graphics data structure and the modeling methods. [CO-2][L-1] **10**
b) Write line and polygon clipping algorithm in computer graphics? Exemplify it. Also discuss line drawing algorithm. [CO-2][L-1] **10**
- Q.4 a) Discuss composition of 3-D transformation in detail. [CO-2][L-1] **10**
b) Define 'projection'. Discuss all types of projections and exemplify them. [CO-2][L-1] **10**

PART-B

- Q.5 a) Quote about interpolation. Write linear interpolation and Lagrange's interpolation formula. Also discuss about types of interpolation methods. [CO-3][L-3] **10**
b) Write short note on B-Spline curve. List the attributes and properties of this curve separately. [CO-3][L-1] **10**
- Q.6 a) Write short notes on:
i) Advanced lighting and shading.
ii) Anisotropic image smoothing. [CO-4][L-1] **5x2**
b) Express your understanding about volume rendering. Explain volumetric data. Discuss all grid types in it. Write indirect volume rendering algorithm for it. [CO-4][L-1] **10**
- Q.7 a) Quote about rendering pipeline in computer graphics? Also differentiate between global illumination and local illumination. [CO-5][L-2] **10**
b) Discuss in detail about Monte Carlo algorithm and photon mapping. [CO-6][L-1] **10**

End Semester Examination, May 2023
B. Tech. – Seventh Semester
SIMULATION AND MODELING (BCS-DS-721)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following in brief:

- a) Explain the different characteristics of multiqueuing system. [CO2/L1]
- b) Enumerate any four terms related to managing stocks in a shopping mall. [CO1/L2]
- c) Why a number series is called a pseudo random number series? [CO3/L2]
- d) The classes in a tuitions class happens between 3:40 PM-7:30 PM daily. What kind of probability distribution can be used to simulate the arrival of students and their learning? [CO5/L3]
- e) List down the steps in simulation study to which an entrepreneur look towards while simulation. [CO2/L1]
- f) List the factors to be considered before the selection of simulation package/software. [CO2/L2]
- g) Differentiate between verification and validation in simulation and modeling. [CO1/L4]
- h) Explain with the help of a suitable example how simulation can be termed as terminating or non-terminating depending on the objective of simulation. [CO3/L4]
- i) Enumerate the input parameters to be considered in the simulation of the water reservoir system. [CO5/L4]
- j) Define multivariate analysis. Explain two methods in detail. [CO2/L2] **2×10**

PART-A

- Q.2 a) A team is asked to develop an online portal for online book delivery system. Describe the queuing system exists in this system. What all factors need to be taken care of while designing the software for parallel booking, so that it is never overstressed? [CO4/L4] **10**
- b) A vendor provides a software to simulate inventory management. How can you analyze the efficiency and applicability of this software? [CO3/L1] **10**
- Q.3 a) Elaborate any method to generate random number, which follows a probability distribution defined by a function. [CO1/L4] **10**
- b) In a snake ladder game, one wants to generate random number sequence. Provide any three methods to generate the same. [CO1/L2] **10**
- Q.4 Describe frequency test, run test and auto correlation test. [CO4/L1] **20**

PART-B

- Q.5 a) Evaluate the need for the chi-square goodness of fit test to accept or reject a candidate distribution. Also assess the following statement with chi-square goodness of fit test: The number of automobile accidents per week in certain community are as follows 12,8,20,2,14,10,15,6,9,4. Are these frequencies in agreement with the belief that accident conditions were same during this 10 week period? [CO3/L4] **10**
- b) State the four steps involved in the development of an input model. [CO4/L3] **10**

- Q.6 a) Explain how probabilities and qualities can be estimated from summary data? [CO3/L3] **10**
b) Describe the types of simulation with respect to output analysis. Give examples. [CO4/L4] **10**
- Q.7 a) Analyze the need for linear congruential method for generating random numbers and generate three random numbers using this method with $X_0 = 30$, $a = 15$, $c = 40$ and $m = 100$. [CO3/L4] **10**
b) Compare and contrast the various coordinate systems. Also define the various modes for simulating autopilot systems. [CO4/L4] **10**

End Semester Examination, May 2023
B. Tech. – Seventh Semester
NETWORK SECURITY AND MANAGEMENT (BCS-DS-725)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Differentiate between 'active security threats' and 'Passive security threats'. [CO1][L-2]
- b) What do you mean by OSI security architecture? [CO-1][L-1]
- c) Which one is the best transposition technique and why? [CO-2][L-1]
- d) Name the types of problems solved by public key cryptography. [CO-2][L-1]
- e) Illustrate the block cipher principles. [CO-2][L-2]
- f) Discuss major components of a firewall. [CO-3][L-1]
- g) Define virus with suitable example. [CO-3][L-1]
- h) Discuss hash function with an example. [CO-4][L-1]
- i) Explain the PGP. [CO-5][L-2]
- j) Differentiate between SNMP v1, v2 and v3. [CO-6][L-2] **2×10**

PART-A

Q.2 Write a note on the various classical encryption techniques with examples.

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

Q.3 In a RSA cryptosystem, a participant A uses two prime numbers $p = 13$ and $q = 17$ to generate her public and private keys. If the public key of A is 35, then find the private key of A.

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

Q.4 Illustrate the malicious software with suitable examples.

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

PART-B

Q.5 Discuss digital signature algorithms with an example and show difference between DSA and RSA.

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

Q.6 Illustrate the IP security with suitable example and show the limitation of IP security

[CO-5] [L-4] **20**

Q.7 Discuss various types of risk to an organization and how we can handle them with examples.

[CO-6] [L-1] **20**

End Semester Examination, May 2023

B. Tech. – Seventh Semester DATA SCIENCE (BCS-DS-727)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 differences between overfitting and underfitting? [CO-1][L-2]
- b) Consider a data set consisting of variables with more than 30 percent missing values. How will you deal with them? [CO5][L3]
- c) Explain the need of cluster analysis. [CO-3][L-2]
- d) Describe predictive modelling. [CO-4][L-2]
- e) For the given points (1, 3), (2, 5) calculate the euclidean distance. [CO3,4][L1]
- f) List the limitations of linear model. [CO-3][L-1]
- g) Write command to create dataframe in R. [CO-1][L-1]
- h) What is bias – variance tradeoff? [CO-2][L-2]
- i) Differentiate between NULL hypothesis and alternate hypothesis. [CO-4][L-1]
- j) Write down the components of optimization problem. [CO-5][L-1] **2×10**

PART-A

- Q.2 a) Illustrate diagrammatically data science life cycle. [CO-1] [L-2] **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 linear algebra operations on vectors and matrices. [CO-2] [L-2] **10**
b) Given the system of equations find the Rank and determine the system of equations is solvable.

$$x + y + z = 2$$

$$6x - 4y + 5z = 31$$

$$5x + 2y + 2z = 13$$

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

- Q.4 a) Categorize and explain optimization on the basis of decision variables and constraints. [CO- 3] [L- 2] **10**
b) Apply multivariate optimization technique to find min/max.

$$f(x, y) = x^2y - 2xy^2 + 3xy + 4.$$

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

PART-B

- Q.5 a) Calculate the line of regression of x and y coefficients from the following table:
X: 1 2 3 4 5 6 7 8
Y: 7 10 12 14 17 20 24 28 [CO-4][L-3] **10**
b) Describe the need of cross-validation and different cross-validation techniques. [CO-5][L-3] **10**

- Q.6 Explain different metrics to assess the logistic regression models. [CO-5][L-2] **20**

- Q.7 a) Compare and contrast Euclidean distance and Manhattan distance in the K means algorithm. [CO- 5] [L-3] **10**
b) Explain the k-NN algorithm with its implementation in R. Discuss the advantages and disadvantages of K-NN algorithm. [CO-5][L-3] **10**

End Semester Examination, May 2023

B. Tech. – Seventh Semester

SOFT COMPUTING (BCS-DS-728)

Time: 3 hrs.

Max Marks:

100

No. of pages: 1

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

- Q.1 Answer the following in brief:
- a) Differentiate between 'biological and artificial neuron'. [CO-1] [L-1]
 - b) What is lattice of fuzzy numbers? [CO-1] [L-1]
 - c) Define need of heuristic functions. [CO-2] [L-1]
 - d) Summarize advantage of forward chaining. [CO-3] [L-2]
 - e) Explain linear rank selection in genetic algorithm. [CO-3] [L-2]
 - f) Define 'defuzzification'. [CO-4] [L-1]
 - g) Explain ANN with an example. [CO-4] [L-2]
 - h) Differentiate between 'supervised and unsupervised learning'. [CO-5] [L-2]
 - i) Describe 'genetic algorithm'. [CO- 6] [L-1]
 - j) What is meant by height of a fuzzy set? [CO-6] [L-2] **2×10**

PART-A

- Q.2 a) Describe back propagation in brief. Take a 2-2-2 (input-hidden-output) neural network and derive equation for weight connection using back propagation. [CO-1] [L-1] **10**
- b) Describe neuro-fuzzy system, its reasoning and controls in detail. [CO-1] [L-1] **10**
- Q.3 a) Consider the following fuzzy set A on $U = \{a, b, c, d, e\}$, $A = \{0.2, 0.6, 0.8, 0.5, 0.9\}$ Find:
i) Level set of A.
ii) α -cuts of set A.
iii) Fuzzy cardinality. [CO-2] [L-2] **10**
- b) Develop a perceptron model to implement an AND operation, where inputs and outputs are taken as bipolar binary values. [CO-2] [L-2] **10**
- Q.4 a) Consider three domains $U = V = W = N$, the set of natural numbers. Let $f: U \times V \rightarrow W$ be given by $f(A, B) = A * B$. Let A and B be fuzzy sets on U and V respectively given by $A = 0.2/2 + 0.8/3 + 0.7/4$, $B = 0.7/3 + 0.6/4 + 0.5/5$ Find the fuzzy set associated with f. State the extension principle in fuzzy set theory. [CO-3] [L-2] **10**
- b) What are the linguistic variables? Explain with the help of an example. [CO3][L2] **10**

PART-B

- Q.5 a) Explain semantic network. Represent the fact "every dog has bitten every mail carrier" using semantic network. [CO-4] [L-2] **10**
- b) Architecture of neuro-fuzzy networks with an example. [CO-4] [L-2] **10**
- Q.6 a) What is self-organizing map? Discuss the features and algorithm of Kohonen's map. [CO-5][L-3] **10**
- b) Sketch a neat labelled 5-layer ANFIS architecture describing the task of each layer. [CO-5] [L-3] **10**
- Q.7 a) Explain optimization of travelling salesman problem using genetic algorithm. [CO-6] [L-2] **10**
- b) Explain knowledge-based system architecture. Support your answer with a neat diagram. Also, state real world example of knowledge-based system. [CO6][L2] **10**

End Semester Examination, May 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 Answer the following in brief:

- List out the best practices of big data analytics.
- How does HDFS ensure the security and integrity of data?
- Explain eager loading with an example in jaql.
- Write down the goals of big data access technologies for reporting and analysis.
- Explain the concept of map reduce.
- Differentiate between business intelligence and big data analysis.
- Describe any five applications of big data.
- Explain two execution modes in PIG.
- How does HDFS ensure the security and integrity of data?
- Explain the data node directory structure.

2×10

PART-A

- Q.2 a) Explain the need for big data and its standards. Discuss with suitable examples. [CO-1] [L-2] **10**
b) Illustrate the various phases involved in big data analytics with a neat diagram. [CO-1] [L-2] **10**
- Q.3 a) Explain the architecture of the hadoop distributed file system with a diagram. [CO- 3] [L-2] **10**
b) Explain the map-reduce data flow with single reduce and multiple reduce. [CO- 2] [L-2] **10**
- Q.4 a) Explain Jaql and its uses with examples of five different types of operations. [CO-4] [L-2] **10**
b) Explain the process of installing HIVE and features of HIVE. [CO-4] [L-2] **10**

PART-B

- Q.5 a) Explain indirect batch analysis on hadoop with example. [CO-2] [L-2] **10**
b) Explain direct batch reporting on hadoop in detail with diagram. [CO-2] [L-2] **10**
- Q.6 Explain stream processing language, its types with development, and operators in detail with example. [CO-6] [L-2] **20**
- Q.7 a) Discuss the uses of a list, sets, and maps in big data with suitable examples. [CO-6] [L-1] **10**
b) Differentiate between punctuation, aggregation and sorting with examples also. [CO-6] [L-3] **10**

End Semester Examination, May 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) List the various advantages and disadvantages of internet of things. [CO-1] [L-1]
- b) Illustrate the types of temperature sensor. [CO-2] [L-1]
- c) Elaborate applications of sensor? Explain anyone. [CO-4] [L-2]
- d) Enlist which protocol is used for online video calling. [CO-5] [L-1]
- e) Illustrate 'smart objects as building blocks of IoT. [CO-2] [L-1]
- f) Differentiate between UDP and TCP/IP. [CO-3] [L-4]
- g) Explain advantages and limitations of raspberry Pi. [CO-2] [L-1]
- h) Explain the function of network configuration. [CO-3] [L-1]
- i) What do you understand by wireless sensor networks? [CO-6] [L-1]
- j) Elaborate IoT security framework? [CO-6] [L-2] **2×10**

PART-A

- Q.2 a) Illustrate IoT application development process with suitable diagram. [CO- 3] [L-2] **10**
b) Compare main characteristics of machine to machine and IoT technology. [CO- 2] [L-4] **10**
- Q.3 a) Describe the basic building blocks of "internet of things" architecture. [CO-1][L-2] **10**
b) Summarize hardware and software design components of IoT system with diagram. [CO-2][L-2] **10**
- Q.4 a) Describe the functionality of IoT network configurations. [CO-3] [L-1] **10**
b) Differentiate between USIM card and SIM card. [CO-3] [L-4] **10**

PART-B

- Q.5 a) Explain different software platforms available for M2M applications. [CO-4] [L-2] **10**
b) Describe the IoT platforms capabilities with examples. [CO-3] [L-2] **10**
- Q.6 a) Compare and contrast specifications of 3G and 4G communication technologies. [CO-5] [L-4] **10**
b) Define various security requirements of IoT communications. [CO-6] [L-2] **10**
- Q.7 a) Write short notes on following:
i) Home automation applications.
ii) Tagging and tracking for healthcare applications. [CO-6] [L-1] **5×2**
b) Identify various challenges faced in IoT connectivity. Discuss the ways to manage these challenges. [CO- 6] [L-3] **10**

End Semester Examination, May 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 Answer the following in brief:

- a) Describe HSSI in brief along with giving its full form. [CO-1][L-1]
- b) Summarize the functions of a network layer. [CO-1][L-2]
- c) Define 'PPP'. [CO-2][L-1]
- d) What is meant by single point of failure? How do we avoid it? [CO-4][L-2]
- e) Discuss the need of IPX/SPX OSI protocols. [CO-3][L-2]
- f) List the functions of AAL layer. [CO-2][L-2]
- g) Discuss SLIP protocol. [CO-4][L-2]
- h) Describe use of S- frame. [CO-5][L-2]
- i) List out features of HSSI. [CO-6] [L-2]
- j) Give the full form of DLCI? Where do we use it? [CO-1][L-1] **2×10**

PART-A

- Q.2 a) What is a wireless network? What are the advantages and disadvantages of wireless networks? [CO-1][L-2] **10**
b) List down all the layers in open systems interconnection and write all the characteristics of each layer. [CO-1][L-2] **10**
- Q.3 a) Explain DNS. Why is DNS monitoring important? Support your answer with relevant points. [CO-2][L-1] **10**
b) Differentiate between 'forward lookup' and 'reverse lookup' in DNS. [CO-2][L-2] **10**
- Q.4 a) Explain the working of firewall. Determine types of firewall. [CO3][L-3] **10**
b) Explain ATM Hubs. How is it different from routers and modems? [CO3][L-2] **10**

PART-B

- Q.5 a) Create a network supporting flow based QOS using ISDN. What type of flow specifications need to define? Explain RSVP protocol. [CO4][L-6] **10**
b) Elaborate SMDS architecture. Define ISSI, SIP and DXI. [CO4][L-3] **10**
- Q.6 a) Give benefits of IBM netview automation. List the capabilities of Netview tool. [CO5][L-2] **10**
b) Briefly explain the network management via HP open view. [CO5][L-2] **10**
- 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, May 2023
B. Tech. – Eighth Semester
IT BUSINESS CONTINUITY AND DISASTER RECOVERY PLANNING
(BCS-DS-801)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

- Q.1
- a) What are capacity centric drivers? [CO1][L2]
 - b) Explain business continuity. [CO4][L1]
 - c) What is LTO? [CO2][L1]
 - d) Explain 2-site replication. [CO4][L2]
 - e) What is the difference between Hot Swap and Hot Plug? [CO3][L3]
 - f) Define 'differential backup'. [CO5][L2]
 - g) What is WORM? [CO1][L2]
 - h) 'Plan the Test and Test the Plan'. Comment on the statement. [CO3][L3]
 - i) What do you mean by vulnerability assessment? [CO2][L2]
 - j) Explain the role of BC/DR teams. [CO4][L1] **2×10**

PART-A

- Q.2
- a) What is disk storage? Explain the types of disk drivers. [CO1][L3] **10**
 - b) Explain the different types of disasters in detail. [CO1][L3] **10**
- Q.3
- a) What is fault tolerance? How fault tolerance can be achieved for HA systems? [CO2][L4] **10**
 - b) Discuss the different components of project plan, key contributors and their responsibilities. [CO2][L3] **10**
- Q.4
- a) Describe the steps in preparation of business impact analysis report and developing the risk mitigation strategy. [CO3][L4] **10**
 - b) Write short notes on:
 - i) HA clustering advantage.
 - ii) High availability on virtual machines. [CO3][L2] **5×2**

PART-B

- Q.5
- a) Explain 'disaster recovery'. What are the different disaster recovery terminologies used? [CO4][L3] **10**
 - b) Discuss the different phases of a disaster recovery plan. [CO4][L4] **10**
- Q.6
- a) Write short notes on:
 - i) Testing the BC/DR Plan.
 - ii) Performing IT Systems and Security Audits. [CO5][L3] **5×2**
 - b) Discuss emergency management pertaining to response plans, crisis management, and recovery tasks. [CO5][L2] **10**
- Q.7
- Compare remote, local, two-site and multi-site replication techniques in detail. [CO6][L3] **20**

End Semester Examination, May 2023
B. Tech. – Eighth Semester
**GAMING AND SIMULATION (CONCEPTS, METHODOLOGY,
TOOLS AND APPLICATIONS) (BCS-DS-831)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following:

- a) Give the various Genres of Games. [CO-3][L-3]
- b) Explain strategic games and role-playing games in brief. [CO-2][L-4]
- c) Discuss the relation between Mobility Games and Education. CO-3][L-1]
- d) Explain the different types of simulation used for gaming. [CO-2][L-3]
- e) Explain the activity system with the help of a diagram. [CO-3][L-4] **4×5**

PART-A

- Q.2 a) Define the objectives of a game in education. Discuss the role of gaming in education for engaged learning. [CO-2][L-1] **10**
b) Explain the simulation of game for teaching of mathematics. [CO-1][L-2] **10**
- Q.3 a) Write a note on cognitive apprenticeship inspired simulation. [CO-5][L-3] **10**
b) Discuss various learning objective models for online laboratories. [CO-3][L-2] **10**
- Q.4 a) Compare traditional and cognitive apprenticeship with the help of examples. [CO-4][L-3] **10**
b) Discuss the design principle for Interactive Learning Environments with embedded formative assessments. [CO-5][L-2] **10**

PART-B

- Q.5 a) List the negative or positive effects of violent video games on the learner. [CO-4][L-4] **10**
b) Explain the role of simulations and virtual environments in IT education. [CO-2][L-3] **10**
- Q.6 a) Discuss conventional simulation process in detail. [CO-5][L-2] **10**
b) Violent video games are effective teachers. Justify the given statement with help of any two examples. [CO-5][L-2] **10**
- Q.7 Write notes on (**any two**):
 - a) Planning simulations.
 - b) Acumen/appreciation simulation.
 - c) Tutor-mediated simulation. [CO-2][L-5] **10×2**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

PROGRAMMING LANGUAGE (BCS-ID-001)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Explain nested classes with an example. [CO-1] [L-2]
- b) What do you understand by multithreading? [CO-4] [L-1]
- c) In the statement 'public static void main ()', what does the keywords public, static and void mean? [CO-2] [L-1]
- d) Demonstrate instance variables with examples. [CO-2] [L-3]
- e) Discuss any two control statements in Java. [CO-3] [L-2]
- f) Discuss types of constructors. [CO-3] [L-2]
- g) What is a byte code in Java? [CO-1] [L-1]
- h) List any two differences between an applet and application programs. [CO-2] [L-2]
- i) Write a command to run JAR file. [CO-4] [L-2]
- j) What is garbage collection? [CO-5] [L-1] **2×10**

PART-A

- Q.2 a) List any five features of Java and briefly explain them. [CO-1] [L-2] **10**
b) Write a program to demonstrate the use of objects and classes in Java. [CO-1] [L-3] **10**
- Q.3 a) Describe the applet life cycle in detail. [CO-2] [L-1] **10**
b) Discuss some most common types of exceptions in Java. Can a try block have multiple catch blocks? Give examples. [CO-2] [L-3] **10**
- Q.4 a) Write short notes on AWT Package and Event Handling. [CO-3] [L-2] **10**
b) What is a package and mention its two types? Further, explain how to create and use packages in Java with an example. [CO-3] [L-2] **10**

PART-B

- Q.5 a) Explain the steps to create RMI based clients and server. Explain the various methods for registering and gaining access to remote object. [CO-4] [L-2] **10**
b) Write short notes on following:
 - i) CORBA.
 - ii) SOAP. [CO-4] [L-2] **5×2**
- Q.6 a) Write a program to concatenate two files and display the output in new file. [CO-5] [L-5] **10**
b) What is multithreading? Write a program to show the concept of multithreading. [CO-5] [L-3] **10**
- Q.7 a) Discuss the JDBC drivers in Java. [CO-6] [L-3] **10**
b) Write a program to connect to a database and retrieve the data. [CO-6] [L-5] **10**

End Semester Examination, May 2023

B. Tech. – Fourth/Sixth Semester 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) Define 'computer forensics'. [CO-5] [L-1]
 - b) What is IP address? [CO-1] [L-1]
 - c) What are the benefits of using a network? [CO-1] [L-2]
 - d) How identity theft is different from fraud? [CO-3] [L-2]
 - e) What is domain name server? [CO-2] [L-1]
 - f) Differentiate between 'white-hat' and black-hat' hackers. [CO-4] [L-1]
 - g) How active scanning is performed? [CO-4] [L-2]
 - h) What are the phases of cyber forensic investigation? [CO-5] [L-1]
 - i) What is cyber stalking? [CO-3] [L-1]
 - j) Describe the scope of cyber laws. [CO-6] [L-1] **2×10**

PART-A

- Q.2 a) Explain the network architecture with the help of layered structure used for communication. [CO-1] [L-2] **13**
b) Define URL. Elaborate the purpose of various components of a URL. [CO-1][L-2] **7**
- Q.3 a) Highlight the importance of information and how it can be secured. [CO-2] [L-2] **8**
b) Write short notes on:
i) Session hijacking.
ii) Denial of service attack. [CO-2] [L-2] **6×2**
- Q.4 a) Explain Phishing and its mechanism. [CO-3] [L-2] **10**
b) How system can be protected against identity theft and online frauds? [CO3][L2] **10**

PART-B

- Q.5 a) Explain (**any two**) hacking techniques:
i) Cross site scripting.
ii) Password cracking.
iii) SQL script injection. [CO-4] [L-2] **6×2**
b) How passive scanning techniques can be beneficial to hacker? [CO-4] [L-2] **8**
- Q.6 a) Highlight FBI guidelines to be followed while investigating cyber forensics case. [CO-5] [L-1] **10**
b) Explain the steps to find evidence in the browser and in system logs. [CO5][L-2] **10**
- Q.7 a) Elaborate the need of protecting data from cyber crime. [CO-6] [L-2] **5**
b) Explain the various cyber laws implemented for protecting the user information. [CO-6] [L-2] **15**

End Semester Examination, May 2023
B. Tech. – Third Semester
ELECTRONIC DEVICES (BEC-DS-301/BEC-DS-301A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following in brief:

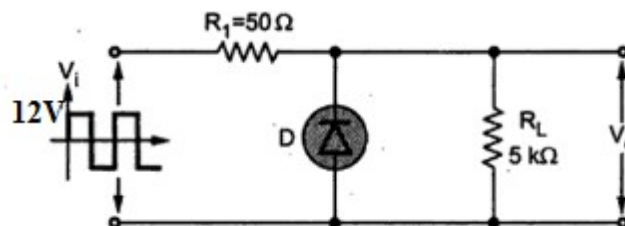
2X10

- a) Describe "Fermi level", also write expression for it with respect to valence band and conduction band.
- b) Give reason of preferring silicon over germanium.
- c) Define 'switching time of PN- diode'.
- d) Define 'dark current in photodiode'.
- e) Draw circuit diagram of voltage multiplier.
- f) Justify why one terminal of transistor is made common between input and output.
- g) Derive the relationship between α and β parameter of transistor.
- h) Differentiate among MOSFET, MISFET and MESFET.
- i) Draw block diagram of regulated power supply.
- j) Draw the pin configuration for three terminals.

2×10

PART-A

- Q.2 a) Illustrate the principle of indirect recombination in band gap. Discuss its mechanism. [CO-1][L-4] **6**
- b) Tabulate difference among conductor, semiconductor and insulator with energy band diagram. [CO-1][L-4] **8**
- c) Explain physically the meaning of the following statement; an electron and a hole recombine and disappear. [CO-1][L-2] **6**
- Q.3 a) Demonstrate functioning of P-N junction diode under forward and reverse bias conditions and draw its V-I characteristics. [CO-2][L-2] **6**
- b) Derive PN diode current equation. [CO-2][L-5] **10**
- c) Discuss the mechanism of LED. [CO-2][L-2] **4**
- Q.4 a) Explain the working of full wave rectifier. Also derive expression for its efficiency and ripple factor. [CO-2][L-5] **12**
- b) Draw output wave form for circuit shown in figure.1, if input voltage is square wave of amplitude 12V. Assume ideal diode condition. Also, identify circuit.

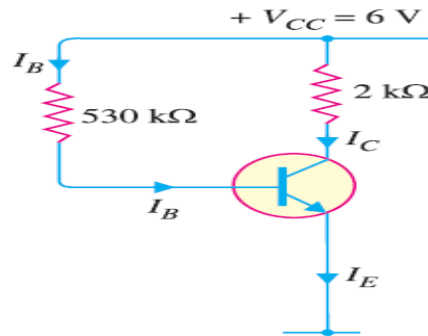


[CO-3][L-5] **8**

PART-B

Q.5 a) Describe input and output characteristics of common emitter configuration of BJT. [CO-4][L-2] **8**

b) Figure shows that a silicon transistor with $\beta = 100$ is biased by base resistor method. Draw the d.c. load line and determine the operating point. Also, evaluate stability factor.



[CO-4][L-5] **12**

Q.6 a) Describe in details construction, drain and transfer characteristics of p-channel JFET. Also sketch transfer curve defined by $I_{DSS} = 10 \text{ mA}$ and $V_p = 3\text{V}$. [CO-4][L-2,5] **10**

b) Derive expression for drain current of n-Channel JFET. [CO-4][L-5] **10**

Q.7 a) Design a regulated power supply using a full wave bridge rectifier of by diode 1N4007, capacitor filter ($C_{in} = 20 \mu\text{F}$ & $C_{out} = 0.02 \mu\text{F}$), IC regulator to provide an output of +12V. [CO-5][L-6] **10**

b) Draw circuit diagram of transistor shunt feedback voltage regulator. [CO-5][L-3] **10**

End Semester Examination, May 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 Answer the following in brief:

- a) Convert $(110101.100)_2$ into decimal, octal and hexadecimal numbers. [CO-1][L-3]
- b) Compare weighted and unweighted codes. [CO-1][L-2]
- c) Define the terms propagation delay and noise margin of digital ICs. [CO-5][L-1]
- d) Realize half-adder circuit using NAND gates only. [CO-3][L-3]
- e) State the need for a tri-state buffer. [CO-1][L-1]
- f) Draw the symbols of edge triggered D and T flip-flops. [CO-3][L-2]
- g) Distinguish between synchronous and asynchronous counters. [CO-3][L-2]
- h) Determine the output state of a 4 bit SIPO shift register after 3 clock pulses if the serial input is held HIGH and the initial contents of the shift register are 0001. [CO-3][L-3]
- i) Illustrate the advantages of flash type ADC over successive approximation type ADC. [CO-4][L-2]
- j) What is the difference between unipolar and bipolar logic families? [CO5][L1] **2×10**

PART-A

- Q.2 a) The received code is 1000001. Check whether code received is correctly received or not if odd parity is used. [CO-1][L-3] **10**
- b) Prove that:
- i) $A + AB = A + B$
 - ii) $(A + B)(A + C) = A + BC$
 - iii) $A + AB + AC = A + B + C$ [CO-1][L-3] **6**
- c) If $A = -60$, $B = -28$
- i) Represent A & B in 8-bit 2's complement form
 - ii) Find B-A [CO-1][L-3] **4**
- Q.3 a) Minimize $Y(A, B, C) = A, B, C + A, B, C + A, B, C + A, B, C$ using Karnaugh map. [CO-2][L-3] **10**
- b) Design and realize the circuit of Half adder using ROM. [CO-2][L-6] **10**
- Q.4 a) Explain the working of level clocked J-K flip-flop with circuit diagram and truth table. [CO-3][L-2] **10**
- b) Implement 4-variable switching function using Mux $F = \Sigma(0, 2, 4, 6, 8, 10, 12)$ for representing positive logic. [CO-3][L-3] **10**

PART-B

- Q.5 a) Draw and explain the working of 4-bit shift left register with timing diagram. [CO-3][L-2] **10**
- b) Design Johnson's counter. Explain how does it differ from ring counter. [CO-3][L-6] **10**
- Q.6 a) What is the major advantage of R-2R ladder type DAC as compared to weighted resistor type DAC? Draw and explain 4 bit R-2R ladder type DAC. [CO4,1][L-5] **10**
- b) Determine the analog output voltage of 6-bit R-2R ladder network DAC with V_{ref} as 5 V when the digital input is 011100. [CO-4][L-3] **10**
- Q.7 a) Draw and explain the working of TTL NAND gate with totem pole output. [CO-5][L-2] **10**
- b) Draw and explain CMOS inverter gate with a circuit diagram. [CO-5][L-2] **10**

End Semester Examination, May 2023

B. Tech. – Third Semester

DIGITAL ELECTRONICS (BEC-DS-302)

Time: 3 hrs.

100

Max Marks:

No. of pages: 1

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

Q.1 Answer the following questions:

- a) State De-Morgan's theorem. [CO-1][L1]
- b) Identify the difference between bipolar and unipolar logic family with example. [CO-4][L3]
- c) Differentiate between combinational and sequential circuits with example. [CO-3][L3]
- d) What are the advantages of digital signal over analog signal? [CO-1][L1]
- e) What is the requirement of A/D and D/A converters? [CO-4][L1]
- f) Find the 9's complement of decimal number 19. [CO-1][L4]
- g) Convert $[543]_{10}$ into its excess-3 code. [CO-1][L1]
- h) What is the difference between toggling and race around condition? How race around condition is avoided? [CO-2][L1]
- i) Justify necessity of Flip-Flop over Latch. [CO-2][L3]

- j) Simplify the expression $\overline{A}.B + A.B + \overline{A}.\overline{B}$. [CO-1][L1] **2×10**

PART-A

Q.2 a) Convert the numbers into desired base:

i) $(7.FD6)_{16} = ()_8$

ii) $(345)_8 = ()_{10}$

iii) $(7864)_{10} = ()_{16}$

iv) $(53.625)_{10} = ()_2$

[CO-1] [L-3] **3×4**

- b) What is logic gate? Describe each logic gate with its truth table. [CO-1] [L-2] **8**

Q.3 a) Simplify the expression $Y = \sum_m(7,9,10,11,12,13,14,15)$, using k-map method and realize the expression using logic gates. [CO-2] [L-6] **10**

b) Prove that:

i) $(A + B)(\overline{AC} + C)(\overline{B} + AC) = \overline{AB}$

ii) $\overline{ABC} + \overline{ABC} + \overline{ABC} + \overline{ABC} + \overline{ABC} = \overline{A} + \overline{B} + \overline{C}$

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

- Q.4 a) Design and realize circuit of full adder using half adder. [CO-2] [L-6] **10**
- b) Demonstrate the working of multiplexer and de-multiplexer. [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] **12**
- b) What do you mean by shift register? Summarize various types of registers in detail. [CO-2] [L-5] **8**

- Q.6 a) Draw and explain 4-bit weighted resistor digital to analog converter. [CO-3][L-2] **10**
- b) Illustrate the working of dual slope analog to digital converter. [CO-3] [L-3] **10**

- Q.7 a) Analyze the various characteristics of digital ICs. [CO-4] [L- 4] **8**
 b) Discuss the working of TTL (transistor-transistor logic) family in detail. [CO-4] [L- 2] **12**

End Semester Examination, May 2023
B. Tech. – Third Semester
SIGNALS AND SYSTEMS (BEC-DS-303/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:

- Find the even and odd components of $x(t) = e^{jt}$.
- Determine the signal energy and signal power for $f(t) = e^{-3|t|}$
- What are the properties of convolution in discrete-time system?
- State Parseval's theorem for continuous-time Fourier series.
- What is unit-ramp function? How can it be obtained from a unit-impulse function?
- With regards to the Fourier series representation, justify the statement: Odd functions have only sine terms.
- Find the exponential Fourier series coefficients for $x(t) = \sin \omega_0 t$.
- What is the condition for the existence of discrete-time Fourier transform?
- What are the properties of Laplace Transform?
- What is region of convergence?

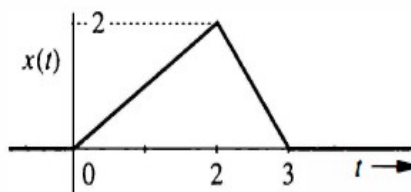
2×10

PART-A

- Q.2 a) Define "LTI system". Check the causality, time invariance and linearity of the $y(n) = x(n^2)$ system. [CO-1][L-3] **10**
- b) Draw the graphical representation of unit step sequence $u(n)$ and shifted unitstep sequence $u(n-1)$ and sketch the signal. [CO-1][L-3] **5**

$$x(n) = u(n) - u(n-1)$$

- c) Describe the signals given in figure:



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

- Q.3 a) Consider an LTI system S and a signal $x(t) = 2e^{-3t}u(t-1)$. 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 the output response of the low-pass RC network due to an input $x(t) = te^{-t/RC}$ by convolution. [CO-2][L-3] **5**

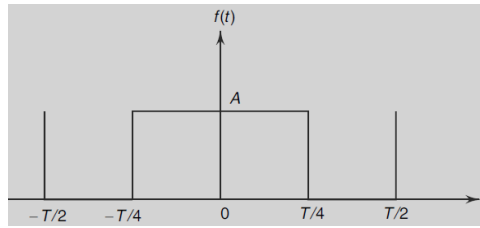
- c) Suppose that the unit impulse response of LTI system is a unit ramp:

$$h(n) = r(n) = nu(n)$$

Compute the response of this system to a unit step input $x(n) = u(n)$. [CO2][L3] **5**

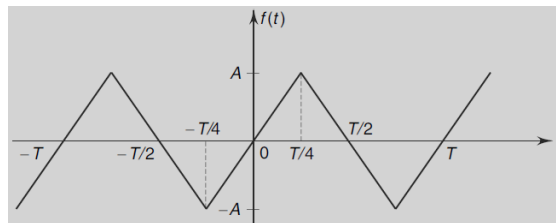
- Q.4 a) Show that a signal $x(t)$ that satisfies half-wave symmetry contains Fourier coefficients with odd harmonics only. [CO-3][L-5] **5**

- b) Obtain the fourier components of the periodic rectangular waveform shown in the figure.



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

- c) Obtain the trigonometric Fourier series of the triangular waveform shown in the figure.



[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 Gaussian pulse $f(t) = e^{-a^2 t^2}$. [CO-4][L-4] **5**
 c) State and prove time convolution and time differentiation properties of Fourier transform. [CO-4][L-5] **10**

- Q.6 a) Verify Parseval's theorem:

$$\sum_{n=-\infty}^{\infty} x(n) x^*(n) = \frac{1}{2\pi} \int_{-\pi}^{\pi} X(e^{j\omega}) X^*(e^{j\omega}) d\omega$$

For the following sequence

$$x(n) = \left(\frac{1}{2}\right)^n u(n)$$

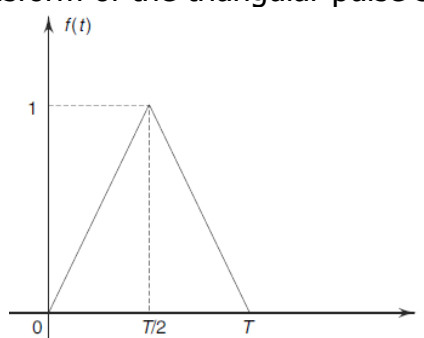
[CO-4][L-5] **10**

- b) Find the DTFT of the following finite duration sequence of length L:

$$x(n) = \begin{cases} A, & \text{for } 0 \leq n \leq L-1 \\ 0, & \text{otherwise} \end{cases}$$

Also, find the inverse DTFT to verify $x(n)$ for $L = 3$ and $A = 1V$. [CO-4][L-4] **10**

- Q.7 a) Find the Laplace transform of the triangular pulse shown in Fig.



[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, May 2023
B. Tech. – Fourth Semester
PYTHON PROGRAMMING AND RASPBERRY PI FUNDAMENTALS
(BEC-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.

Q.1 Answer the following in brief:

- a) List a few commands in the datetime module in Python. [CO-2] [L-1]
- b) What is the use of "urlopen" in Raspberry Pi Programming? [CO-4] [L-3]
- c) What do you understand by private variables in Python? [CO-3] [L-2]
- d) Which command is used to capture an image from camera interfaced with Raspberry Pi? [CO-5] [L-4]
- e) What do you understand by typecasting in Python? [CO-1] [L-3]
- f) List a few advantages of Linux based operating systems. [CO-3] [L-1]
- g) What is the utility of pack() method in Tkinter? [CO-2] [L-3]
- h) How can runtime warnings be disabled in Raspberry Pi? [CO-4] [L-2]
- i) How many times will a loop with the following code execute: for i in range (0,4)?
4] [CO-1] [L-1]
- j) Do we interface a Bluetooth module with Raspberry Pi? [CO-5] [L-2] **2×10**

PART-A

- Q.2 a) What are the commonly used logical operators in Python? Explain with examples using Python codes. [CO-1] [L-2] **10**
- b) What do you understand by Nested loops? Write a program to print the sum of first n natural numbers where n is provided by the user. [CO-2] [L-4] **10**
- Q.3 a) How does dictionary in Python differ from the other data types? How can entries in the dictionary be added and updated? Explain using codes. [CO-2] [L-4] **10**
- b) What are modules in Python? Discuss the features of random module. [CO-1] [L-2] **10**
- Q.4 a) What do you understand by Polymorphism? Explain with Python codes. [CO-3] [L-3] **10**
- b) What is the utility of 'try' block in Python? What other blocks are associated with it? [CO-3] [L-3] **10**

PART-B

- Q.5 a) How can a programmer build GUI in Python? State the module that is used. [CO-3] [L-3] **10**
- b) How do Buttons in Tkinter work? Explain with codes. [CO-3] [L-4] **10**
- Q.6 a) How can LEDs be interfaced with Raspberry Pi? Explain with a code. [CO-4][L-4] **10**
- b) What are the different built-in modules in the Raspberry Pi board? Discuss in detail [CO-4][L-2] **10**
- Q.7 Write short notes on the following:
- a) Raspberry Pi as MQTT broker. [CO-5] [L-2] **10**
 - b) Programming GPIO pins. [CO-5] [L-2] **10**

End Semester Examination, May 2023

B. Tech. – Third Semester

BASIC ELECTRONICS (BEC-DS-312)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

2x10=20

Q.1 Answer the following in brief:

- a) Define switching time of PN junction diode. [CO 1][L-1]
- b) Evaluate V_{rms} for full-wave rectifier. [CO 1][L-2]
- c) Derive relation between α and β . [CO 2][L-2]
- d) Draw h parameter model of transistor for CE configuration. [CO 2][L-2]
- e) Define slew rate of operational amplifier. [CO 3][L-1]
- f) Draw circuit diagram of current to voltage converter Op-Amp. [CO 4][L-2]
- g) Justify the use of 3-RC network in RC phase shift oscillator. [CO 6][L-3]
- h) Draw block diagram of feedback amplifier. [CO 6][L-2]
- i) Differentiation 'Zener and Avalanche diode'. [CO 5][L-2]
- j) State virtual ground concept. [CO 5][L-3] **2x10**

PART-A

- Q.2 a) Explain V-I characteristics of PN junction diode in brief. [CO 1][L-2] **10**
b) Explain working of full wave rectifier. Also derive expression for efficiency and form factor of it.

[CO 1][L2] **10**

- Q.3 Describe input and output characteristics of common base configuration of BJT. Also differentiate among CB, CE and CC configuration of transistor. [CO 2][L2] **20**

- Q.4 Draw equivalent circuit of single stage RC coupled amplifier circuit. Also explain its frequency response. Analyze the role of input capacitor, coupling capacitor and emitter bypass capacitor in a two stage RC coupled amplifier. Sketch the circuit in support. [CO 3] [L-2] **20**

PART-B

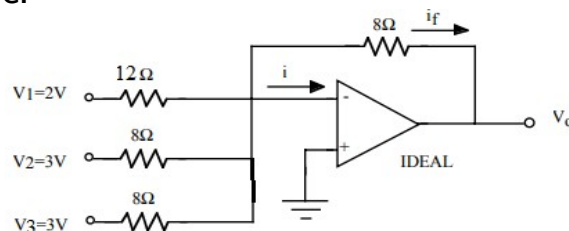
- Q.5 Derive expression for resonance frequency of Wein bridge oscillator. [CO4][L-3] **20**

- Q.6 a) Explain advantage of negative feedback for stability in gain and bandwidth. [CO4][L-3] **10**
b) Explain ideal characteristics of operational amplifier and draw its block diagram.

[CO5][L-3] **10**

- Q.7 a) Explain differential amplifier configuration for DC analysis. [CO6][L-3][8] **10**

- b) Derive expression for closed loop gain for inverting configuration. Also evaluate output voltage for the figure. [CO 6][L-2][12] **10**



End Semester Examination, May 2023

B. Tech. – Third Semester

ANALOG ELECTRONICS (BEC-DS-321)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

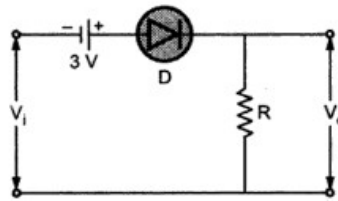
Q.1 Answer the following in brief:

- Define switching time of PN junction diode.
- The reverse bias saturation current for PN junction diode is $10 \mu\text{A}$ at 300K . Determine its ac resistance at 150mV forward bias.
- Write Barkhausen criteria of oscillation.
- Evaluate CMRR if differential gain is 10^6 and common mode gain is 2×10^5 .
- Illustrate term 3dB up and 3dB down.
- Derive relation between α and β .
- Derive expression for stability factor S .
- Differentiate between bipolar junction transistor and field effect transistor.
- State various cascading methods of multistage amplifier.
- Draw block diagram of regulated power supply.

2×10

PART-A

- Q.2 a) Derive 'PN diode current' equation. [CO-1] [L2] **10**
b) Explain working of full wave rectifier. Also derive expression for root mean square value of current and efficiency of it. Draw output wave form for circuit shown in figure.1, if the peak value of A.C. input is 12V . Show all voltage levels in the output.



[CO-1] [L-2, 3] **10**

- Q.3 a) Describe input and output characteristics of common base configuration of BJT. Also explain Potential divider biasing. Derive expression for stability factor. [CO-2][L-2,3] **20**

- Q.4 Describe in details construction, drain and transfer characteristics of n-channel JFET. Derive expression for drain current of n-channel JFET. Also sketch transfer curve defined by $I_{DSS} = 10\text{mA}$ & $V_p = -5\text{V}$. [CO-3] [L-2,3,4] **20**

PART-B

- Q.5 a) Draw block diagram of operational amplifier and write its ideal characteristics. [CO- 4][L-4] **6**
b) Write note on op-amp as integrator. [CO-4][L-3] **6**
c) Explain instrumentation amplifier. [CO-4][L-3] **8**
- Q.6 a) Analyze operation of operational amplifier as comparator. Also write difference between comparator and schmitt trigger. [CO-5][L-5] **10**
b) Describe the working of full wave precision rectifier for inverting configuration of operational amplifier. [CO-5][L-5] **10**
- Q.7 a) Design a regulated power supply using a full wave bridge rectifier using diode 1N4007, capacitor filter ($C_{in} = 25 \mu\text{F}$ & $C_{out} = 0.01 \mu\text{F}$), IC regulator to provide an output of $+12\text{V}$. [CO-5] [L-5,6] **10**

- b) Give justification with mathematical support for use of 3-RC network in RC phase shift oscillator. Differentiate between RC phase shift oscillator and wein bridge oscillator. [CO-4][L-3,4] **10**

End Semester Examination, May 2023
B. Tech. – Third Semester
DIGITAL ELECTRONICS AND CIRCUITS (BEC-DS-322)

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 'digital signal' and 'analog signal' with an example. [CO-1][L-2]
- b) Convert the following hexadecimal number $(3FA7.F)_{16}$ into its equivalent. [CO-1][L-1]
 - i) Binary ii) Decimal iii) Octal number
- c) Formulate a table for decimal numbers 0-15 showing binary to gray code. [CO-2][L-2]
- d) What do you understand by QM method? Enlist its merits and demerits over K-map. [CO-2][L-2]
- e) Compare edge triggered and level-triggered sequential devices. [CO-3][L-2]
- f) Discuss the need of master slave JK flip-flop. [CO-3][L-2]
- g) Enlist various applications of analog to digital converters and digital to analog converters. [CO-6][L-1]
- h) Describe the advantages of unipolar logic families. [CO-5][L-1]
- i) Illustrate various specifications of A to D converters. [CO-4][L-2]
- j) Which one is the fastest logic family and Why? [CO-5][L-2] **2×10**

PART-A

- Q.2 a) Implement AND, OR, NOT, XOR and XNOR gates using only NOR gate. Evaluate their Boolean expressions also. [CO-1][L-3,4] **10**
b) Discuss the applications of Hamming code. The seven-bit hamming code is received as 0010001. Assume that even parity has been used, check whether it is correct or not. If not, find the correct code. [CO-1][L-3] **10**
- Q.3 a) Design a full adder circuit using PAL, PLA and ROM. [CO-2][L-6] **10**
b) Implement the given expression using a 16:1 multiplexer and two 8:1 multiplexers. $f(A, B, C, D) = \sum m(0, 2, 3, 6, 8, 9, 12, 14)$. [CO-2][L-3] **10**
- Q.4 a) Draw and explain the working of Ring counter along with its timing diagram. How it can be converted into Johnson counter. [CO-3][L-4] **10**
b) Evaluate the output of JK flip-flop when both the inputs are set high (logic 1). Discuss the all possible remedies if to remove the race around condition in JK-flipflop. [CO-3][L-5] **10**

PART-A

- Q.5 a) Design a synchronous counter that count as 000, 010, 101, 110, 000, 010...by drawing the state diagram and k-maps. Ensure that the unused states of 001, 011, 100, and 111 go to 000 on next clock pulse. Use J K-flip flops. [CO-3,6][L-6] **10**
b) Design a 4-bit bidirectional shift register using D flip-flop. Enlist various applications of shift registers [CO-3,6][L-6] **10**
- Q.6 a) Illustrate the analog to digital conversion process. Describe the operation of parallel comparator type analog to digital converter. Analyze its performance in terms of processing time required for analog to digital conversion. [CO-4][L-4] **10**

- b) Discuss the need of analog to digital and digital to analog converters. Describe the working of binary weighted resistor type digital to analog converter. Summarize its disadvantages as digital to analog converter. [CO-4][L-3] **10**

- Q.7 a) Why ECL is called Emitter coupled logic? Design NOR/OR logic using ECL. [CO-5][L-4,5] **10**
- b) Design and illustrate the operation of NAND, NOR and NOT gates by using CMOS technology. [CO-5][L-6] **10**

End Semester Examination, May 2023
B. Tech. – Fourth Semester
COMMUNICATION ENGINEERING (BEC-DS-401A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

- Q.1
- Define 'modulation'. Why is it needed?
 - Write the equation of AM modulated wave for modulation index=0.5 and draw its spectra.
 - What is vestigial sideband transmission? Write its application.
 - The modulating frequency in frequency modulation is doubled. What will be the effect on bandwidth?
 - In an FM system if the maximum value of deviation is 75 KHz and the maximum modulating frequency is 10 KHz. Calculate the deviation ratio and bandwidth of the system.
 - State sampling theorem.
Find the Nyquist rate and the Nyquist interval for the signal:
$$x(t) = \cos(4000\pi t) \cos(4000\pi t)$$
 - Explain aliasing error. How can it be reduced?
 - Explain FSK in detail.
 - What do you mean by M-ary signaling? What are its advantages?
 - Determine noise figure using Friss formula if $G_1=15\text{dB}$, $F_1=10\text{dB}$ and $F_2=20\text{dB}$. Also calculate noise voltage and noise power at temperature 2900K, Bandwidth 5MHz and resistor 50 ohm.
- 2×10**

PART A

- Q.2
- Draw the block diagram of a communication system and explain each block in detail. Write their fundamental limitations. [CO2] [L-2] **12**
 - What are the advantages of digital communication system? [CO1] [L-1] **8**
- Q.3
- How is SSB signal generated by the filter method? Explain in detail with a block diagram and necessary equation. Give the advantages and disadvantages of this method. [CO3] [L-3] **10**
 - One input to AM modulation is 500 KHz, carries with amplitude of 20Vp. The second input is 10 KHz modulating signal that is of sufficient amplitude to cause a change in o/p wave of $\pm 7.5 \text{ Vp}$. Determine:
 - Upper and Lower side frequencies.
 - Modulation co-efficient and % modulation.
 - Expression of modulated wave.
 - Draw o/p spectrum.
 - Total transmitted power and power saving in SSB.[CO3] [L-4] **10**
- Q.4
- Explain Foster Seeley discriminator. [CO3] [L-3] **10**
 - Discuss with suitable block diagram Armstrong method for FM generation. Why it is also called indirect method? [CO3] [L-2] **10**

P. T. O.

PART B

- Q.5 a) Explain PWM/PPM modulator and demodulator; also give its advantages, disadvantages and applications. [CO4] [L-2] **8**
- b) A television signal having a bandwidth of 3.6 MHz is transmitted using binary PCM system. Given that the number of quantization level is 256.
Determine:
i) Code word length.
ii) Transmission bandwidth.
iii) Find bit rates.
iv) Output signal to quantization noise ratio. [CO4] [L-3] **6**
- c) Explain Delta and adaptive delta modulation with its advantages and disadvantages and applications. [CO4] [L-2] **6**
- Q.6 a) Explain the operation of QPSK transmitter and receiver and derive the expression for its bit error probability. [CO4] [L-2] **12**
- b) Explain QAM technique with neat diagram. [CO4] [L-2] **8**
- Q.7 a) For a bandwidth of 1 MHz, calculate the thermal noise voltage generated by two resistors of 50 and 100 Kohm, when they are connected in series and in parallel. [CO1] [L-3] **8**
- b) What is noise? Explain in detail different types of internal noise. [CO1] [L-2] **12**

End Semester Examination, May 2023

B. Tech. – Fourth Semester ANALOG CIRCUIT (BEC-DS-402)

Time: 3 hrs.

Max Marks: **100**

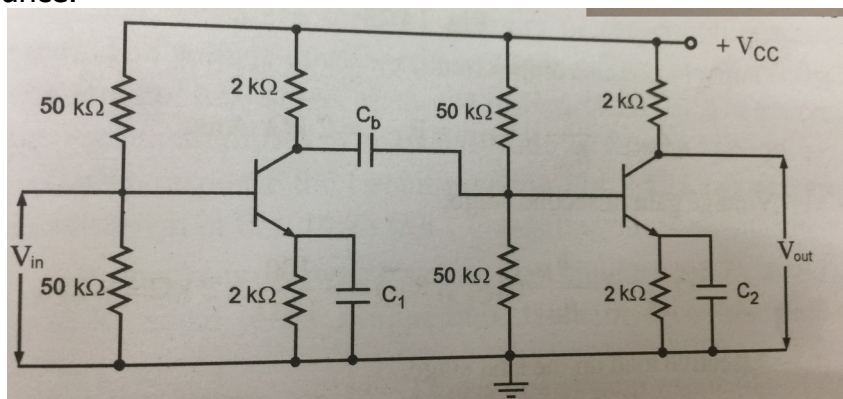
No. of pages: 2

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

- Q.1
- Draw h-parameter model of CE configuration of transistor. [CO1] [L-1]
 - Draw T- model of transistor. [CO1] [L-1]
 - In an amplifier, the maximum voltage gain is 2000 and occurs at 2 KHz. It falls to 1414 at 10 KHz and 50 Hz. Find: i) Bandwidth ii) Lower cut-off frequency iii) Upper cut-off frequency. [CO1] [L-2]
 - A CE class A power amplifier is coupled to a load resistance of $12\ \Omega$ by transformer of primary –to-secondary turn ratio 8:1. The signal has a peak –to-peak swing of 250 mA. Evaluate the output power. [CO2] [L-2]
 - Derive the expression for gain of negative feedback amplifier. [CO3] [L-2]
 - Describe the consequences of base spreading resistance. [CO1] [L-1]
 - Define Crossover distortion in power amplifier. [CO2] [L-1]
 - State difference between Schmitt trigger and comparator. [CO4] [L-2]
 - State Barkhausen criteria of oscillation. [CO3] [L-1]
 - Sketch the output waveform if $V_{in} = 20 \sin 2\pi \times 20^3 t$ is applied to the inverting configuration of Op-Amp 741. Given $R_1 = 1K\Omega$ and $R_f = 10K\Omega$. [CO4] [L-2] **2×10**

PART-A

- Q.2
- Derive expression for lower and upper cutoff frequency of n-stage RC coupled amplifier. [CO1][L-4] **10**
 - The parameter of two-Stage RC coupled amplifier is shown in the figure. Given $h_{fe} = 50$, $h_{ie} = 1.1K\Omega$, $h_{re} = h_{oe} = 0$. Evaluate mid-frequency gain and value of C_b necessary to give a lower 3-dB frequency of 20Hz. Also evaluate input and output impedance.



[CO1][L-4] **10**

- Q.3
- Evaluate characteristics parameter for pi-model of transistor. A BJT has the following:
 $h_{ie} = 1100\Omega$, $h_{re} = 2.5 \times 10^{-4}$, $h_{fe} = 50$, $h_{oe} = 2.5 \times 10^{-5} \text{ mho}$. Determine h-parameter for CC and CB configuration. Assume $r_{bb'} = 100\Omega$ estimate hybrid – Π parameter. [CO1][L-5] **12**
 - Evaluate efficiency of class-B power amplifier with suitable explanation. [CO2][L-5] **8**

- Q.4 a) Restate advantage of negative feedback amplifier with suitable derivation for the stability of gain. [CO2][L-4] **5**
 b) An amplifier having a gain of 500 without feedback has an overall negative feedback applied which reduces the gain to 100? Calculate the fraction of output voltage feedback. If due to ageing of components, the gain without feedback falls by 20%, calculate the % fall in gain with feedback. [CO2][L-6] **8**
 c) Derive expression of input and output impedance for current series feedback amplifier. [CO2][L-5] **7**

PART-B

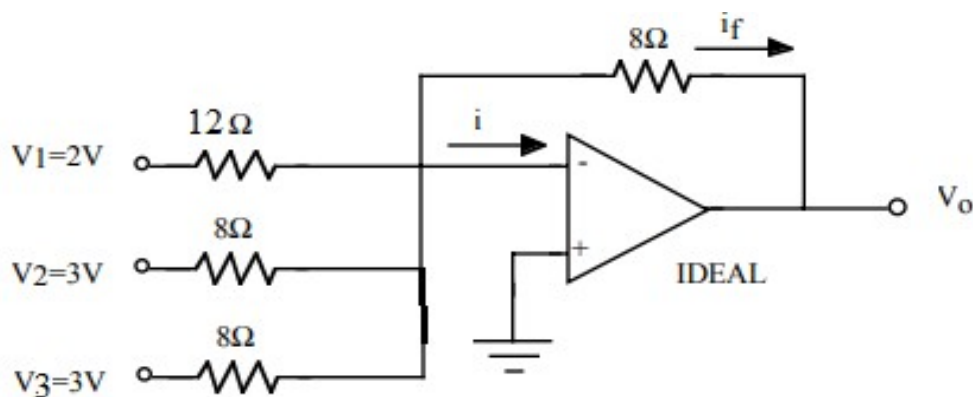
- Q.5 a) Derive expression for resonance frequency of RC Phase shift oscillator. [CO3][L-5] **10**
 b) Prove that ratio of the parallel to series resonant frequencies of crystal oscillator is given approximately by:

$$\frac{F_p F_p}{F_s F_s} = \left(1 + \frac{1}{2} \frac{C}{C'}\right) \left(1 + \frac{1}{2} \frac{C}{C'}\right)$$

Where C' = Mounting capacitance. If $C = 0.04\text{pF}$ and $C' = 2\text{pF}$, by what percentage is the parallel resonant frequency greater than the series resonant frequencies.

[CO3][L-4, L-5,6] **10**

- Q.6 a) Reanalyze DC analysis of dual input unbalanced output differential amplifier configuration. [CO3][L-2] **8**
 b) Draw block diagram of operational amplifier and write ideal characteristics of it. [CO3][L-3] **6**
 c) Evaluate current (i) & output voltage (V_o) for the figure given below: [CO4][L-2] **6**



- Q.7 a) Draw input and output wave form for input function applied to operational amplifier as integrator.

$$\begin{aligned} V_{in} &= +10 & \text{for} & & 0 \leq t \leq T \\ V_{in} &= -10 & \text{for} & & T \leq t \leq 2T \end{aligned}$$

Assume time constant to be unity.

[CO4][L-4] **6**

- b) Design 1st order high pass filter for following specifications:
 i.) Passband Voltage Gain=2
 ii.) Cut off Frequency = 10KHz
 iii.) Assume $R_f = 10\text{K}\Omega$ and $C = 0.001\mu\text{F}$
 c) Explain precision rectifier (Full- wave) for inverting configuration of Op-Amp with suitable derivation. [CO4][L-5] **8**
 [CO4][L-2] **6**

End Semester Examination, May 2023
B. Tech. – Fourth Semester
MICROPROCESSORS AND MICROCONTROLLERS (BEC-DS-403)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following in brief:

- a) List the 16 – bit registers of 8085 microprocessor. [CO1] [L1]
- b) Explain difference between Microprocessor and Microcontroller. Also list different criteria for selection of a microcontroller for a particular application. [CO1] [L2]
- c) Calculate the physical address from the following logical (DS: EA) address:
EF01 : 0001 H ii) 1105 : 2EDB H [CO2] [L3]
- d) How many address lines are available in a 4096*8 EPROM CHIP? [CO4] [L3]
- e) Explain DJNZ instruction of Intel 8051 microcontroller. [CO3] [L2]
- f) Specify the single instruction, which clears the most significant bit of B register of 8051, without affecting the remaining bits. [CO3] [L3]
- g) Write the structure of program status word (PSW) of 8051. [CO3] [L2]
- h) What are the functions of 8051 microcontroller pins P3.4 and P3.5? [CO3] [L1]
- i) What is the significance of GATE bit with reference to timer/counter programming of 8051 microcontroller? [CO5] [L1]
- j) If the crystal frequency is 22 MHz, what will be the baud rate if:
i) TH1 = -3
ii) TH1 = -12 with SMOD =0 and SMOD=1. [CO4] [L3] **2×10**

PART-A

- Q.2 a) Draw the functional block diagram of 8085 microprocessor and discuss its operation. [CO1] [L2] **10**
b) Categorize the hardware and software interrupts of 8085 in terms of maskable and non-maskable vectored and non-vectored interrupts. [CO1] [L4] **10**
- Q.3 a) Explain the significance of following signals in 8086 processor:
i) HOLD ii) RESET iii) READY iv) LOCK v) BHE [CO2] [L2] **10**
b) How does the 8086 processor access a word from an odd and even memory location? [CO2] [L3] **5**
c) List the steps taken by 8086 processor in response to receiving an interrupt. Also discuss the Interrupt vector table of 8086 microprocessor. [CO2] [L2] **5**
- Q.4 a) Draw and discuss the read and write cycle timing diagrams of 8086 in minimum mode. [CO2] [L3] **10**
b) What do you mean by addressing mode? What are the different addressing modes supported by 8086? Also explain physical address formation in different addressing mode. [CO2][L5] **10**

PART-B

- Q.5 a) Show the hardware architecture of 8051 microcontroller, with a neat block diagram. [CO3] [L2] **10**
b) Describe internal data memory organization of 8051 microcontroller. [CO3] [L2] **10**

- Q.6 a) Explain operation of timer in mode 1. Discuss programming steps to generate time delay using mode 1. Write a program to generate delay of 1 second using timer 0 in mode 1. [CO5] [L6] **10**
- b) Find the values of TMOD to operate as timers in the following modes:
- i) Mode 1 Timer 1
 - ii) Mode 2 Timer 0, Mode 2 Timer 1
 - iii) Mode 0 Timer 1 [CO5] [L3] **10**
- Q.7 a) Write a program to send the text string "hello" to serial port 1. Set the baud rate at 9600, 8 bit data, and 1 stop bit. [CO4] [L6] **10**
- b) Sketch interfacing diagram of external 16K EPROM and 8K RAM with the microcontroller. [CO4] [L6] **10**

End Semester Examination, May 2023

B. Tech - Fourth Semester

ELECTROMAGNETIC WAVES (BEC-DS-404A/BEC-DS-404)

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:

- State Poisson's and Laplace equations.
- Find the expression for Electric boundary condition for normal and tangential components.
- Explain importance of Maxwell's Ampere's circuit law in differential and integral form.
- Explain skin depth and complex permittivity.
- What are the conditions to solve Maxwell's equation for EM wave in free-space?
- What is the polarization of wave?
- Draw and explain the electrical model of a transmission line.
- What is intrinsic impedance? What is its value for free space?
- Statement Poynting's Theorem and Poynting vector.
- Explain in brief transformer and motional EMF.

[CO.1-5][L 1-3] **2×10**

PART-A

Q.2 a) Explain the following with it applications:

- Divergence theorem [CO-1] [L-2] **10**
 - Continuity equation
- b) i) For a given vector in cylindrical coordinates, $A = \rho^2 \sin^2 \phi a_\rho$ and specified closed surface $\rho = 4$ and $0 < z < 5$, find both sides of the divergence theorem. Is the theorem satisfied? [CO-1] [L-3] **5**
- ii) Given point P (-4, 2, 3) and vector $A(y, (x - z), 0)$ express P and A in cylindrical co-ordinates. [CO-1] [L-3] **5**

Q.3 a) Given a vector field $D = r \sin \phi a_r - (1/r) \sin \theta \cos \phi a_\theta + r^2 a_\phi$, Determine (a) D at P (10, 150°, 330°) (b) The component of D tangential to the spherical surface $r = 10$ at P (c) A unit vector at P perpendicular to D and tangential to the cone $\theta = 150^\circ$. [CO-2] [L-5] **10**

b) Derive the boundary condition in electrostatic field between perfect dielectric and conducting medium. [CO-2] [L-2] **10**

Q.4 a) State Biot-Savart's law. The y- and z-axes, respectively, carry filamentary currents 10A along a_y and 20A along $-a_z$. Find H at (-3, 2, 5). [CO-3/4] [L-1/5] **10**

b) Region 1, described by $3x + 2y \geq 10$, is free space whereas region 2, described by $3x + 2y \leq 10$, is a magnetic material for which $\mu = 5\mu_0$. Assuming that the boundary between the material and free space is current free, find B_2 if $B_1 = 0.1a_x + 0.4a_y + 0.2a_z$ Wb/m².

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

PART-B

Q.5 a) An EM wave is traveling in a lossless medium for which $\mu = \mu_0$, $\epsilon = 8\epsilon_0$. The Electric field associated with the EM wave is $E = 5 \sin(2\pi \times 10^8 t - \beta x) a_y$ A/m, Find i) Direction of propagation ii) Frequency of operation iii) Intrinsic impedance η iv) Phase constant β . [CO-4] [L-3] **10**

b) Derive an equation for time-varying potentials (vector potential A and scalar potential V). [CO-4] [L-4] **10**

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- Q.6 a) Express an equation of reflection/transmission coefficient of a plane wave at normal incidence. [CO-5] [L-4] **10**
- b) Analyze the plane wave equation in:
- i) Lossy dielectric.
 - ii) Free space. [CO-5] [L-4] **10**
- Q.7 a) A lossless transmission line with $Z_0 = 50\Omega$ is 10m long and operates at 200MHz. The line is terminated with a load $Z_L = 60 + j40\Omega$. If $u = 0.8c$ ($c = 3 \times 10^8$ m/sec) on the line, find:
- i) The reflection coefficient.
 - ii) The standing wave ratio.
 - iii) The input impedance. [CO-5] [L-5] **10**
- b) Write short notes on following:
- i) Smith chart.
 - ii) Attenuation constant.
 - iii) Characteristic impedance.
 - iv) Transmission line parameters. [CO-5] [L-2] **2½×4**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

ARTIFICIAL INTELLIGENCE (BEC-DS-406)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- a) Explain the term "Q-learning". [CO-1] [L-1]
- b) Which is better for image classification? Supervised or unsupervised classification? Justify. [CO-4] [L-3]
- c) Define 'precision and recall'. [CO-3] [L-2]
- d) What is a neural network? [CO-2] [L-1]
- e) What are support vectors in SVM? [CO-4] [L-2]
- f) Explain the components of expert systems. [CO-2] [L-2]
- g) What is clustering? [CO-3] [L-2]
- h) What is the minimax algorithm? [CO-1] [L-1]
- i) Explain linear regression technique. [CO-5] [L-3]
- j) How is overfitting and underfitting tackled in machine learning? [CO-5] [L-3] **2×10**

PART-A

- Q.2 a) How artificial intelligence, machine learning, and deep learning differ from each other? [CO-1] [L-3] **10**
b) Give a brief introduction to the turing test in AI. [CO-1] [L-2] **10**
- Q.3 a) Explain SVM algorithm in detail. [CO-2] [L-2] **10**
b) What is F1 score? How would you use it? [CO-2] [L-3] **10**
- Q.4 a) What is the decision tree algorithm? [CO-3] [L-2] **10**
b) What is 'naive' in a naive bayes? [CO-3] [L-3] **10**

PART-B

- Q.5 a) What are the types of machine learning? [CO-3] [L-2] **10**
b) What is a random forest? How does it work? [CO-3] [L-3] **10**
- Q.6 a) Discuss KNN algorithm in detail. [CO-4] [L-2] **10**
b) What are hyperparameters in deep neural Networks? [CO-4] [L-3] **10**
- Q.7 Write short notes on the following:
a) AI in robotics. [CO-5] [L-3] **10**
b) Natural language processing (NLP). [CO-5] [L-3] **10**

End Semester Examination, May 2023
B. Tech. – Fifth Semester
DIGITAL SIGNAL PROCESSING (BEC-DS-501)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

- Q.1 Answer the following questions in brief:
- What do you mean by effect of finite word length in DSP?
 - State and explain scaling, linearity and time delay properties of Z transform.
 - Determine Z transform of $x(n) = 5^n u(n)$.
 - Compute the DFT of the four point sequence $x(n) = \{0, 1, 2, 3\}$.
 - What is phase factor or twiddle factor?
 - Define phase delay and group delay. List out the conditions for the FIR filter to be linear phase.
 - Use the backward difference for the derivative and convert the analog filter to digital filter given $H(s) = 1/(s^2 + 16)$.
 - What is Gibb's phenomenon or Gibb's oscillation?
 - Draw the following discrete time signals:
 $x(n) = u(n) - u[n-3]$
 $x(n) = \delta(n+N)$
 - Draw the direct form implementation of the FIR system having difference equation:

$$y(n) = x(n) - 2x(n-1) + 3x(n-2) - 10x(n-6)$$

2×10

PART-A

- Q.2
- What are the various applications of digital signal processing?

[CO-1][L-2] **10**
 - Explain the process of sampling rate conversion using the decimation and interpolation.

[CO-1][L-2] **10**
- Q.3
- State and prove time shift property of Z-Transform. Find the Z transform of:
 $x(n) = 2^n u(n-2)$

[CO-2][L-3] **10**
 - Find the inverse Z-Transform of:

$$X(z) = \frac{z^2 + z}{(z-1)(z-3)}, \text{ ROC : } |z| > 3,$$

[CO-2][L-3] **10**
- Q.4
- State and prove any four properties of DFT.

[CO-3][L-2] **8**
 - Find out the 8-point DFT of the following sequence using DIT-FFT algorithm.
 $x(n) = \{1, 1, 1, 1, 0, 0, 0, 0\}$

[CO-3][L-4] **12**

PART-B

- Q.5 What are the desirable properties of windowing technique?
 The desired frequency response of a LPF is:
- $$H_d(e^{j\omega}) = \begin{cases} 1 & -\pi/2 \leq \omega \leq \pi/2 \\ 0 & \pi/2 \leq \omega \leq \pi \end{cases}$$
- Find $h(n)$ using rectangular window of length 5.

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

Q.6 a) Design an IIR filter using Impulse Invariant method, given that:

$$H_a(s) = 1/(s^2 + 17s + 12)$$

Assume $T=1$ sec

[CO-5][L-3] **10**

b) What is bilinear transformation? Derive the mapping formula. Compare bilinear transformation with other transformations based on their stability. [CO-5][L-3] **10**

Q.7 a) Draw the direct form implementation of the FIR system having difference equation $y(n) = x(n) - 2x(n-1) + 3x(n-2) - 10x(n-6)$. [CO-][L-3] **10**

b) Find the Direct form-I and Direct form-II for a causal LTI system with the following transfer function:

$$H(z) = (1 + (1/5)z^{-1}) / [(1 - (1/2)z^{-1} + (1/3)z^{-2})(1 + (1/4)z^{-1})] \quad [\text{CO-5}][\text{L-3}] \quad \mathbf{10}$$

End Semester Examination, May 2023

B. Tech. – Fifth Semester ANTENNA (BEC-DS-503)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following in brief:

- a) Why does a single linearly polarized antenna receive only half of the flux density available at its aperture produced from an unpolarized radio astronomical source? [CO1]
- b) Why the majority of antenna measurements operate in the far-field range? [CO1]
- c) The field produced by a subjected antenna is twice that produced by an isotropic antenna. [CO1]
- d) Why is a short antenna likely to be less efficient than one which is quarter wavelength long or half-wavelength long? [CO2]
- e) If the minor lobes of a radiation pattern remain constant as the beam width of the main lobe approaches zero, show that the directivity of the antenna approaches a constant value. [CO2]
- f) At what distance from the dipole is the induction field equal to the radiation field? [CO3]
- g) Show that the refractive index of the ionosphere is less than one whereas that of the un-ionized medium is one. [CO4]
- h) Why is it often required to change the frequency of transmission in short-wave broadcasting? [CO3]
- i) What is the condition on phase for the end-fire array with increased directivity? [CO4]
- j) Is the isotropic and Omni-directional radiator same or different? Draw the required radiation pattern for justification. [CO4] **2×10**

PART-A

- Q.2
 - a) Show that the directivity of a small loop antenna is $3/2$. [CO1] [L3] **5**
 - b) Design binomially the pattern multiplication of 8 point isotropic source having separation of each element by $\lambda/2$. CO1] [L6] **10**
 - c) Calculate $D(\theta, \phi)$, the directivity for the unidirectional source with following power pattern. $U(\theta, \phi) = U_m \sin\theta \sin^2\phi$ where $0^\circ \leq \theta \leq 180^\circ$, $0^\circ \leq \phi \leq 180^\circ$. [CO1][L2] **5**
- Q.3
 - a) A radio link has a 15W transmitter connected to an antenna of 2.5m^2 effective aperture of 5GHz. The receiving antenna has an effective aperture of 0.5m^2 and is located at a 15Km line-of-sight distance from the transmitting antenna. Assuming lossless, matched antennas, find the power delivered to the receiver. [CO2] [L5] **5**
 - b) Explain the following of the parabolic reflector and folded dipole antennas
 - i) Basic properties.
 - ii) Structure.
 - iii) Modes.
 - iv) Radiation.

v) Applications.

[CO2] [L5] **10**

- c) Describe the slotted line technique for impedance measurement. [CO3] [L2] **10**
[CO2] [L5] **5**

- Q.4 a) Derive mathematical expression for vector potential of electric current source. [CO2] [L6] **10**
b) Explain the following terms:
i) Radiation intensity.
ii) Beam solid angle.
ii) Reciprocity theorem.
iv) Polarization of antenna.
v) Effective aperture. [CO2] [L2] **2×5**

PART-B

- Q.5 a) Discuss methods and techniques for measuring:
i) Noise temperature of an antenna. [CO3] [L5] **10**
ii) Range of an antenna. [CO3][L1] **10**
b) Derive mathematical expression for radial component of electric field vector for Hertzian dipole.
- Q.6 a) Analyse the formation of an inversion layer in the troposphere and the phenomenon of duct propagation. Explain the factors that help in the formation of the du. [CO4] [L4] **10**
b) At what distance, in wavelength, is the radiation component of magnetic field twice the induction component? At what distance is it 100 times. [CO4] [L3] **5**
c) Describe principal pattern of antenna with suitable diagram to differentiate between different regions of antenna. [CO4] [L2] **5**
- Q.7 a) Two vertically oriented half wave dipoles are spaced 1.5λ apart to form an array. Calculate the half power beam width of the major lobes of an array in horizontal plane, for the following two cases, when the dipoles are fed with.
i) Equal and in phase current (broad-side array) and
ii) Equal current but with a phase difference of 540° between the two current (end-fire array). [CO3] [L3] **10**
b) Describe the following terms:
i) Super-refraction
ii) LUF
iii) Virtual height
iv) Skip distance
v) OWF [CO4] [L2] **2×5**

End Semester Examination, May 2023

B. Tech. – Fifth Semester

INTRODUCTION TO MEMS (BEC-DS-513)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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:

- Define MEMS with its MEMS technology.
- State applications of Micro-gyroscopes
- Explain the working principle of photo resist.
- Distinguish between dry and wet oxidation.
- What do you understand by wafer bonding?
- Compare the properties of gallium arsenide with silica compounds
- Differentiate between active and passive substrate materials
- Describe the process of ion implantation.
- Summarize chemical and plasma etching.
- Discuss micro actuation with shape memory alloy.

2×10

PART-A

- Q.2 a) Describe in detail the working principle, applications and advantages of Microsystems [CO-1] [L-2] **12**
b) Differentiate between 'Microsystems' and 'Microelectronics'. [CO-1] [L-2] **8**
- Q.3 a) Illustrate the process of packaging materials in MEMS. [CO-2] [L-3] **12**
b) Justify that silicon compounds are used as a substrate material for MEMS devices. [CO-2] [L-5] **8**
- Q.4 a) Analyze the CVD process to be utilized during fabrication of microsystem. [CO-3] [L-4] **10**
b) Classify various types of lithography. Explain in detail X-ray lithography with its major features. [CO-3] [L-4] **10**

PART-B

- Q.5 a) Describe the function of:
i) Biomedical and biosensors.
ii) Optical sensors. [CO-4] [L-2] **5×2**
b) Categorize various types of pressure sensors. [CO-4] [L-2] **10**
- Q.6 a) Illustrate the working of micro-motors with a neat sketch. [CO-4] [L-3] **10**
b) Paraphrase in detail actuation using piezoelectric effect. [CO-4] [L-2] **10**
- Q.7 a) Demonstrate the principle of nanofabrication and summarize the applications of nano-products [CO-5] [L-2] **12**
b) Conclude various challenges in nanoscale engineering along with social impact of nano scale engineering. [CO-5] [L-5] **8**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
MOBILE COMMUNICATION (BEC-DS-602)

Time: 3 hrs.

Max Marks:

100

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Describe mobile computing and give its various applications. [CO-1][L-1]
- b) List the various goals, assumptions and requirements in Mobile IP. [CO-2][L-2]
- c) Compare fixed and wireless networks. [CO-1][L-2]
- d) Define agent discovery in Mobile IP. [CO-2][L-1]
- e) Interpret DVB for highspeed internet access. [CO-4][L-3]
- f) Justify the role of proactive and reactive protocols in ad-hoc routing. [CO-4][L-5]
- g) Distinguish between e-commerce and M-Commerce. [CO-5][L-2]
- h) Differentiate between TCP and traditional TCPs. [CO-4][L-2]
- i) Compare Class 0, Class 1 and Class 2 in wireless transaction protocol. [CO-4][L-2]
- j) Discuss the role of home agent and foreign agent in Mobile IP. [CO-1][L-2] **2×10**

PART-A

- Q.2 a) Draw and explain the architecture of mobile computing with design considerations. [CO-2][L-2] **10**
- b) Describe various mobile computing devices and also discuss various applications and challenges in mobile computing. [CO-2][L-2] **10**
- Q.3 a) With the help of a diagram explain the various system architectures in IEEE 802.11. [CO-2][L-3] **10**
- b) Demonstrate the concept of IP micro-mobility with the help of its three prominent approaches: cellular IP, HAWAII and Hierarchical Mobile IPV6. [CO-3][L-3] **10**
- Q.4 a) Explain WSP/B over WTP, session establishment, suspension and termination in detail. [CO-4][L-2] **10**
- b) Draw and explain the architecture of WAP 1.X. [CO-4][L-2] **10**

PART-B

- Q.5 a) Define 'CODA'. Explain the three states of client in CODA. [CO-4][L-2] **12**
- b) Describe the various components of data video broadcasting systems. [CO-4][L-2] **8**
- Q.6 a) Explain 'mobile ad-hoc network' with routing based on destination sequence distance vector. What is the need of ad-hoc networks? [CO-5][L-2] **10**
- b) Classify various types of ad-hoc routing protocols. Discuss about route discovery and route maintenance in dynamic source routing. [CO-5][L-4] **10**
- Q.7 a) Describe briefly Kangaroo and Joey model. How will you handle movement and disconnections in Kangaroo and Joey transaction model [CO-5][L-2] **12**
- b) Define 'transaction and team transaction'. List its various properties in detail. [CO-5][L-2] **8**

End Semester Examination, May 2023

B. Tech. – Sixth Semester DEEP LEARNING (BEC-DS-603)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Why are GANs so popular in deep learning? [CO-1][L-1]
- b) What is the meaning of bagging and boosting in deep learning? [CO-4][L-3]
- c) Why is Leaky ReLu function used in deep learning? [CO-3][L-2]
- d) What are hyper parameters in deep learning? [CO-2][L-1]
- e) What is back propagation? [CO-4][L-2]
- f) What are the elements in tensor flow that are programmable? [CO-2][L-2]
- g) What is VGG-16 architecture? [CO-3][L-2]
- h) What are the advantages of using intel open VINO toolkit? [CO-1][L-1]
- i) What is ResNet architecture in CNN? [CO-5][L-3]
- j) What is gated recurrent unit in RNN? [CO-5][L-3] **2×10**

PART-A

- Q.2 a) How do machine learning and deep learning differ from each other? Explain with examples. [CO-1][L-2] **10**
b) What do you understand by neural network? Why are they used in deep learning? [CO-1][L-2] **10**
- Q.3 a) Discuss the different types of activation functions used in deep learning. [CO-2][L-2] **10**
b) What are the supervised learning algorithms in deep learning? Explain in detail. [CO-2][L-2] **10**
- Q.4 a) What are the applications on RNN and CNN with reference to deep learning? [CO-3][L-3] **10**
b) Discuss encoder and decoder RNN in detail. [CO-3][L-3] **10**

PART-B

- Q.5 a) Explain deep Boltzmann machine with reference to deep learning? Why is CNN better than DBM? [CO-3][L-3] **10**
b) Why do we prefer CNN over ANN for image data? [CO-3][L-3] **10**
- Q.6 a) Discuss some real-world case studies with reference to deep learning. [CO-4][L-4] **10**
b) What are the different types of pooling? Explain their characteristics. [CO-3][L-3] **10**
- Q.7 Write short notes on:
a) Deep learning frameworks. [CO-4][L-2] **10**
b) Intel one API toolkit. [CO-4][L-2] **10**

End Semester Examination, May 2023
B. Tech. — Sixth Semester
MICROWAVE THEORY AND TECHNIQUES (BEC-DS-611)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

- Q.1 a) What are passive microwave components? Give two examples. [CO1][L-1]
b) Name two dominant modes for circular waveguides. [CO-2][L-1]
c) Mention two properties of scattering matrix. [CO-3][L-2]
d) Calculate the cut off wavelength in a standard rectangular waveguide operating in TM₁₁ mode. [CO-2][L-4]
e) Define coupling factor of a directional coupler. [CO-3][L-1]
f) Two identical directional couplers are used in a waveguide to sample the incident and reflected powers. The output of two couplers is found to be 2.5 mW and 0.15 mW. Find the value of VSWR in the waveguide. [CO-5][L-4]
g) What is frequency pushing with reference to a Magnetron? [CO-4][L-1]
h) Calculate the range of RADAR in nautical miles if the round trip travel time is 3 μ s. [CO-5][L-4]
i) Give an application of PIN Diode. [CO-4][L-1]
j) Name the technique for measurement of medium microwave power. [CO-5, L-1] **2 \times 10**

PART-A

- Q.2 a) What are microwave frequencies? What are their frequency bands as designated by IEEE? [CO-1][L-1] **10**
b) Discuss the major applications of microwave frequencies. [CO-1][L-1] **10**
- Q.3 a) A 5 GHz signal is propagated in a rectangular waveguide with dimensions of 5cm \times 2.5cm. Assuming the dominant mode, calculate the cut off wavelength (λ_c), guide wavelength (λ_g), group velocity (V_g), phase velocity (V_p) and characteristic impedance of the waveguide. [CO-2][L-4] **10**
b) Show that a waveguide acts as a high pass filter. [CO-2, L-3] **10**
- Q.4 a) Applying the properties of scattering matrix. Also, derive the scattering matrix of E-H plane Tee. [CO-3][L-3] **10**
b) Explain the working of a circulator and isolator. [CO-3][L-1] **10**

PART-B

- Q.5 a) Explain any four limitations of a conventional tube for their operation at microwave frequencies. [CO-4][L-2] **10**
b) What are slow wave structures? Explain how a helical TWT achieves amplification. [CO-4][L-2] **10**
- Q.6 Write short notes on:
a) PIN diode. b) Varactor diode.
c) GUNN diode. d) IMPATT diode. [CO-4][L-1] **5 \times 4**
- Q.7 a) Explain the technique for measurement of frequency with the help of a block diagram. [CO-5][L-2] **8**
b) Derive the simple form of RADAR range equation. [CO-5][L-4] **12**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
WIRELESS SENSOR NETWORKS AND MIMO (BEC-DS-618)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 Tiny OS? Where is it used? [CO-2] [L-2]
 - b) List the applications of wireless sensor networks. [CO-1] [L-2]
 - c) State the important characteristics of WSN. [CO-1] [L-2]
 - d) Mention some examples of sensor nodes. [CO-3] [L-2]
 - e) What is the role of gateway in WSN? [CO-1] [L-2]
 - f) Which frequencies are used in WSN? [CO-2] [L-2]
 - g) Cite various features of MANET. [CO-1] [L-3]
 - h) Define the term QOS. [CO-2] [L-2]
 - i) How cellular network is different from wireless sensor networks? [CO-1] [L-2]
 - j) What are the performance matrices in WSN? [CO-2] [L-2] **2×10**

PART-A

- Q.2 a) Discuss the design issues in wireless sensor networks. [CO-2] [L-5] **10**
b) Compare mobile adhoc network and wireless sensor network. [CO-3] [L-2] **10**
- Q.3 a) Discuss the classification of routing protocols for wireless sensor networks. [CO-3] [L-4] **10**
b) Discuss in detail the contention based MAC protocols. [CO-1] [L-2] **10**
- Q.4 a) What factors the quality of service in sensor network depends. [CO-3] [L-2] **10**
b) What is data dissemination? Discuss various methods of data dissemination. [CO-3] [L-2] **10**

PART-B

- Q.5 a) Elaborate in detail the concept of gateway with different scenarios in WSN. [CO-4] [L-3] **10**
b) Discuss in detail various design principles for WSNs. [CO-4] [L-3] **10**
- Q.6 a) Design MIMO channel model used in communication. [CO-3] [L-5] **10**
b) Explain the role of equalizer in MIMO systems. [CO-3] [L-4] **10**
- Q.7 a) What are the characteristics of fading channel? Derive the expression for channel capacity of MIMO systems with fading channels. [CO-5] [L-6] **10**
b) Calculate the capacity of MIMO systems. [CO-5] [L-6] **10**

End Semester Examination, May 2023

B. Tech. – Sixth Semester SYSTEM VERILOG (BEC-DS-622)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

- Q.1
- a) Explain logic synthesis process of VLSI design flow. [CO1][L2]
 - b) What is the importance of level partitioning in verification. [CO1][L2]
 - c) Define enumeration and string data types in system verilog? [CO2][L1]
 - d) What is the difference between == and === operator? [CO2][L1]
 - e) Why forever is used instead of always in program block? [CO3][L3]
 - f) What do you understand by parameterized classes? [CO3][L2]
 - g) Explain the scoreboard class of testbench architecture. [CO4][L2]
 - h) What is a virtual interface in SV? [CO4][L2]
 - i) Define coverage and illustrates its various types. [CO5][L3]
 - j) What is the difference between \$random and \$urandom? [CO5][L2] **2×10**

PART-A

- Q.2
- a) Illustrate the design flow of VLSI system. [CO1][L3] **7**
 - b) Write short notes on verification:
 - i) planning ii) approaches iii) matrices. [CO1][L2] **7**
 - c) Discuss emulation, hardware and software verification techniques with block diagram. [CO1][L2] **6**
- Q.3
- a) Classify the data types used in system verilog verification. [CO2][L4] **7**
 - b) Define SV verification function and task with example. [CO2][L3] **7**
 - c) What is the difference between system verilog dynamic and associated array? [CO2][L2] **6**
- Q.4
- a) What is the need for a virtual interface in system verilog? Explain with example. [CO3][L3] **7**
 - b) Discuss the importance of program block in SV verification. [CO3][L3] **7**
 - c) Explain overriding and overloading class with examples. [CO3][L2] **6**

PART-B

- Q.5
- a) Draw and explain the SV test bench architecture. [CO4][L4] **7**
 - b) Discuss the different types of test benches and their applications. [CO4][L4] **6**
 - c) Explain how to verify the RTL design using functional verification approach. [CO4][L3] **7**
- Q.6
- a) Write short notes on test bench components:
 - i) generator ii) environment iii) test bench-top. [CO4][L2] **6**
 - b) Explain SV verification randomization and write a program to generate external constraint. [CO5][L3] **7**
 - c) Write the system verilog test bench program for full-adder. [CO5][L3] **7**
- Q.7
- a) Draw and explain the coverage flow diagram and also discuss its importance in SV verification. [CO5][L3] **7**
 - b) Discuss the difference between 'constrained random verification' and 'coverage driven verification'. [CO5][L2] **6**
 - c) Explain direct programming interface (DPI) and how it helps to interface system verilog verification with other languages? [CO5][L3] **7**

End Semester Examination, May 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 Answer the following in brief:

- a) Define 'look angles'. [CO-2] [L1]
- b) What are the frequency bands allocated for satellite communication? [CO-1][L1]
- c) State Kepler's law of planetary motion. [CO-1][L1]
- d) Calculate the EIRP of a satellite downlink which at 12Ghz operates with a transmit power of 6W and an antenna gain of 42.2db. [CO-3][L4]
- e) Differentiate between FDMA and TDMA. [CO-4][L3]
- f) What do you mean by intermodulation products and effects in FM systems? [CO-4][L1]
- g) Differentiate between 'active and passive satellites'. [CO-1][L3]
- h) Discuss the role of eclipse effects. [CO-2] [L2]
- i) A satellite in an elliptical orbit has an apogee of 30,000km and a perigee of 3000km. Determine the semi-major axis of the elliptical orbit. [CO-2] [L4]
- j) Compare between single carrier pre-carrier systems and companded single sideband systems. [CO-4] [L4] **2×10**

PART-A

- Q.2 a) Describe the block diagram of satellite communication system and explain each block in detail. [CO-1] [L2] **14**
b) List the various advantages of satellite communication. [CO-1] [L4] **6**
- Q.3 a) Discuss various orbital perturbations and parameters required for orbit determination in satellite communication. [CO-2][L2] **15**
b) The Semi major axis and the semi minor-axis of an elliptical satellite orbit are 30000km and 18000km respectively. Determine the apogee and perigee distances. [CO-2][L3] **5**
- Q.4 a) Derive the expression for Complete link design equation for satellite communication. [CO-3] [L6] **10**
b) Generate the expression for System noise temperature, C/N and G/T ratio. [CO-3] [L6] **10**

PART-B

- Q.5 a) Prove that for FM signal $(S/N)_o = (C/N)I^2 / 3(1+m)^2$. [CO-3] [L5] **12**
b) Describe satellite digital link design in detail. [CO-4] [L2] **8**
- Q.6 a) Summarize time division multiple access and explain TDMA frame structure in detail. [CO-4] [L5] **12**
b) Analyze demand assignment multiple access techniques (DAMA). [CO-4] [L4] **8**
- Q.7 Write short notes on **(any two)**:
 - a) GPS.
 - b) VSAT.
 - c) Laser satellite communication. [CO-5] [L2] **10×2**

End Semester Examination, May 2023
OPEN ELECTIVE – COMMON FOR ALL BRANCHES
SOLAR TECHNOLOGY (BEC-OE-003)

Time: 3 hrs.
100

Max Marks:

No. of pages: 1

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

- Q.1 a) An amount of 300Wh energy is consumed in 5 hour. Evaluate its consumed power. [CO-1] [L-4]
b) List three energy sources that are considered to be inexhaustible. [CO-1] [L-1]
c) State MPPT. [CO-3] [L-1]
d) Define principle of solar cell with pictorial diagram. [CO-2] [L-4]
e) Identify fault detection steps in PV module. [CO-2] [L-3]
f) A DC fan works on 24V and while running it takes 3A current. Calculate the DC power consumed by Fan. [CO-2] [L-4]
g) Input DC power of an inverter is 300 W. Output AC power efficiency is 250 W. Calculate the efficiency of the inverter. [CO-4] [L-4]
h) Define role of compass in solar setup design. [CO-4] [L-2]
i) Classify various types of wires. [CO-2] [L-3]
j) State Safety measures taken in Installation of Solar PV Systems. [CO-5] [L-3] **2×10**

PART-A

- Q.2 a) Differentiate renewable and Non renewable energy sources. [CO-1] [L2] **12**
b) Evaluate factors affecting electricity and its implication in country development. [CO-1][L4] **8**
- Q.3 a) Illustrate the various solar PV module array connections. [CO-2] [L-3] **12**
b) Justify the role of Batteries in Solar System. [CO-2] [L-2] **8**
- Q.4 a) Describe types of power converters in detail. [CO- 3] [L- 2] **10**
b) Analyze the features, working and types of charge converters. [CO- 3] [L- 4] **10**

PART-B

- Q.5 a) Describe types of solar PV systems. Explain hybrid and standalone PV system in details. [CO-4] [L2] **12**
b) Categorize the various configuration of Grid Connected Solar PV system. [CO-4][L3] **8**
- Q.6 Write short notes on **any two** of the following:
a) Features of solar design lab software.
b) Complex RCC site design of 400KW.
c) Solar Access shading and loss calculation. [CO-4][L-2] **10×2**
- Q.7 Review Solar PV plant installation checklist and explain installation and trouble shooting of solar PV power plant. [CO-5] [L2] **20**

End Semester Examination, May 2023
OPEN ELECTIVE – COMMON FOR ALL BRANCHES
EVERYDAY ELECTRONICS (BEC-OE-004)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 a) Define 'Luminance signal'. [CO3][L1]

- [CO3], L-1, (2)
- b) Describe active and passive components with examples. [CO1][L-2]
 - c) Define 'diffusion current and drift current'. [CO2][L-1]
 - d) Calculate the value of resistor which has first three-color band as orange, yellow and black. [CO3][L-1]
 - e) Define 'Transistor' and explain its types with symbols. [CO1][L-2]
 - f) Define 'reflector-based antennas'. [CO4][L-1]
 - g) Define 'actuators'. [CO5][L-2]
 - h) Define microwave communication with its range. [CO4][L-1]
 - i) List five special function registers. [CO5][L-3]
 - j) Define the term 'Mechatronics'. How robots work? [CO4][L-2] **2×10**

PART-A

- Q.2 a) With the help of diagram explain PN junction diode with its biasing conditions and also draw its V-I characteristics. [CO2][L-2] **10**
b) Explain various advantages and disadvantages of electronics with various applications. [CO2][L-2] **10**
- Q.3 a) Explain LED and Varactor Diode in detail. [CO2][L-2] **10**
b) Explain the term transistor and also describe the operation of PNP transistor. [CO2][L-2] **10**
- Q.4 a) Explain transmission and reception of television signal. [CO3][L-2] **10**
b) What is Android? Why do we use Android? Explain its main features. [CO3][L-2] **10**

PART-B

- Q.5 a) Explain the working principle of RADAR with its block diagram. [CO4][L-2] **10**
b) Define SONAR and also describe its principle with its applications. [CO4][L-2] **10**
- Q.6 a) What is microwave communication? Explain EM spectrum in brief. [CO5][L-1] **10**
b) Give brief introduction about working of air conditioner, refrigerators and Washing machine. [CO5][L-2] **10**

- Q.7 a) Draw pin diagram of 8051 Microcontroller and explain each pin in brief. [CO5][L-2] **10**
 b) Define robotics and differentiate between actuators and sensors. [CO-5][L-2] **10**

End Semester Examination, May 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
- a) In IPV6 addressing, how many bytes are present? [CO1] [L1]
 - b) Classify different data types in IOT. [CO5] [L1]
 - c) Which class does 221.0.0.0 belong to? [CO3] [L3]
 - d) Differentiate between industrial and consumer IOT. [CO1] [L2]
- [CO1] [L2]**
- e) In class A, how many network id and host id are present? [CO1] [L2]
 - f) How many digital pins are present in Arduino? [CO4] [L3]
 - g) Explain the basic structure of Arduino program. [CO4] [L2]
 - h) Define OSI model and where it is used. [CO4] [L1]
- [CO4] [L1]**
- i) Elaborate the role of internet of things in smart parking system. [CO5] [L2]
 - j) Differentiate between static and dynamic IP addressing. [CO3] [L1] **2×10**

PART-A

- Q.2
- a) Elaborate in detail various components of IOT. [CO1] [L2] **10**
 - b) Describe the layered architecture of IoT systems in detail. [CO1] [L2] **10**
- Q.3
- a) Compare and contrast between IoT and M2M. Discuss in detail the IoT and M2M standardized architecture. [CO2] [L5] **10**
 - b) Mention in detail the various features of M2M. [CO2] [L2] **10**
- Q.4
- a) Classify different types of communication networks. [CO3] [L2] **10**
 - b) Cite the differences between IPv4 and IPv6. [CO3] [L5] **10**

PART-B

- Q.5
- a) Write down a program to blink LED connected on pin no. 13 on Arduino board. [CO4] [L6] **10**
 - b) Draw the pin diagram of Arduino development board. [CO4] [L2] **10**
- Q.6
- a) Elaborate various challenges in the implementation of IOT. [CO4] [L4] **10**
 - b) Discuss in details various security requirements in IOT. [CO4] [L2] **10**
- Q.7
- a) Discuss in detail how the IoT technology is impacting the healthcare sector and changing our everyday lifestyle with the following examples:
 - i) Health and fitness monitoring.
 - ii) Wearable electronics. [CO5] [L2] **10**

b) Write notes on the implementation of IOT in the following:

- i) Smart home automation
- ii) Smart irrigation system.

[CO5] [L2] **5×2**

End Semester Examination, May 2023

B. Tech. – First Semester

BASIC ELECTRICAL ENGINEERING

(BEE-101/BEE-101A/ESC-EE-101)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

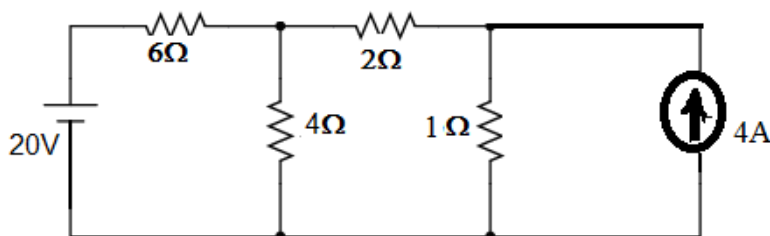
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following in brief:

- a) Find the equivalent current source for a given voltage source. [CO1][L3]
- b) The power dissipated in a pure inductor is _____. [CO1][L3]
- c) An alternating voltage of $220\sin\omega t$ is connected across a coil. Find the peak value of voltage. [CO1][L2]
- d) What is the power factor of a series RLC network at resonance? [CO1][L3]
- e) What are the electrodes and electrolyte used in lead acid battery? [CO1][L1]
- f) State two advantages of three phase system over single phase system. [CO3][L2]
- g) List two difference between star and delta connected system. [CO3][L2]
- h) Name the different losses in a transformer. [CO4][L1]
- i) What is a commutator? [CO4][L3]
- j) Can an induction motor run at synchronous speed? Justify your answer. [CO4][L2] **2×10**

PART-A

- Q.2 a) Explain superposition theorem. [CO2][L1] **10**
b) Obtain the current in the 2Ω resistor using superposition's theorem.



[CO2][L4] **10**

- Q.3 a) A coil of resistance 100Ω and an inductance of 100 mH is connected in series with a capacitance of $85\mu\text{F}$ across 240 V ac supply. Calculate i) impedance ii) magnitude of current, ii) power factor, iv) voltage across the capacitance and v) power dissipated in the network. [CO2][L2] **10**
b) Derive the relation between phase voltage and line voltage for a star connected system. [CO3][L2] **10**
- Q.4 a) Derive the condition of maximum efficiency of a transformer. [CO4][L2] **8**
b) Differentiate the core and shell type transformer. [CO4][L2] **6**
c) Explain the hysteresis loop of a magnetic material. [CO4][L2] **6**

PART-B

- Q.5 a) Draw and explain the parts of dc machine. [CO4][L3] **10**
 b) Derive the emf equation of dc machine. [CO4][L2] **5**
 c) State the applications of dc shunt motor. [CO4][L2] **5**
- Q.6 a) Explain the working of a three phase induction motor. [CO3][L2] **10**
 b) Explain the working of any two types of single phase induction motors. [CO4][L3] **10**
- Q.7 a) What is earthing? Why is it necessary? [CO1][L1] **5**
 b) Explain the working of lead acid battery with charging and discharging equations. [CO1][L2] **10**
 c) Differentiate between MCB and MCCB. [CO1][L2] **5**

End Semester Examination, May 2023
B. Tech. — Third Semester
ELECTRICAL CIRCUIT AND ANALYSIS (BEE-DS-301)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 3

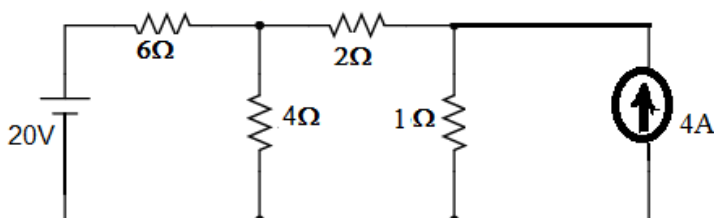
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following in brief:

- | | |
|--|-------------------------|
| a) Write the significance of Thevenin and Norton theorem. | [CO-1][L-1] |
| b) How the concept of duality and dual networks relates. | [CO-1][L-2] |
| c) List any two properties of inverse Laplace transform. | [CO-2][L-2] |
| d) Discuss steady state representation of induction and capacitor. | [CO-2][L-2] |
| e) Define transmission parameters of two port network. | [CO-3][L-2] |
| f) Which parameters are used in parallel connection and 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) State properties of Reduced Incidence matrix. | [CO-1][L-1] |
| j) Define tree, graph, twig and link. | [CO-1][L-1] 2×10 |

PART-A

Q.2 a) Find the current flowing in the $4\ \Omega$ resistor using superposition theorem:



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

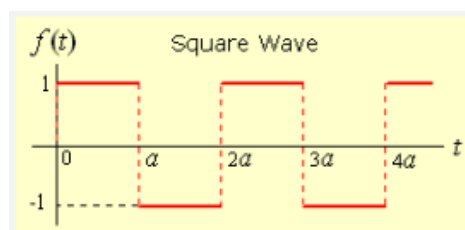
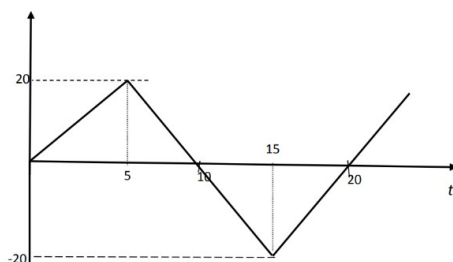
b) Explain the concept of duality and dual networks with a circuit diagram.

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

Q.3 a) Derive an expression for transient response of series RLC circuit with step input.

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

b) Obtain the waveform analysis of given waveforms also find its Laplace transform.



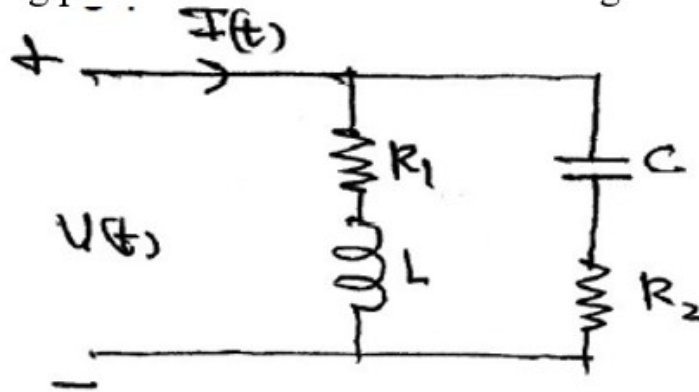
[CO-2][L-3] **10**

Q.4 a) Plot the poles and zeros for the given function:

$$H(s) = \frac{(3s+6)}{s^3+3s^2+7s+5}$$

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

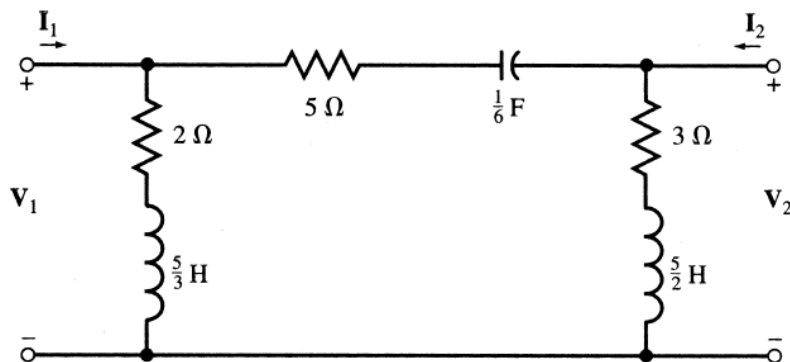
b) Calculate the driving point admittance of the network shown in the figure:



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

PART-B

Q.5 a) Obtain the Y parameters of the following network:

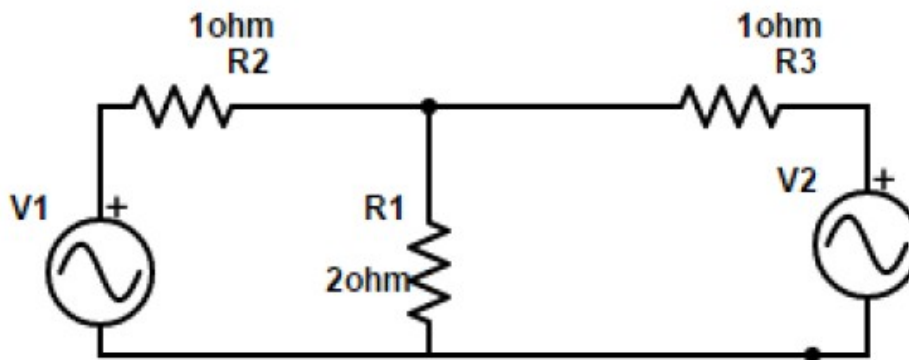


[CO-3][L-3] **10**

b) Explain the interconnection of two- port networks for parallel connections.

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

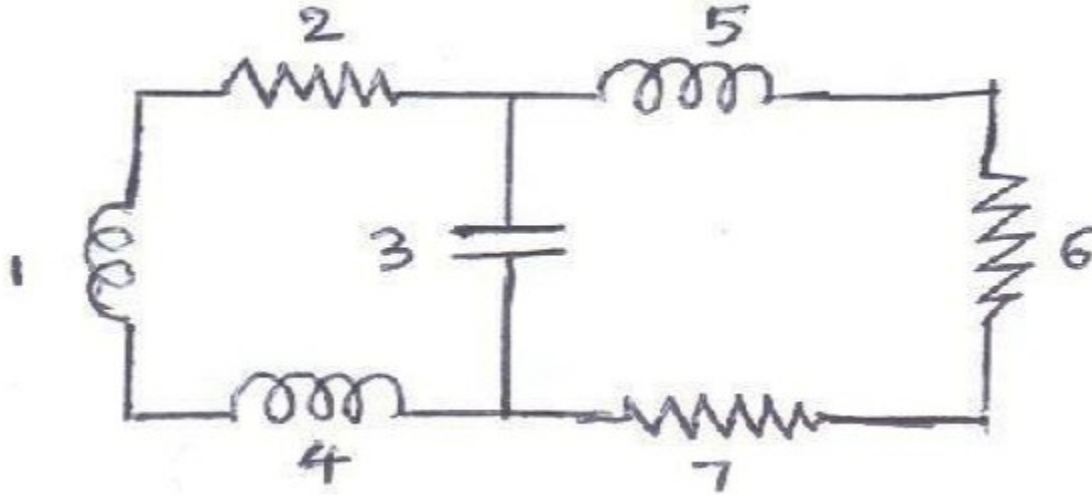
Q.6 a) Find the image parameters of the following circuit:



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

b) Describe the analyze process of m-derived low pass filter with expressions.

Q.7 a) For the given network draw graphs, tree, twigs and links:

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

b) Write short note on:

- i) Loop matrix.
- ii) Cut set matrix.

[CO-1] [L-2] **5×2**

End Semester Examination, May 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:

- What is the relationship between reluctance, flux and mmf?
- In context of DC machines, the lap winding has several paths. Thus this is more suited for _____.
- What are the drawbacks of brake test on DC machines?
- What are the conditions to be fulfilled for a dc shunt generator to build up emf?
- Why starters are used for DC motors?
- Define voltage regulation in a transformer.
- A transformer with 120V, 800 turns in primary and 12V in secondary. How many turns would be required in the secondary?
- List three advantages of the three-phase transformer over three single-phase transformers while transferring three-phase voltage?
- What are the applications of winding taps?
- List the advantages of PMDC over fractional KW motor? [CO-1,2,3,4][L-1,2] **2×10**

PART-A

- Q.2
- At every point, magnetic field lines are nearly normal to the surface of a ferromagnet. Why? [CO-1][L-2] **10**
 - Derive an expression for the torque as a partial derivative of stored energy. [CO-1][L-2] **10**
- Q.3
- Explain the process of commutation in a DC generator. [CO-2][L-2] **10**
 - Calculate the emf generated by a 4 pole wave wound armature having 45 slots with 18 conductors per slot. When driven at 1200 rpm the flux per pole is 0.016Wb. [CO-2][L-3] **10**
- Q.4
- Explain the speed control of DC shunt motor. [CO-2][L-2] **10**
 - A dc series motor draws a current of 44 A at 220 V running at 820 RPM. The armature and field resistances are 0.2 ohm and 0.1 ohm respectively. The total of iron and friction losses at this load condition is 0.5 kW. Determine the armature torque and efficiency of the motor. [CO-2][L-5] **10**

PART-B

- Q.5
- Draw the labeled phasor diagram of the single phase transformer supplying load at leading power factor. [CO-3][L-2] **10**
 - A 500kVA transformer has iron losses of 2600W and copper losses of 7400W at full load. Calculate its efficiency at $\frac{3}{4}$ full load at unity pf and 0.9 pf lagging. [CO-3][L-3] **10**
- Q.6
- Explain the construction and working of an autotransformer. [CO-3][L-2] **10**
 - Explain with neat circuit diagram the Scott connection scheme for conversion of three phase supply to two phase supply. Name one application of the same. [CO-3][L-2] **10**
- Q.7
- Derive the torque equation for reluctance motor. [CO-4][L-2] **10**

- b) Explain the constructional features of permanent magnet brushless DC motor. [CO-3][L-2] **10**
(CO-4)(L-2] **10**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

ELECTRICAL MACHINES II (BEE-DS-401)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

- Q.1
- a) Enlist losses the present in induction motor but not in transformer. [CO-1][L-1]
 - b) What is meant by slip? [CO-1][L-1]
 - c) Name different insulating materials used in electrical machines. [CO-2][L-1]
 - d) What is the difference between magnetic field produced by single phase and polyphase supply? [CO-2][L-2]
 - e) Why winding slots are skewed in 3- ϕ induction motor? [CO-3][L-1]
 - f) Why are alternators rated in KVA and not in kW? [CO-3][L-2]
 - g) List applications of a single phase induction motor. [CO-4][L-2]
 - h) Why is cylindrical rotor alternator selected for stream turbine? [CO-4][L-1]
 - i) What are the functions of a damper winding? [CO-5][L-2]
 - j) How many windings are there in the stator of 1-phase induction motor? [CO-5][L-2] **2×10**

PART-A

- Q.2
- a) Explain emf generation in rotating electrical machines. [CO-1] [L-1] **10**
 - b) Compare different enclosures used in electrical machines. [CO-1] [L-3] **10**
- Q.3
- Evaluate the production of three rotating magnetic field in an electrical machine. [CO-2] [L-3] **20**
- Q.4
- a) Derive the torque equation of three phase induction motor. [CO-3] [L-3] **10**
 - b) A 400 V, 3 phase delta connected induction motor gave following results on no load test: 400 V; 3.0 A; 645 Watts.
Friction and wind age losses are 183 watts. Determine no load power factor, energy and magnetizing components of no load current. [CO-3] [L-4] **10**

PART-B

- Q.5
- a) Using Ferrari's theory, explain the concept of phase splitting in single phase induction motor. [CO-3] [L-1] **10**
 - b) With the help of a diagram explain capacitor start single phase induction motor. [CO-3] [L-2] **10**
- Q.6
- a) Differentiate between 'rotating armature' and 'rotating field' type of synchronous generators. [CO-4][L-4] **10**
 - b) Draw equivalent circuit of a three phase induction motor. [CO-4][L-2] **10**
- Q.7
- a) Draw and explain V curve of a synchronous motor. [CO-5][L-2] **10**
 - b) Write a short note on 'synchronous condenser'. [CO-5][L-1] **10**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

POWER SYSTEMS-I (BEE-DS-402A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following in brief:

- a) Enumerate the advantages and disadvantages of hydropower plants. [CO-1][L-2]
- b) What is the use of spill ways? [CO-1][L-1]
- c) Differentiate between fixed and operating costs of power plants. [CO-2][L-2]
- d) How sub-stations are classified? [CO-3][L-2]
- e) What is a voltage surge? Draw a typical lightning voltage surge. [CO-4][L-2]
- f) What is the need for overlapping the zones of protection? [CO-4][L-2]
- g) What is the application of bewley lattice diagram? [CO-4][L-2]
- h) How many different types of renewable energy are there? [CO-5][L-1]
- i) What is the type of generator used in wind power plant? [CO-5][L-2]
- j) Why high voltage is preferred for power transmission? [CO-3][L-1] **2×10**

PART-A

- Q.2 a) Explain the construction and working of Thermal power plant with a layout. [CO-1] [L-2] **10**
- b) Discuss why?
- i) Nuclear power plants are used only as base load plants.
 - ii) A nuclear reactor needs a moderator material.
 - iii) Control rods are used in nuclear power reactor. [CO-1] [L-2] **6**
- c) Justify the statement, "Hydro power plants are used as a peak load power plants." [CO-1] [L-2] **4**
- Q.3 a) What is the significance of load factor and diversity factor in the cost of the supply of electrical energy? [CO-2] [L-2] **4**
- b) A consumer has the following connected loads: 10 lamps of 60 W each and two heaters of 1000 W each. His maximum demand is 1500 W. On the average he uses 8 lamps 5 hours a day and each heater for 3 hours a day. Find his average load, monthly energy consumption and load factor. [CO-2] [L-2] **6**
- c) What type of tariff is employed for domestic consumers? Why this tariff is not employed for bulk consumers? Discuss various tariff used in power system economics. [CO-2][L-2] **10**
- Q.4 a) Derive the capacitance of a three-phase overhead line. [CO-3] [L-3] **10**
- b) Explain the following:
- i) Corona effect.
 - ii) Disruptive critical voltage.
 - iii) Visual critical voltage.
 - iv) Corona power loss. [CO-3] [L-3] **10**

PART-B

- Q.5 a) A single phase two wire feeder, 1500m long, supplies a load of 60A at 0.8 p.f, 40A at 0.85 p.f and 50A at 0.88 p.f lagging at distances of 600, 1200 and 1500 meters respectively from the feeding point. The resistance and reactance of the feeder

per Km length are 0.06 and 0.1 ohms respectively. If the voltage at the far end is to be maintained at 220V. Calculate the voltage at the sending end and its phase angle with respect to the receiving end voltage. [CO-3][L-3] **10**

b) List out the Comparisons between AC and DC distribution systems. [CO-3][L-2] **10**

Q.6 a) What is a surge diverter? What is the basic principle of operation of a surge diverter? [CO-4][L-2] **10**

b) Explain INSULATION COORDINATION as used in power system in detail. [CO-4][L-2] **10**

Q.7 a) Draw and explain PV characteristics of solar cell. [CO-5][L-2] **6**

b) Write a note on 'tidal energy source'. [CO-5][L-2] **4**

c) Why induction generators are used in wind mills. Explain the construction and working of induction generator. [CO-5] [L-2] **10**

End Semester Examination, May 2023
B. Tech. – Fourth Semester
FUNDAMENTALS OF ELECTRIC AND HYBRID VEHICLES
(BEE-DS-421)

Time: 3 hrs.
100

Max Marks:

No. of pages: 1

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

- Q.1
- a) Explain the effect of gear ratio on vehicle torque and rpm. [CO-1][L-1]
 - b) Enumerate the expression of power used in electric vehicles. [CO-1][L-2]
 - c) Describe the effect of an aerodynamic drag on the speed of vehicles. [CO-2][L-1]
 - d) Determine battery energy capacity. [CO-3][L-2]
 - e) Comment on the social and environmental importance of hybrid electric vehicles. [CO-2][L-1]
 - f) Enlist the types of electric braking employed in electric vehicles. [CO-3][L-2]
 - g) Explain the parameter SOC and DOD of battery. [CO-3][L-2]
 - h) Determine the significance of back EMF in DC Motors. [CO-2][L-2]
 - i) Express the importance of slip in controlling speed of induction motors. [CO-4][L-2]
 - j) List the types of charging techniques employed in electric vehicles. [CO-4][L-1] **2×10**

PART-A

- Q.2
- a) Comment on major reasons for the development of electric and hybrid electric vehicles and challenges faced in the prevalent system. [CO-1][L-2] **10**
 - b) Compare the components required in electric vehicles with IICE-based vehicles. [CO-1][L-2] **10**
- Q.3
- Enlist the different modes of hybrid vehicle drive trains and discuss the parallel drive train in detail. Describe the power flow modes of operation in parallel hybrid configuration. [CO-1][L-2] **20**
- Q.4
- a) Explain the method to control the speed of DC Drives by changing the armature voltage by employing converters. [CO-3][L2] **10**
 - b) Discuss the operation of brushless DC motors and list its implication in electric vehicles. [CO-2][L-2] **10**

PART-B

- Q.5
- a) Discuss the different types of Batteries. Which types of batteries are relevant in today's EV Market? [CO-3][L-2] **10**
 - b) Discuss the concept of features, principle of operation and performance of ultracapacitors. [CO-2][L-2] **10**
- Q.6
- a) A EV battery has a capacity of 15 kWh. Assuming the effective capacity used in the beginning is 85% and end of life is 70% of capacity, what is the range (km) that the vehicle (using 80 Wh/km) can support, when the battery is new? What range (km) will it support at the end of life? [CO-4][L2] **10**
 - b) Discuss the concept of fast charging, slow charging and battery swapping. [CO-3][L-2] **10**

- Q.7 Describe the guidelines and standards of charging infrastructure for electric vehicles in India as per the NITI Aayog. [CO-4][L-2] **20**

End Semester Examination, May 2023

B. Tech. – Fifth Semester

CONTROL SYSTEMS (BEE-DS-502)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

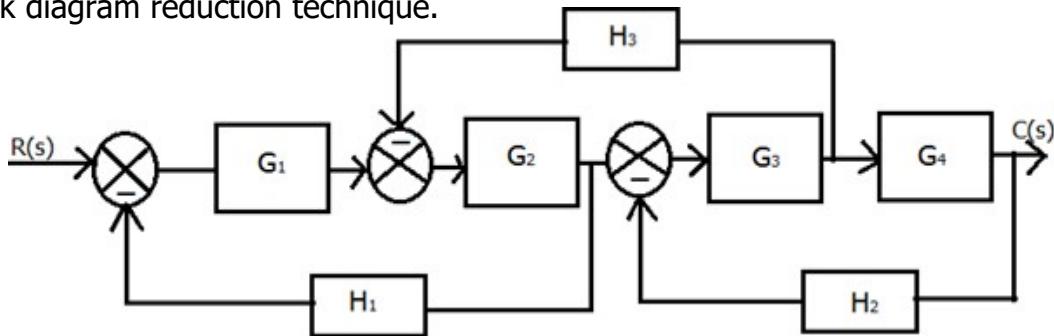
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following in brief:

- a) Give an example each of open loop and closed loop system. [CO1][L2]
- b) Describe '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 is break away point in root locus analysis? [CO2][L2]
- g) Define 'controllability'. [CO1][L2]
- h) What is the significance of corner frequency? [CO3][L2]
- i) Draw the polar plot of transfer function $\frac{K}{S(1+ST_1)}$. [CO2][L2]
- j) Name time domain specifications of a second order system. [CO3][L1] **2×10**

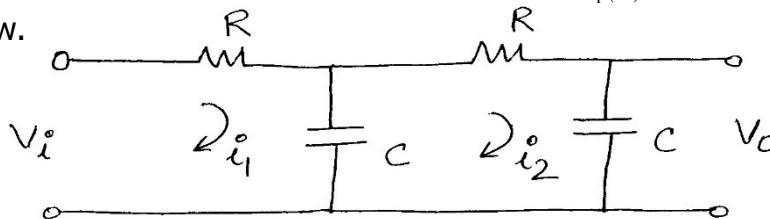
PART-A

Q.2 a) Determine the transfer function $C(S)/R(S)$ of the following block diagrams using block diagram reduction technique.



[CO1],[L3] **10**

b) Derive an expression for transfer function $\frac{V_o(s)}{V_i(s)}$ for the electrical network given below.



[CO 2], [L3] **10**

P. T. O.

- 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**

$$G(s)H(s) = \frac{K}{(s+3)(s+1)(s+2)}$$

b) Draw the root locus of a system with varied from 0 to ∞ . [CO 3], [L3] **10**

- Q.4 a) Explain the steps followed for drawing Bode plot. [CO 3], [L2] **10**
 b) Using Nyquist stability criterion, find the stability of closed loop system with $G(s)H(s) = \frac{10}{s(5s+1)}$. [CO 2], [L3] **10**

PART-B

- Q.5 a) Discuss phase lag compensation with circuit diagram and Bode plot. [CO4][L2] **10**
 b) The open loop transfer function of a unity feedback system is $G(s)H(s) = K/s(s+4)(s+5)$. It is desired that the velocity constant should be at least 5 and the damping ratio should be 0.707. Design a suitable lag compensator using root locus technique. [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 $y = [1 \ 0 \ 0]x$. Find the transfer function model of this state space system. [CO1][L3] **10**

- Q.7 a) What is the significance of performance indices? Explain the common performance indices used in control system. [CO5][L2] **10**
 b) Explain the different non linearities like saturation, dead zone and hysteresis. [CO5][L2] **10**

End Semester Examination, May 2023

B. Tech. – Fifth/Sixth Semester CONTROL SYSTEMS (BEE-DS-502)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

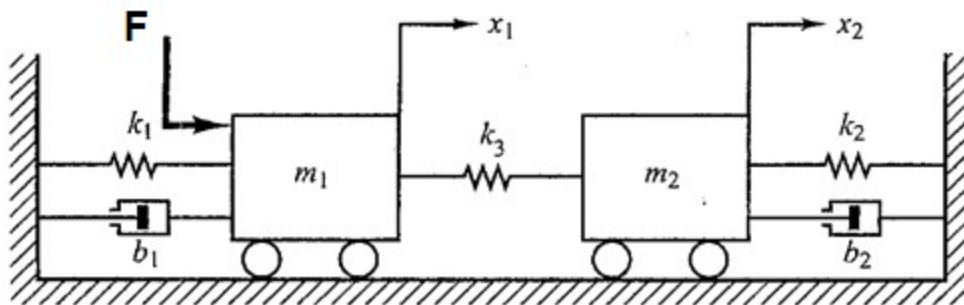
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question

Q.1 Answer the following in brief:

- Compare open loop and closed loop system with an example. [CO1][L1]
- Differentiate between type and order of a system? [CO2][L1]
- Name the types of nonlinearities in a system? [CO5][L2]
- What are difference time domain specifications? [CO3][L2]
- How will you obtain breakaway point in root locus? [CO2][L3]
- What is performance index in optimal control? [CO5][L1]
- State two advantages of state space model. [CO1][L1]
- How will you obtain the transfer function if the state space model (A, B, C matrices) is given? [CO1][L3]
- Define bounded input bounded output stability. [CO2][L1]
- What is Mason Gain's formula? [CO-2][L-1,2] **2×10**

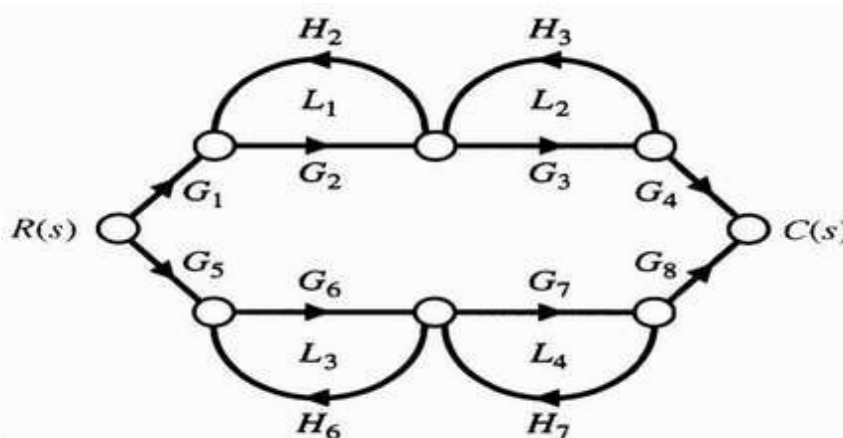
PART-A

Q.2 a) Obtain the transfer function $\frac{X_1(s)}{F(s)}$ of the following mass spring damper system.



[CO1][L3] **10**

b) Obtain the transfer function of following signal flow graph:



- Q.3 a) Discuss the time response of an under damped second order system for unit step input. [CO1][L3] **10**
 b) Using Routh Hurwitz criterion. Find the stability of characteristic equation given as $2s^5 + s^4 + 2s^3 + 4s^2 + s + 6 = 0$ [CO3][L3] **5**
 [CO 2], [L3] **5**

- c) The open loop transfer function of a closed loop system is $G(s)H(s) = \frac{K}{s(s+4)(s+2)}$. Draw the root locus as K is varied from 0 to ∞ . [CO4][L3] **10**

- Q 4 a) A unity feedback control system has $G(s) = \frac{10}{(1+0.1s)(1+0.02s)}$. Draw the bode plot. [CO4][L3] **10**
 b) State and explain Nyquist stability criterion. [CO2][L2] **10**

PART-B

- Q.5 a) Discuss phase lead compensation with circuit diagram and bode plot. [CO5][L2] **10**
 b) Explain the different approaches to control system design. [CO5][L2] **10**

- Q.6 a) Obtain the state space model of the transfer function:
 $\frac{Y(s)}{U(s)} = \frac{2s^2 + 6s + 2}{s^3 + 6s^2 + 11s + 6}$ [CO1][L3] **10**
 b) A linear time invariant system is given by $\dot{x} = Ax$, Given $A = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$. Find the state transition matrix. [CO1][L3] **10**

- Q.7 a) Explain the output regulator problem in optimal control theory. [CO5][L2] **10**
 b) What are the important characteristics of non linear system? [CO5][L2] **10**

End Semester Examination, May 2023
B. Tech. – Fifth Semester
POWER SYSTEM PROTECTION (BEE-DS-525)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 various types of faults in power system. [CO-1] [L-1]
- b) Define 'PSM' and relay pick up as used in power system. [CO-2] [L-2]
- c) How relays are connected in the power system? [CO-2] [L-3]
- d) Why power system is protected in zones? [CO-3] [L-2]
- e) How aliasing effect the signal? [CO-4] [L-2]
- f) Why secondary of the CT is never kept open-circuited? [CO-3] [L-2]
- g) The setting of earth fault relays kept low as compared to that of phase fault relays. Give reason. [CO-4] [L-3]
- h) List out the advantage and disadvantage of EMT. [CO-4] [L-2]
- i) How does a PMU work? [CO-5] [L-2]
- j) Prove that $1+a+a^2=0$. [CO-1] [L-1] **2×10**

PART-A

- Q.2 a) Explain principle of power system protection as used for designing the protection scheme in power system. [CO-1][L-5] **10**
b) How circuit breakers are used as protective device in power system. [CO-2][L-2] **10**
- Q.3 a) Explain the working of an over current relay with help of different inverse-time characteristics. [CO-3] [L-3] **10**
b) Derive the expression for L-L-G fault. [CO-2] [L-3] **10**
- Q.4 a) With the protection scheme for transmission lines in detail. [CO-3] [L-2] **10**
b) Discuss in detail use of differential protection. In what conditions is it necessary to use directional protection in place of differential protection? [CO-3] [L-2] **10**

PART-B

- Q.5 a) Explain 'sampling theorem'. What is phasor estimation using least square method? [CO-4] [L-3] **10**
b) Why digital protective relays are important in power system protection. [CO-4] [L-2] **10**
- Q.6 a) Derive the equivalent circuit of a current transformer. What is the effect of saturation on the CT function? [CO-5] [L-2] **10**
b) Examines the reason for testing of relays while explaining the test done. [CO-4] [L-3] **10**
- Q.7 a) Explain system protection schemes consisting of under-frequency, under-voltage and df/dt relays for a two source equivalent of the power system. [CO-5] [L-2] **10**
b) Discuss units and wide-area measurement systems (WAMS) along with application of WAMS for improving protection systems. [CO-5] [L-2] **10**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

POWER SYSTEMS-II (BEE-DS-601A)

Time: 3 hrs.

Max Marks: **100**

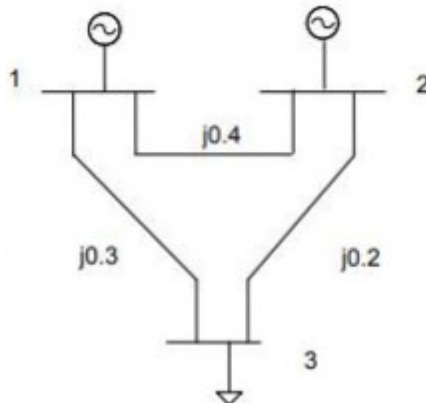
No. of pages: 2

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

- Q.1
- a) What are the quantities specified and to be determined from load flow study for various types of buses. [CO-1][L-2]
 - b) What are the advantages of Gauss-Seidel method? [CO-1][L-1]
 - c) State the advantages of bus admittance matrix and Ybus. [CO-1][L-2]
 - d) Compare G-S method and N-R methods of load flow solutions. [CO-1][L-2]
 - e) Define steady state operating condition. [CO-2][L-2]
 - f) Describe multimachine stability. [CO-2][L-2]
 - g) What is meant by an infinite bus? [CO-2] [L-2]
 - h) What are coherent machines? [CO-3] [L-2]
 - i) List the assumptions made in solving swing equation. [CO-4] [L-2]
 - j) A speed governor system cannot completely eliminate frequency error caused by a step load change in power system. Evaluate this statement. [CO-4] [L-2]
 - k) Contrast the functions of "speed Governor" and "speed changer" in a speed governing systems of a turbine generator set. [CO-4] [L-2]
 - l) What is meant by PMU? [CO-5] [L-1]
 - m) Enlist functions of SCADA. [CO-5] [L-2]
 - n) Why compensation is required in power systems? [CO-3][L-1] **2×10**

PART-A

- Q.2
- a) Explain the step by step computational procedure for the Newton-Raphson method of load flow studies. [CO-1] [L-2] **10**
 - b) Figure shows a three bus power system.
Bus 1 : Slack bus, $V = 1.05/00$ p.u.
Bus 2 : PV bus, $V = 1.0$ p.u. $P_g = 3$ p.u.
Bus 3 : PQ bus, $P_L = 4$ p.u., $Q_L = 2$ p.u.
Carry out one iteration of load flow solution by Gauss Seidel method. Neglect limits on reactive power generation.



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

- Q.3
- a) State and explain equal area criterion. How do you apply equal area criterion to find the maximum additional load. [CO-3] [L-2] **10**
 - b) Describe the step-by-step solution of swing equation, mentioning the assumptions made. [CO-2] [L-2] **10**

- Q.4 a) What is the need of a governing mechanism? Illustrate with neat diagram the operation of speed governing mechanism. [CO-2] [L-2] **10**
b) Explain the following methods of voltage control i) Tap changing transformers ii) Phase shift Transformers. [CO-2] [L-2] **10**

PART-B

- Q.5 a) Illustrate the various functions of energy control centre. [CO-3] [L-3] **10**
b) Explain in detail phasor measurement unit in computer control of power system. [CO-3][L-2] **10**
- Q.6 a) Analyze the coordination equation for economic dispatch including losses and give the steps for economic dispatch calculation, neglecting losses. [CO-4][L-2] **10**
b) A plant has two generators supplying the plant by and neither is to be operated below 20MW or above 135MW. Incremental costs with PG1 and PG2 in MW are $dF_1/dPG_1=0.14PG_1+21$ Rs/MWhr $dF_2/dPG_2=0.225PG_2+16.5$ Rs/MWhr for economic dispatch, find the plant capacity when the demand equals i) 45MW ii) 125 MW iii) 250MW. [CO-4][L-2] **10**
- Q.7 a) The operation of the STATCOM is based on the operation of synchronous machine as rotating synchronous condenser, explain. [CO-5] [L-2] **4**
b) Draw and explain the compensating voltage v/s line current characteristics of TCSC and SSSC. [CO-5] [L-2] **6**
c) Explain how a UPFC is different from a simple VSC. How an UPFC scheme can be implemented using two back to back voltage source converters? Explain the block diagram for a basic UPFC control scheme. [CO-5] [L-2] **10**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

PROGRAMMABLE LOGIC CONTROLLERS AND SCADA (BEE-DS-602)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

- Q.1
- a) Explain the types of automation. [L-1] (CO-1)
 - b) Compare the PLC and PC. [L-2] (CO-2)
 - c) Why a stop button must be normally closed, and a start button must be normally open? [L-1] (CO-3)
 - d) List any four PLC programming languages. [L-1] (CO-2)
 - e) Write name of the software used in Mitsubishi PLC. [L-2] (CO-3)
 - f) Define w.r.t. to SCADA: i) Tags ii) items. [L-1] (CO-2)
 - g) Compare fixed and modular PLC. (any two points) [L-3] (CO-2)
 - h) Write a ladder program for AND gate. Draw its truth table. [L-1] (CO-3)
 - i) Write the input and output devices to be interfaced with PLC. [L-1] (CO-2)
 - j) Write the addressing for the following:
Input Module: 32-bit, Output Module: 16-bit and Analog Input: 16-bit and analog output: 16-bit. (L-2) [CO-2] **2×10**

PART-A

- Q.2
- a) Describe the various elements of an Industrial Automation Systems and how they are organized hierarchically in levels. [L-1] (CO-1) **10**
 - b) Discuss briefly about the requirement of automation systems. [L-1] (CO-1) **10**
- Q.3
- a) Explain about the architecture of PLC with neat diagram. [L-1] (CO-2) **10**
 - b) Discuss the wiring of discrete I/O modules involved in PLC. [L-1] (CO-2) **10**
- Q.4
- a) Develop a ladder program explaining the use of Latching Relay. [L-4](CO-3) **10**
 - b) Develop a ladder program for Traffic light control system with following conditions: i) Red light ON for 30 sec, ii) green light ON for 25 sec, and iii) Yellow light on for 05 sec. iv) Repeat the sequence until stop push button is pressed. [L-4] (CO-3) **10**

PART-B

- Q.5
- a) Draw block diagram of SCADA system and explain its parts. [L-2](CO-4) **10**
 - b) State the advantages and disadvantages of SCADA. [L-2](CO-3) **10**
- Q.6
- a) Describe the steps involved on developing SCADA application for Power system. [L-2] (CO-4) **10**
 - b) Compare the DCS and SCADA. [L-3](CO-4) **10**
- Q.7
- Explain the different types of SCADA protocols. [L-2](CO-4) **20**

End Semester Examination, May 2023
B. Tech. — Fourth/Sixth Semester
RENEWABLE ENERGY SYSTEMS (BEE-DS-624)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- a) Classify the factors responsible for global warming. [CO-1][L-2]
- b) List the advantages and disadvantages of conventional and non-conventional energy source? [CO-1][L-2]
- c) Which type of material is preferred for solar cells? [CO-2][L-2]
- d) Differentiate Pyranometer and Pyrhelimeter. [CO-2][L-2]
- e) What factors led to the accelerated development of wind power? [CO-3][L-1]
- f) By _____ the ocean thermal energy conversion (OTEC) is produced. [CO-3][L-1]
- g) Classify the refuse-derived fuel (RDF) as per their applications. [CO-4][L-2]
- h) Define the terms:
 - i) Zenith and its angle.
 - ii) Solar Constant.
- i) What are the different types of nuclear reactions? [CO-5][L-1]
- j) Name a few cities where geothermal energy is harnessed. [CO-5][L-1] **2×10**

PART-A

- Q.2 a) Explain how the solar energy collection is affected by tilting a flat plate collector with respect to the ground. [CO-1][L-2] **10**
b) Sketch the solar water heating and stills in solar thermal devices. [CO-1][L-3] **10**
- Q.3 a) Write the empirical equations given by Angstrom for predicting the availability of solar radiation. [CO-2][L-2] **10**
b) List the various factors to consider when choosing instruments to measure solar power. [CO-2][L-1] **10**
- Q.4 a) Discuss the mechanism of production of local winds. [CO-3][L-2] **10**
b) Compare the lift force and drag force in detail. [CO-3][L-3] **10**

PART-B

- Q.5 a) Give the expression for potential and kinetic energy from ocean waves. [CO-3][L-3] **10**
b) What is the source of tidal energy? Which is the minimum tidal range required for a practical tidal plant? How much is the potential in tides? [CO-3][L-1] **10**
- Q.6 a) How can energy be extracted from bio fuels through the process of anaerobic digestion? [CO-4][L-2] **10**
b) Write short notes on:
 - i) Energy framing.
 - ii) Energy from reuse. [CO-4][L-1] **5×2**
- Q.7 a) Describe the working principle of a fuel cell with reference to the H₂ – O₂ cell. [CO-5][L-2] **10**

b) What are hot spots? Why hot spots are important in harnessing geothermal energy? [CO-5] [L-2] **10**

End Semester Examination, May 2023

B. Tech. – Sixth Semester ELECTRIC DRIVES (BEE-DS-625)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- Which power electronic device can be used for ac motors?
- List various applications of electric drives.
- Starting torque of induction motor depends on _____.
- What is the effect of decreasing field flux of a DC motor by a large amount?
- Give applications of AC drives.
- What is meant by steady state stability?
- List different types of braking in induction motor drive.
- State advantages of induction motor drives.
- Enlist different rotor side control methods of induction motor.
- Give advantages of rotor resistance control.
- Write the expression of the average value of the load voltage in the step up dc dc converter. **2×10**

PART-A

- Q.2 a) With block diagram, explain different components of an electric drive system. [CO-1] [L-2] **10**
b) Classify DC motors on the basis of excitation systems. [CO-1] [L-1] **10**
- Q.3 a) Using waveforms, analyze the operation of chopper controlled DC drive. [CO-2][L-3] **10**
b) Differentiate between time ratio and current limit control of a DC drive. [CO-2][L-2] **10**
- Q.4 a) Explain the operation of bidirectional DC motor drive in motoring and braking mode. [CO-3] [L-2] **10**
b) Analyze the control of DC motor using dual converter. [CO-3][L-3] **10**

PART-B

- Q.5 Evaluate the performance of closed loop position control system. [CO-4] [L-2] **20**
- Q.6 a) Analyze the impact of stator voltage controllers on the operation of induction motor. [CO-5][L-3] **10**
b) Explain the frequency control of induction motor. [CO-5][L-3] **10**
- Q.7 Evaluate the effect of rotor side speed controlling of induction motor using slip power recovery. [CO- 5][L-4] **20**

End Semester Examination, May 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 in brief:

- | | |
|---|------------------------|
| a) What are the advantages of robots? | [CO1] [L2] |
| b) What is meant by degree of freedom in robot? | [CO1] [L2] |
| c) What is an end effector? | [CO1] [L2] |
| d) What are important operations in navigation system of robot? | [CO3] [L2] |
| e) Name two tactile sensors used in robot? | [CO2] [L2] |
| f) How computer vision improves the capability of robot? | [CO2] [L2] |
| g) Differentiate manipulation and locomotion. | [CO3] [L2] |
| h) Name the two types of joints commonly used in robots. | [CO3] [L2] |
| i) What is meant by robot work envelope? | [CO1] [L2] |
| j) What is meant by sensor noise? | [CO3] [L2] 2×10 |

PART-A

- | | | |
|-----|--|------------------------|
| Q.2 | a) Explain the classification of robots. | [CO-1] [L-2] 10 |
| | b) Explain the different characteristics that makes robot intelligent. | [CO-1] [L-2] 10 |
| Q.3 | a) Explain different types of mechanical grippers. | [CO-1] [L-2] 10 |
| | b) Differentiate accuracy and repeatability of an industrial robot. | [CO-2] [L-2] 10 |
| Q.4 | a) Explain hydraulic drive systems with diagram. | [CO-2] [L-2] 10 |
| | b) Explain any two non-tactile sensors used in robots. | [CO-1] [L-2] 10 |

PART-B

- | | | |
|-----|---|------------------------|
| Q.5 | a) Explain the different types of errors in localization. | [CO-2] [L-2] 10 |
| | b) State and explain different kinematic pairs. | [CO-3] [L-2] 10 |
| Q.6 | a) Explain robot vision system and its importance in robot. | [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, May 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 Answer the following in brief:
- a) What is meant by energy? [CO-1] [L-1]
 - b) Differentiate between renewable and non-renewable energy. [CO-1] [L-1]
 - c) How much energy is generated by renewables in India? [CO-1] [L-2]
 - d) How does orientation of a building affects its internal temperature? [CO-2] [L-1]
 - e) What is the composition of solar radiation? [CO-2] [L-1]
 - f) Give disadvantages of wind energy. [CO-2] [L-2]
 - g) What is meant by biomass? [CO-3] [L-1]
 - h) What is wave energy? [CO-3] [L-1]
 - i) What is meant by fermentation? [CO-4] [L-1]
 - j) How is geothermal energy extracted? [CO-4] [L-2] **2×10**

PART-A

- Q.2 a) State different advantages and disadvantages of renewable energy. [CO-1] [L-1] **10**
 b) List different primary energy sources and different energy sources obtained from them. [CO-1] [L-1] **10**
- Q.3 a) Evaluate the technique for trapping heat present in solar energy in water heating and lighting. [CO-2] [L-3] **10**
 b) How is solar energy used for regulating the temperature of a green building? Explain in detail. [CO-2] [L-2] **10**
- Q.4 a) Compare flat plate and parabolic type of solar collectors. [CO-3] [L-2] **10**
 b) Analyze working of a solar photovoltaic cell. [CO-3] [L-3] **10**

PART-B

- Q.5 a) Explain wind turbine energy conversion system. [CO-3] [L-2] **10**
 b) Compare horizontal and vertical axis wind turbines. [CO-3] [L-3] **10**
- Q.6 a) Compare different techniques used for extracting energy from biomass. [CO-4] [L-3] **15**
 b) Equate the performance of biogas as a fuel. [CO-4] [L-4] **5**
- Q.7 Write short note on **(any two)**:
- a) Fuel cell.
 - b) Geothermal energy.
 - c) Waste to energy. [CO-4] [L-4] **10×2**

End Semester Examination, May 2023

B. Sc. (Hons.) Geology – Sixth Semester

WATERSHED MANAGEMENT (BGE-DS-601)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

- Q.1 Answer the following in brief:
- | | |
|---|------------------------|
| a) Significance of a watershed development. | [L3][CO-1] |
| b) Methods of delineation of a watershed. | [L3][CO-1] |
| c) Differentiate between grassland and culturable land. | [L3][CO-1] |
| d) Draw a line diagram of ridge and furrow structure. | [L4][CO-1] |
| e) Discuss any two methods of soil conservation. | [L2][CO-3] |
| f) Compare drip and sprinkler irrigation. | [L5][CO-2] |
| g) Assess the benefits of social forestry. | [L3][CO-4] |
| h) Discuss water use efficiency. | [L3][CO-5] |
| i) Comment on Reclamation of land. | [L4][CO-4] |
| j) Ploughing, furrowing, trenching and bunding. | [L2][CO-6] 2×10 |

PART-A

- | | | |
|-----|---|----------------------|
| Q.2 | a) Explain the various characters of watershed. | [L3][CO-1] 10 |
| | b) Discuss ways of watershed development. | [L3][CO-2] 10 |
| Q.3 | a) Discuss rainwater harvesting methods for hilly watershed. | [L4][CO-1] 10 |
| | b) Comment on construction and designs of a check dam. | [L5][CO-2] 10 |
| Q.4 | a) Discuss the development of irrigation in India. | [L4][CO-2] 10 |
| | b) Discuss the benefits of drip and sprinkler irrigation systems over conventional methods. | [L3][CO-2] 10 |

PART-B

- | | | |
|-----|---|----------------------|
| Q.5 | a) Describe wasteland and discuss various types of waste lands. | [L6][CO-4] 10 |
| | b) Explain factors for land degradation. | [L6][CO-4] 10 |
| Q.6 | a) Explain soil and water conservation. | [L4][CO-5] 10 |
| | b) Give an overview major grass cover of India. | [L4][CO-5] 10 |
| Q.7 | a) Discuss Monitoring and mapping through remote sensing. | [L6][CO-6] 10 |
| | b) Explain Watershed management plan and role of GIS. | [L5][CO-6] 10 |

End Semester Examination, May 2023

B. Sc. (Hons.) Geology – Sixth Semester

GEOCHEMISTRY (BGE-DS-602)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Write short notes on the following:

- | | |
|-------------------------|-----------------------|
| a) Ionic bond. | [CO1][L1] |
| b) Geosphere. | [CO3][L1] |
| c) Salts and ions. | [CO1][L1] |
| d) Mineral stability. | [CO5][L2] |
| e) Helium burning. | [CO1][L2] |
| f) Labile elements. | [CO1][L2] |
| g) Hydrolysis. | [CO1][L2] |
| h) Lithophile elements. | [CO5][L2] |
| i) Pegmatite. | [CO5][L2] |
| j) Diagenetic minerals. | [CO5][L2] 2×10 |

PART-A

Q.2 a) Discuss the process of element formation in the universe. [CO-1][L5] **10**

b) Describe the significance of trace elements in the petro-chemistry and economic geology. [L2][CO-1] [CO-1][L5] **10**

Q.3 a) Discuss the geochemistry of marine waters. What is the importance of residence time in marine water salinity? [CO-2][L2] **10**

b) Discuss the processes operate during diagenesis in sediments and how they convert the loose sediments in lithified rock? [CO-2][L6] **10**

Q.4 a) Discuss the cosmic abundance of elements. [CO-3][L3] **10**

b) Classify and explain importance of the stony meteorites. [CO-3][L4] **10**

PART-B

Q.5 a) Give the most acceptable classification of elements based on their preferred host phases. [CO-4][L5] **10**

b) Describe the weathering process that led to soil formation. What are the controlling factors of soil formation? [CO-4][L5] **10**

Q.6 a) What are different types of rare earth elements? Discuss their source and importance in petrology. [CO-5][L6] **10**

b) How compatible and non-compatible elements help us to understand the evolution of magma. [CO-5][L6] **10**

Q.7 a) Describe the principle, application and limits of C-14 method of dating. [CO-6][L6] **10**

b) Discuss four stable isotopes which have application in geology. [CO-6][L5] **10**

End Semester Examination, May 2023

B. Sc. (Hons.) Geology – Sixth Semester

GEOPHYSICS (BGE-DS-604)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 briefly the main geophysical investigation techniques. [CO1][L1]
- b) Explain the wenner configuration with the help of suitable diagram. [CO4][L2]
- c) Differentiate between the qualitative and quantitative scale for earthquake measurement. [CO2][L2]
- d) Justify the reason for earthquake in Himalayan region. [CO1][L2]
- e) What are the advantages of geophysical exploration? [CO1][L1]
- f) Explain the seismic refraction with the help of a diagram. [CO5][L1]
- g) Define the following terms for a seismic wave: wavelength, frequency, cycle. [CO2][L2]
- h) What is the purpose of signal processing? [CO5][L2]
- i) Why should borehole analysis be important in case of hydrocarbon exploration? [CO6][L2]
- j) Differentiate between SP log and resistivity logs. [CO4][L1] **2×10**

PART-A

- Q.2 a) Explain the working principle of torsion gravimeter and torsion magnetometer with the help of suitable diagrams. [CO1][L6] **10**
b) In a land seismic survey line, hydrophones are placed at every 150 meters, for a total spread of 5 Kms. After the charge is blast kept at 5 meters below the surface, the first wave at the nearest geophone is received after .40 seconds. Find out the velocity of the wave in water layer. Explain the concept with the help of a diagram. [CO5][L3] **10**
- Q.3 a) An empty fold is buried under the basaltic area. What are the various methods, which can help in identifying the location and extent of the subsurface salt dome? Justify the method with the physical property being exploited. [CO6][L3] **10**
b) Explain the triangulation method of finding the location of an earthquake. [CO1][L4] **10**
- Q.4 a) Explain the wenner and Schulumberger configuration of the electrical Resistivity method with their application areas. [CO4][L2] **10**
b) Justify the reason for continental crust being older than the oceanic crust. [CO1][L4] **10**

PART-B

- Q.5 a) How the radioactive logs can help in finding the lithology around a cased borehole? The lithology in an area comprises of repetitive layers of shale, sand, sandy clay etc. The target is find out the presence of water and its quantity. [CO6][L4] **10**
b) Explain the role of sonic logs in the "a part" of this question. [CO6][L2] **10**
- Q.6 a) What is the purpose of caliper log? [CO6][L3] **6**
b) A bore hole has been strengthened with steel based casing. What is the most appropriate logging solution and why? [CO6][L3] **6**
c) Explain the various gravity reductions in case of gravity survey. [CO3][L3] **8**
- Q.7 a) A seismic Reflection survey is carried out over a 1000m thick horizontal layer on earth with a P wave velocity of 2000m/s. calculate the travel time of the reflected wave placed at 1000 m apart. [CO5][L5] **10**
b) Differentiate between active and passive methods of geophysical explorations. [CO1][L2] **10**

End Semester Examination, May 2023

B. Tech. – Third Semester

CYBER LAW AND ETHICS (BHM-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) What is the purpose of network? | [CO-1][L-2] |
| b) Describe hub, switch and router. | [CO-1][L-2] |
| c) What protocols are used in URL? | [CO-1][L-2] |
| d) How many types of IP configuration are there? | [CO-2][L-2] |
| e) Explain DNS poisoning. | [CO-2][L-2] |
| f) What are the various types of cyber crimes? | [CO-3][L-2] |
| g) Which section of IT Act is repealed? | [CO-4][L-2] |
| h) What are the three major Internet privacy issues? | [CO-5][L-2] |
| i) How can we avoid privacy issues? | [CO-5][L-2] |
| j) What is the validity of e-signatures? | [CO-6][L-2] 2×10 |

PART-A

- Q.2 a) Differentiate between types of computer networks. [CO-1][L-2] **10**
b) Differentiate between domain and URL with the help of examples. [CO-1][L-2] **10**

Q.3 Explain the following:

- | | | |
|----------------|------------------------------|------------------------|
| a) Malware | b) Denial of service attacks | |
| c) Web attacks | d) Session hijacking | [CO-2][L-2] 5×4 |

Q.4 a) Explain different types of following attacks:

- | | | |
|--|--------------------|-------------------------|
| i) Investment offers | ii) Auction frauds | |
| iii) Identity | iv) Theft. | [CO-3][L-2] 2½×4 |
| b) Describe the steps to create secure browser settings. | | [CO-3][L-2] 10 |

PART-B

Q.5 Explain the need of computer and its impact in society. Justify the need for cyber law in 21st century. [CO-4][L-2] **20**

- Q.6 a) Explain the different limitations of privacy laws in India. Also describe the five key privacy and data protection requirements. [CO-5][L-2] **10**
b) Why is right to privacy a constitutional right? Illustrate the importance of right to privacy in India. [CO-5][L-2] **10**

- Q.7 a) Demonstrate the procedures for legal recognition of electronic documents. [CO6][L2] **10**
b) What is the most common way that intellectual property is violated and what are the penalties imposed for violation of IPR? [CO-6][L-2] **10**

End Semester Examination, May 2023

B. Tech. – Third Semester

CYBER LAW AND ETHICS (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) Discuss the importance of information and its security. [CO-2] [L-2]
- b) Discuss confidentiality, integrity and availability in brief. [CO-2] [L-2]
- c) Discuss phishing with example. [CO-3] [L-1]
- d) Explain the authentication process. [CO-2] [L-2]
- e) List some examples of internet fraud. [CO-3] [L-1]
- f) List most common types of cybercrimes. [CO-4] [L-1]
- g) List some of the items in cyber security audit checklist. [CO-5] [L-1]
- h) Describe Electronic signature for recognition of electronic records. [CO-5] [L-2]
- i) What protects the intellectual property created by artists? [CO-6] [L-1]
- j) Discuss what kind of work can be protected using Trademark? [CO-6] [L-2] **2×10**

PART-A

- Q.2 a) Explain the simplex, half-duplex and full-duplex modes of communication. List examples in each of the mode. [CO-1] [L-2] **10**
b) Discuss DNS with the help of a diagram. Also explain DNS Cache Poisoning. [CO-2] [L-2] **10**
- Q.3 a) Summarize the types of Attacks: Investment Offers, Auction Frauds, Identity Theft with examples of each. [CO-3] [L-5] **10**
b) List various secure Browser Settings that can be applied in web browser. [CO-2] [L-1] **10**
- Q.4 Discuss each of these types of Threats: Malware, Denial of Service Attacks, Web Attacks, Session Hijacking. [CO-3] [L-2] **20**

PART-B

- Q.5 a) List penalties and offences under the IT Act, 2000. [CO-6] [L-1] **10**
b) List some positive and negative aspects of the IT Act. [CO-6] [L-2] **10**
- Q.6 a) Why are cyber ethics important? Explain the term: Cyber Bullying. [CO-5] [L-1] **10**
b) List some of the limitations on free speech in cyberspace. [CO-5] [L-2] **10**
- Q.7 a) Discuss why is 'Legal Recognition of Electronic Record' important? [CO-4] [L-2] **10**
b) List the three main mechanisms for protecting intellectual property and differentiate between them. [CO-6] [L-2] **10**

Q.7 Can culture, gender, nationality or social class have an effect on communication?
[CO-3][L-1] **10**

End Semester Examination, May 2023
B. Tech. – First / Second Semester
ENGLISH (BHM-201/BHM-201A/BHM-121/HSMC-101)

Time: 2 hrs.

Max Marks: **50**

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Write down the different types of verbal communication with examples of each.
- b) What are 7 C's of communication?
- c) What is inter-cultural communication? Explain with an example.
- d) Name the styles of communication.
- e) Define 'barriers in communication'.

[CO-1] [L-1] **2×5**

PART-A

Q.2 What do you understand by SWOT? Explain with your self-assessment. [CO-2][L-1]
10

Q.3 What is personality development? How to bring out the best in one's personality?
[CO-2][L-1] **10**

Q.4 Write your self introduction. [CO-2][L-1] **10**

PART-B

Q.5 Write an email to your college secretary complaining about the cleanliness issues of the department toilets. [CO-3][L-1] **10**

Q.6 What does SMART stand for? Why should we set goals? Explain five principles of goal setting. [CO-3][L-1] **10**

Q.7 Write a letter to your mentor seeking permission to join a volunteering opportunity during your summer break from 30/5/2023 to 1/7/2023. [CO-3][L-1] **10**

End Semester Examination, May 2023

B. Tech. – Third Semester

UNIVERSAL HUMAN VALUES (BHM-320)

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.

- Q.1 As proposed in UHV, what is the first priority for a human being in life? (L-1, CO-1)
a) Physical facility b) Relationship
c) Right understanding d) Wealth
- Q.2 Which of the following is the basic aspiration of human beings? Choose the best answer as discussed in UHV. (L-1, CO-1)
a) To Become b) To be
c) To do d) To get
- Q.3 Which of the following is NOT true? (L-3, CO-1)
a) Values are universal while skills are not
b) Values hold a higher priority than skills
c) Skill guide the values
d) Skills and values are complimentary
- Q.4 Which of the following is not a level of living for a human being? (L-3, CO-3)
a) Family b) Society
c) Individual d) Profession
- Q.5 Lack of right understanding is the main reason for _____ among the students. (L-3, CO-3)
a) Clarity of goals b) Peer pressure
c) Self-confidence d) Affection for batch mates
- Q.6 Which of the following statement is true? (L-2, CO-3)
a) Skills and values, all vary from person to person
b) Skills determine the value of everything
c) Values relate to 'what to do' and skills are related to 'how to do'
d) Values relate to 'how to do' and skills are related to 'what to do'
- Q.7 Which one of the following is not a basic requirement for fulfillment of aspirations of every human being? (L-3, CO-3)
a) Right understanding b) Relationship
c) Physical facility d) Status in society
- Q.8 Observing the imagination, one can see that? (L-3, CO-2)
a) Imagination goes in certain parts of the body
b) Object of imagination may vary from time to time
c) Imagination is a part of desire
d) Imagination is a part of thought
- Q.9 A student says- There is a vast generation gap between the teachers and students. How can something that is true for teachers be true for the students too? (L-5, CO-3)
a) We have to learn to live with the generation gap in any relationship.
b) Life is about bridging the gaps which will always continue.
c) There is no gap in the natural acceptance, it is the same for the teachers as well as the students.
d) The students have to obey the teachers even if there is a gap.

- Q.10 Choose the most appropriate response. Universal means: (L-1, CO-1)
 a) It is prevalent the same way across the world
 b) If a survey is conducted across the world, maximum number of people will accept it
 c) It is naturally acceptable to every human being
 d) It is an accepted norm across the world
- Q.11 Self is _____ to human existence. (L-1, CO-2)
 a) Barrier
 b) Central
 c) Secondary
 d) Instrumental
- Q.12 Feeling of responsibility in the self towards the body does not include? (L-2, CO-2)
 a) Protecting the body
 b) Nurturing the body
 c) Respecting the body
 d) Rightly utilizing the body
- Q.13 Which of the following statements is False? (L-4, CO-2)
 a) Self has the potential of knowing
 b) Body has the activity of assuming
 c) The self is a conscious entity
 d) The body is a material entity
- Q.14 The presence of self in any entity is marked by the presence of? (L-2, CO-2)
 a) Activity of fulfilling
 b) Activity of recognizing
 c) Activity of assuming
 d) Activity of knowing
- Q.15 Feeling of self-regulation does not include which of the following? (L-2, CO-2)
 a) Protecting the body
 b) Nurturing the body
 c) Guiding the body
 d) Rightly utilizing the body
- Q.16 Choose the incorrect answer. (L-4, CO-2)
 a) Self gives sensation to the body and reads instruction from the body
 b) Self gives instruction to the body and reads sensation from the body
 c) There is exchange of information between self and body
 d) Body receives instruction from the self
- Q.17 Choose the most appropriate answer. (L-4, CO-2)
 a) Body has the activity of assuming but not knowing
 b) Body has the activity of assuming as well as knowing
 c) Self has the activity of knowing but not assuming
 d) Self has the activity of knowing as well as assuming
- Q.18 Choose the correct answer. (L-4, CO-2)
 a) Body wants to live, self is used as an instrument
 b) Self wants to live, body is used as an instrument
 c) Self and body are instruments of each other
 d) Self and body, both want to live
- Q.19 Which of the following activities is directly related to Thought? (L-4, CO-2)
 a) Selecting
 b) Imaging
 c) Tasting
 d) Comparing
- Q.20 Which of the following is not a source of favorable sensation from the body? (L-4, CO-1)
 a) Touch
 b) Sound
 c) Idea
 d) Smell
- Q.21 With right evaluation, I am able to see with the other? (L-2, CO-2)
 a) Competition
 b) Complimentarity
 c) Struggle for survival
 d) Self-regulation
- Q.22 Natural acceptance of a human being is the same as: (L-2, CO-2)
 a) Intention
 b) Competence
 c) Thought
 d) Pre-conditionings
- Q.23 What is not acceptable naturally? (L-2, CO-2)
 a) Competence
 b) Competition
 c) Cooperation
 d) Collaboration

- Q.24 Trust is: (L-1, CO-2)
 a) Feeling of strong attachment with the other
 b) The feeling of being related to all
 c) Feeling of strong affection with the other
 d) The foundation value in relationship
- Q.25 Anger results from? (L-1, CO-2)
 a) Lack of competition
 b) Lack of communication skill
 c) Lack of physical facility
 d) Lack of trust
- Q.26 The naturally acceptable feelings in relationship are NOT. (L-2, CO-3)
 a) Universal
 b) Indefinite
 c) Mutually Fulfilling
 d) Invariant with time
- Q.27 Every human being has the same: (L-2, CO-1)
 a) Level of competence
 b) Program for right understanding
 c) Pre-conditioning
 d) Imagination
- Q.28 On the basis of right evaluation of our mutual competence in human-human relationships, we recognize our? (L-1, CO-1)
 a) Contradiction in relationship
 b) Complimentarity in relationship
 c) Superiority
 d) Inferiority
- Q.29 Over-evaluation as a tendency leads to? (L-1, CO-1)
 a) Ego
 b) Depression
 c) Self-introspection
 d) Mutual happiness
- Q.30 Differentiation cannot be there in relationship on the basis of? (L-1, CO-1)
 a) Intention
 b) Body
 c) Physical facility
 d) Belief
- Q.31 Which of the following is not a natural characteristic of human being living with human consciousness? (L-2, CO-2)
 a) Perseverance
 b) Bravery
 c) Cruelty
 d) Generosity
- Q.32 Which of the following is NOT TRUE? (L-2, CO-2)
 a) There is mutual fulfillment in the nature
 b) The processes are cyclic in the nature
 c) There is mutual enrichment in the nature
 d) The processes are acyclic in the nature
- Q.33 The innateness of the physical order is? (L-3, CO-2)
 a) Growth
 b) Existence
 c) Deformation
 d) Respiration
- Q.34 Which of the following is naturally acceptable? (L-3, CO-1)
 a) Give-give economics
 b) Take-give economics
 c) Give-take economies
 d) Take-take economies
- Q.35 The activities in the bio order do not include? (L-2, CO-2)
 a) Respiration
 b) Formation
 c) Deformation
 d) Selecting
- Q.36 What cannot be said as the purpose of storage in a harmonious society? (L-2, CO-1)
 a) Right utilization of nature
 b) Mutual fulfillment in relationship
 c) Fulfillment of human needs
 d) Accumulation of resources
- Q.37 Which of the following does not have the self? (L-2, CO-2)
 a) Tiger
 b) Deer
 c) Mosquito
 d) Cow
- Q.38 Which of the following has not been listed as an order of nature? (L-2, CO-1)
 a) Physical order
 b) Bio order
 c) Bird order
 d) Animal order

- Q.39 The inheritance of the animal order is: (L-1, CO-2)
a) Breed based b) Seed based
c) Constitution based d) Sanskar based
- Q.40 Madness for profit leads to: (L-2, CO-1)
a) Exploitation of natural resources b) Happiness of people
c) Prosperity of people d) Protection of nature
- Q.41 As per the content shared, what is the correct order among the following? (L-2, CO-2)
a) Human education> Human constitution> Human conduct> Universal human order
b) Human education> Human conduct> Human constitution> Universal human order
c) Human constitution> Human conduct> Human education> Universal human order
d) Human conduct> Human constitution> Human education> Universal human order
- Q.42 Human economics is closely related to: (L-2, CO-1)
a) Policy for enrichment b) Policy for protection
c) Policy for right utilization d) Policy for profit maximization
- Q.43 Which of the following is not included in the misconduct of a child in an environment of domination? (L-3, CO-2)
a) Arbitrariness b) Opposition
c) Revolt d) Compliance
- Q.44 Which of the following comes at the first priority? (L-1, CO-1)
a) Policy for protection b) Policy for enrichment
c) Policy for prevention d) Policy for right utilization
- Q.45 There is the problem of misuse of public funds in the society. What could be the solution to this problem which can form a human tradition? (L-2, CO-1)
a) Severe punishment to the convicted person in public
b) Stop issuing of public funds so that there is no misuse
c) Develop the feeling of prosperity in people dealing with public funds
d) Ignore the problem to some extent until it becomes severe
- Q.46 Which of the following is the correct sequence of the natural process of development of a child? (L-3, CO-3)
a) Obeying, imitating, following, self-discipline
b) Imitating, obeying, following, self-discipline
c) Imitating, following, obeying, self-discipline
d) Following, obeying, imitating, self-discipline
- Q.47 Which of the following cannot be called as Renewable and Decentralized Energy Technologies? (L-5, CO-1)
a) Fossil fuel based energy conversion systems
b) Gadgets and implements utilizing human muscles power
c) Decentralized wind power
d) Micro hydel electro-mechanical power generation
- Q.48 Which of the following is the odd one out in terms of developing a holistic management model? (L-2, CO-1)
a) The whole unit working as a well-knit family
b) Cooperative, motivational and mutually fulfilling
c) Maximum profit for human labour and skills
d) Sharing of responsibility and participative mode of management
- Q.49 Which of the following is not included in the character of a person? (L-2, CO-1)
a) Competitive skills b) Rightfully acquired wealth
c) Compassionate behavior d) Chastity in conjugal relationship
- Q.50 What cannot be said as the program of action at the level of individual? (L-3, CO-1)
a) Self-awareness b) Self-exploration
c) Self-criticism d) Self-evaluation

Mark the answers below by filling the most appropriate oval with blue pen as 

A B C D

Q1. ☐ ☐ ☐ ☐
Q2. ☐ ☐ ☐ ☐
Q3. ☐ ☐ ☐ ☐
Q4. ☐ ☐ ☐ ☐
Q5. ☐ ☐ ☐ ☐

Q6. ☐ ☐ ☐ ☐
Q7. ☐ ☐ ☐ ☐
Q8. ☐ ☐ ☐ ☐
Q9. ☐ ☐ ☐ ☐
Q10. ☐ ☐ ☐ ☐

Q11. ☐ ☐ ☐ ☐
Q12. ☐ ☐ ☐ ☐
Q13. ☐ ☐ ☐ ☐
Q14. ☐ ☐ ☐ ☐
Q15. ☐ ☐ ☐ ☐

Q16. ☐ ☐ ☐ ☐
Q17. ☐ ☐ ☐ ☐
Q18. ☐ ☐ ☐ ☐
Q19. ☐ ☐ ☐ ☐
Q20. ☐ ☐ ☐ ☐

Q21. ☐ ☐ ☐ ☐
Q22. ☐ ☐ ☐ ☐
Q23. ☐ ☐ ☐ ☐
Q24. ☐ ☐ ☐ ☐
Q25. ☐ ☐ ☐ ☐

Q46. ☐ ☐ ☐ ☐
Q47. ☐ ☐ ☐ ☐
Q48. ☐ ☐ ☐ ☐
Q49. ☐ ☐ ☐ ☐
Q50. ☐ ☐ ☐ ☐

A B C D

Q26. ☐ ☐ ☐ ☐
Q27. ☐ ☐ ☐ ☐
Q28. ☐ ☐ ☐ ☐
Q29. ☐ ☐ ☐ ☐
Q30. ☐ ☐ ☐ ☐

Q31. ☐ ☐ ☐ ☐
Q32. ☐ ☐ ☐ ☐
Q33. ☐ ☐ ☐ ☐
Q34. ☐ ☐ ☐ ☐
Q35. ☐ ☐ ☐ ☐

Q36. ☐ ☐ ☐ ☐
Q37. ☐ ☐ ☐ ☐
Q38. ☐ ☐ ☐ ☐
Q39. ☐ ☐ ☐ ☐
Q40. ☐ ☐ ☐ ☐

Q41. ☐ ☐ ☐ ☐
Q42. ☐ ☐ ☐ ☐
Q43. ☐ ☐ ☐ ☐
Q44. ☐ ☐ ☐ ☐
Q45. ☐ ☐ ☐ ☐

End Semester Examination, May 2023

B. Tech. – Fourth Semester

UNIVERSAL HUMAN VALUES (BHM-320)

Time: 2 hrs.

Max Marks: **50**

No. of pages: 5

Note: All questions are **compulsory**. Each question has **FOUR** options with **ONE** correct answer. Select the correct answer. All questions are of **ONE** mark each. There is no **NEGATIVE** marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.

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

- Q.1 What is naturally acceptable in a society? [CO-1] [L- 1]
a) People with differing goals b) People with conflicting goals
c) People with holistic goals d) People with competing goals
- Q.2 A student says- Since physical facilities is temporary, is feeling of prosperity also is temporary. What will the most appropriate response to this? [CO-3] [L-5]
a) Yes, feeling prosperity will depend on the availability of physical facility
b) Yes you are right, the feeling is sometimes continuous and sometimes temporary
c) Physical Facility is temporary, but the feeling of having/producing more will continue
d) Feeling of prosperity requires just understanding of need, and physical facility
- Q.3 A student says- If happiness is continuous, how will I know that it is happiness at all. So I need to be unhappy at times to know that I am happy. What will be the most...? [CO-3] [L-5]
a) Happiness and unhappiness always go together. So you will naturally be able to know it
b) Happiness is naturally acceptance, so you will be able to know it when you are happy
c) Unhappiness is part and parcel of life. So, accept it.
d) Happiness and unhappiness are two sides of the same coin
- Q.4 Development of a human being essentially means? [CO-2] [L-2]
a) Transformation from animal consciousness to human consciousness
b) Keep progressing in life in terms of money, post and fame
c) Keeping oneself always ahead of others
d) Working day and night for wealth
- Q.5 A student says- I will be bored of happiness if I am always happy. What would be the most appropriate response to this? [L-5] [CO-3]
a) Happiness is naturally acceptable. So you can never be bored of happiness.
b) Boredom is a part of life. Do not bother about it.
c) Happiness is never continuously actually. So you will never be bored.
d) Happiness through sensation is required from time to time so that you are not bored.

- Q.6 Which of the following statement is true? [CO-3] [L-2]
a) Skills and values, all vary from person to person
b) Skills determine the value of everything
c) Values relate to 'what to do' and skills are related to 'how to do'
d) Values relate to 'how to do' and skills are related to 'what to do'
- Q.7 Which one of the following is not a basic requirement for fulfillment of aspirations of every human being? [CO-3] [L-3]
a) Right understanding b) Relationship
c) Physical facility d) Status in society
- Q.8 Observing the imagination, one can see that? [CO-2] [L-3]
a) Imagination goes in certain parts of the body
b) Object of imagination may vary from time to time
c) Imagination is a part of desire
d) Imagination is a part of thought
- Q.9 A student says- There is a vast generation gap between the teachers and students. How can something that is true for teachers be true for the students too? [CO-3] [L-5]
a) We have to learn to live with the generation gap in any relationship
b) Life is about bridging the gaps which will always continue
c) There is no gap in the natural acceptance, it is the same for the teachers as well as the students
d) The students have to obey the teachers even if there is a gap
- Q.10 Choose the most appropriate response. Universal means? [CO-1] [L-1]
a) It is prevalent the same way across the world
b) If a survey is conducted across the world, maximum number of people will accept it
c) It is naturally acceptable to every human being
d) It is an accepted norm across the world
- Q.11 Brain is a part of? [CO-1] [L-4]
a) Self b) Body
c) Both Self and Body d) Neither Self nor Body
- Q.12 The response of the Self does NOT include? [CO-2] [L-4]
a) Recognizing b) Fulfilling c) Assuming d) Respiration
- Q.13 Human being is? [CO-2] [L-1]
a) Co-existence of self and brain
b) Co-existence of self and body
c) Co-existence of self and consciousness
d) Co-existence of brain and body
- Q.14 Which of the following is NOT a source of imagination in the Self? [CO-3] [L-1]
a) Preconditioning b) Sensation
c) Desire d) Natural acceptance
- Q.15 The wealthier you are, the more prosperous you are, i.e. the more you have accumulated, the more prosperous you are. Evaluate this statement. [CO-2] [L-4]
a) Yes, the statement is true
b) Prosperity and wealth are the same thing
c) Prosperity and wealth are two different things

- d) Wealth determines prosperity but not vice-versa
- Q.16 Choose the incorrect answer. [CO-2] [L-4]
- a) Self gives sensation to the body and reads instruction from the body
 - b) Self gives instruction to the body and reads sensation from the body
 - c) There is exchange of information between self and body
 - d) Body receives instruction from the self
- Q.17 Choose the most appropriate answer. [CO-2] [L-4]
- a) Body has the activity of assuming but not knowing
 - b) Body has the activity of assuming as well as knowing
 - c) Self has the activity of knowing but not assuming
 - d) Self has the activity of knowing as well as assuming
- Q.18 Choose the correct answer. [CO-2] [L-4]
- a) Body wants to live, self is used as an instrument
 - b) Self wants to live, body is used as an instrument
 - c) Self and body are instruments of each other
 - d) Self and body, both want to live
- Q.19 Which of the following activities is directly related to Thought? [CO-2] [L-4]
- a) Selecting
 - b) Imaging
 - c) Tasting
 - d) Comparing
- Q.20 Which of the following is not a source of favorable sensation from the body? [CO-1] [L-4]
- a) Touch
 - b) Sound
 - c) Idea
 - d) Smell
- Q.21 Can we talk about the feelings with definiteness? [CO-3] [L-4]
- a) Yes, they are definite, they can be discussed with definiteness
 - b) No, feeling are abstract, they cannot be discussed with definiteness
 - c) Cannot stay
- Q.22 Which of the following statement is true? [CO-3] [L-4]
- a) Intention of the human being is always doubtful
 - b) One's intention is always to make the other happy
 - c) Intention of a human keeps varying from time to time
 - d) Intention of human being can never be understood
- Q.23 Anger will not result if? [CO-3] [L-3]
- a) I doubt the intention of the other
 - b) I feel opposed to the other
 - c) I am assured of the intention of the other
 - d) I lack trust of the other
- Q.24 Which of the following is TRUE? [CO-3] [L-3]
- a) Reaction is naturally acceptable
 - b) Response is naturally acceptable
 - c) One reacts when the conduct is definite
 - e) One responds when the conduct is indefinite
- Q.25 Give the best suited answer? [CO-3] [L-3]
- a) With a feeling of Trust, there is always a compromise in relationship
 - b) With a feeling of Trust, there is no opposition for the other
 - c) With a feeling of Trust, there is effort to withdraw from the others
 - d) With a feeling of Trust, there is ignorance of mistakes of the others

- Q.26 The naturally acceptable feelings in relationship are NOT. [CO-3] [L-2]
 a) Universal b) Indefinite
 c) Mutually Fulfilling d) Invariant with time
- Q.27 Every human being has the same? (L- 2, CO- 1)
 a) Level of competence b) Program for right understanding
 c) Pre-conditioning d) Imagination
- Q.28 On the basis of right evaluation of our mutual competence in human-human relationships, we recognize our? [CO-1] [L-1]
 a) Contradiction in relationship b) Complimentarity in relationship
 c) Superiority d) Inferiority
- Q.29 Over-evaluation as a tendency leads to? [CO-1] [L-1]
 a) Ego b) Depression c) Self-introspection d) Mutual happiness
- Q.30 Differentiation cannot be there in relationship on the basis of? [CO-1] [L-1]
 a) Intention b) Body c) Physical facility d) Belief
- Q.31 Which of the following does not fulfill the relation with the nature? [CO-2] [L-1]
 a) Biomass based energy technologies
 b) Animal driven gadgets
 c) Poaching of animals
 d) Micro-hydel and wind power prime-movers
- Q.32 As proposed in UHV, there is mutual _____ in the nature. [CO-1] [L-1]
 a) Struggle b) Fulfillment c) Conflict d) Disorder
- Q.33 Madness for profit leads to? [CO-1] [L-2]
 a) Exploitation of natural resources b) Happiness of people
 c) Prosperity of people d) Protection of nature
- Q.34 The number of orders in the nature is? [CO-3] [L-1]
 a) Three b) Five c) Four d) Ten
- Q.35 Which of the following is NOT a unit of Bio order? [CO-2] [L-1]
 a) Plant b) Air c) Tree d) Shrub
- Q.36 Justice from family to world family leads to? [CO-3] [L-3]
 a) Unguided society b) Inequitable society
 c) Unfulfilled society d) Undivided society
- Q.37 Which of the following is one of the goals at the level of society? [L-1] [CO-3]
 a) Struggle for survival b) Exploitation
 c) Fearlessness d) domination
- Q.38 Which of the following is not a human goal? [CO-1] [L-2]
 a) Right understanding b) Prosperity
 c) Strong military d) Co-existence
- Q.39 In a harmonious society, what will be visible? [CO-1] [L-3]
 a) There will be no exchange of physical facilities
 b) The exchange of physical facilities will be for mutual profit
 c) The exchange of physical facilities will be for mutual fulfillment
 d) The exchange of physical facilities will be for maximum profit
- Q.40 Which of the following is not included in the preservation of nature? [CO-1] [L-2]
 a) Enrichment of nature b) Protection of nature

c) Exploitation of nature

d) Right utilization of nature

- Q.41 Human economics is closely related to? [CO-1] [L-2]
a) Policy for enrichment b) Policy for protection
c) Policy for right utilization d) Policy for profit maximization
- Q.42 There is the problem of misuse of public funds in the society. What could be the solution to this problem which can form a human tradition? [CO-1] [L-2]
a) Severe punishment to the convicted person in public
b) Stop issuing of public funds so that there is no misuse
c) Develop the feeling of prosperity in people dealing with public funds
d) Ignore the problem to some extent until it becomes severe
- Q.43 What can be called as one of the criteria for holistic technology? [CO-1] [L-2]
a) Producing with imported resources and expertise as far as possible
b) Promoting the use of renewable energy resources
c) Reducing human interaction and cooperation
d) Promoting centralization
- Q.44 Which of the following is the odd one out in terms of developing a holistic management model? [CO-1] [L-2]
a) The whole unit working as a well-knit family
b) Cooperative, motivational and mutually fulfilling
c) Maximum profit for human labour and skills
d) Sharing of responsibility and participative mode of management
- Q.45 Which of the following cannot be called as Renewable and Decentralized Energy Technologies? [CO-1] [L-5]
a) Fossil fuel based energy conversion systems
b) Gadgets and implements utilizing human muscles power
c) Decentralized wind power
d) Micro hydel electro-mechanical power generation
- Q.46 What is there as the basis for all values? [CO-1] [L-3]
a) Enrichment b) Protection d) Co-existence e) Preservation
- Q.47 What cannot be said as the program of action at the level of individual? [CO-1] [L-3]
a) Self-awareness b) Self-exploration
c) Self-criticism d) Self-evaluation
- Q.48 Which of the following is NOT an example of renewable energy technology? [CO-1] [L-3]
a) Biomass based energy conversion systems
b) Coal based power plant
c) Decentralized wind power
d) Micro hydel electro-mechanical power
- Q.49 Which of the following is correct? [CO-1] [L-4]
a) Justice is recognition, fulfillment and evaluation of human-human relationship, leading to mutual happiness
b) Justice is mutual happiness leading to fulfillment, recognition and evaluation of human-human relationship
c) Justice is evaluation of human-human relationship, leading to recognition, fulfillment and mutual happiness
d) Justice is fulfillment of human-human relationship, leading to recognition, evaluation and mutual happiness

Q.50 Choose the incorrect mapping among the following?

[CO-1] [L-4]

- a) Desire- imaging
- b) Thought- analyzing
- c) Expectation- tasting
- d) Thought- selecting

End Semester Examination, May 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 Most countries have which type of constitution?
- a) Unwritten constitution
 - b) Written constitution
 - c) Royal constitution
 - d) Legal constitution
- Q.2 Indian constitution is an example of which type of constitution?
- 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 articles are there in the Indian constitution?
- a) 100
 - b) Less than 200
 - c) About 350
 - d) More than 400
- Q.5 The most important mandate of the Constituent Assembly was to do what?
- 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 elected as the president of the constituent assembly?
- a) B.N. Rau
 - b) B.R. Ambedkar
 - c) Jawaharlal Nehru
 - d) Rajendra Prasad
- Q.7 When were the words "secular" and "socialist" added in the preamble of Indian constitution?
- a) 1976 (42nd Constitution Amendment Act)
 - b) 1958 (18th Constitution Amendment Act)
 - c) 1980 (50th Constitution Amendment Act)
 - d) 1982 (52nd Constitution Amendment Act)
- Q.8 Fundamental rights in the Indian constitution are inspired by which country's constitution.
- a) USA
 - b) Germany
 - d) Ireland
 - e) Japan

- Q.9 Kesavananda Bharti case is associated to which of the following concepts about Indian constitution?
- Basic structure doctrine
 - Separation of power between center and states
 - Legislative reforms in government
 - Panchayati raj system
- Q.10 Which of the following is true about fundamental rights?
- Fundamental rights are included in Part VII of constitution
 - Fundamental rights are justiciable
 - Fundamental rights can never be suspended under any circumstance
 - Fundamental rights allows citizens to demand basic income from government
- Q.11 Directive principle of state policy are in the form of which of the following?
- Advise to state governments
 - A legal notice to state governments
 - A sanction approved by the Governor of a state
 - Advise to political parties of the country
- Q.12 Schedule 7 of the constitution talks about which the following?
- Division of power between center and states
 - Fundamental Rights and Directive Principles
 - Emergency powers of the President
 - Judicial appointments
- Q.13 "No person can be convicted for the same offence more than once" explains which of the following concepts of the constitution?
- Directive principle
 - Fundamental rights
 - Basic structure doctrine
 - Double jeopardy
- Q.14 In a federal state, how many levels of government exist in any part of the country?
- 1
 - 2
 - 3
 - Any number that the government wants
- Q.15 Which of the following is a type of federalism?
- Unilateral
 - Coming together
 - Bicameral
 - None of the above
- Q.16 Article 1 of Indian constitution defines India as:
- Fully federal state
 - Quasi unitary state
 - Union of states
 - All of the above
- Q.17 In the Indian federal set up, central government has more powers.
- Correct
 - Wrong
 - Both have equal powers
 - Depends on the desire of the President
- Q.18 In 2019, the Indian government revoked which of the Indian constitution related to the state of Jammu and Kashmir.
- Article 370
 - Article 375
 - Article 16
 - None of the above

- Q.19 Which of the followings 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 following freedoms under fundamental rights, except.
a) Speech and expression b) Religion
c) Residence d) Passport
- Q.21 The constitution provides "lists" demarcating jurisdictions or law making powers between center and states. Which of the following is not one of the lists?
a) Union list b) State list c) Concurrent list d) Governor list
- 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 a criteria for deciding revenue distribution as per the XVth Finance Commission?
a) Linguistic diversity b) Performance
c) Annual rainfall d) No of MLAs
- 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 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.

End Semester Examination, May 2023
B. Tech. – Third Semester
QUANTITATIVE APTITUDE (MA-301/MA-301A/BHM-MC-004)

Time: 2 hrs.

Max Marks: **50**

No. of pages: **5**

Note: *All questions are compulsory. Each question has **FOUR** options with **ONE** correct answer. Select the correct answer. All questions are of **ONE** mark each. There is no **NEGATIVE** marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.*

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 After interchanging + and −, 8 and 7, which one of the following becomes correct:
 a) $6 + 8 \times 2 - 7 = 0$ b) $8 \times 2 + 7 - 6 = 9$
 c) $7 \times 8 + 6 - 9 = 25$ d) $8 - 7 + 3 \times 5 = 35$ [CO-1][L-1]
- Q.2 In a class $\frac{3}{4}$ th of the students do not know either English or Hindi. But $\frac{1}{6}$ th of the students know English. How much students know both English and Hindi if students who know Hindi are $\frac{1}{8}$ th of total students in the class?
 a) $\frac{1}{24}$ b) $\frac{100}{24}$
 c) $\frac{10}{12}$ d) $\frac{1}{4}$ [CO-2][L-1]
- Q.3 If ABCD is a 4 digit number divisible by 4, then how many such 4 digit number exist?
 a) 360 b) 400
 c) 450 d) 500 [CO-1][L-1]
- Q.4 What is the sum of all two-digit numbers that give a remainder of 3 when they, are divided by 7?
 a) 666 b) 676
 c) 683 d) 777 [CO-1][L-1]
- Q.5 Find the unit's digit in $(264102+264103)$?
 a) 0 b) 2
 c) 4 d) 6 [CO-2][L-1]
- Q.6 If the unit's digit in the product of $(47ax729 \times 345 \times 343)$ is 5, then how many values that a can take?
 a) 9 b) 3
 c) 7 d) 5 [CO-1][L-1]
- Q.7 In a meet, persons from five different places have assembled in Bangalore High School. From the five places the persons come to represent are 42, 60, 210, 90 and 84. What is the minimum number of rooms that would be required to accommodate so that each room has the same number of occupants and occupants are all from the same places?
 a) 44 b) 62
 c) 81 d) 96 [CO-3][L-1]
- Q.8 A person has to completely put each of the three liquids i.e. 403 liters of petrol, 465 litres of diesel and 496 liters of mobil oil in bottles of equal size without mixing any of

a) 44
b) 34
c) 31
d) None of these

[CO-2][L-1]

a) $\frac{3}{20}$
c) $\frac{1}{5}$

b) $\frac{1}{6}$
d) $\frac{1}{3}$

[CO-1][L-1]

a) 0.7 b) 0.8
c) 0.9 d) 1.2

[CO-1][L-1]

a) 2.870 b) 2.967
c) 3.876 d) 3.912

[CO-1][L-1]

a) $3^{10}/2$ b) $3^{10}-2^{10}$
c) $3^5(3^5-1)$ d) None of these [CO-2][L-1]

a) 2940m b) 6300m
c) 1080m d) 3360m

[CO-1][L-1]

a) 4
b) 8
c) 16
d) 32

[CO-3][L-1]

a) 18 b) 19
c) 15 d) Both a and b [CO-2][L-1]

a) 38 b) 39
c) 40 d) 41

[CO-1][L-1]

a) 85 b) 90
c) 95 d) None of these [CO-2][L-1]

a) 24 b) 26
c) 23 d) 22

[CO-2][L-1]

2/5 312

- Q.19 The average wages of a worker during a fortnight comprising 15 consecutive working days was Rs.90 per day. During the first 7 days, his average wages was Rs.87/day and the average wages during the last 7 days was Rs.92 per day. What was his wage on the 8th day?
 a) 83 b) 92
 c) 90 d) 97 [CO-3][L-1]
- Q.20 The batting average of a cricket player for 64 innings is 62 runs. His highest score exceeds his lowest score by 180 runs. Excluding these two innings, the average of the remaining innings becomes 60 runs. His highest score is?
 a) 212 Runs b) 220 Runs
 c) 214 Runs d) 241 Runs [CO-1][L-1]
- Q.21 The average of 8 observations was 25.5. It was noticed later that two of those observations were wrongly taken. One observation was 14 more than the original value and the other observation was wrongly taken as 31 instead of 13. What will be the correct average of those 8 observations?
 a) 22.5 b) 21.5
 c) 25 d) 24.5 [CO-3][L-1]
- Q.22 Arithmetic mean of the scores of a group of students in a test was 52. The brightest 20% of them secured a mean score of 80 and the duller 25% a mean score of 31. The mean of remaining 55% is?
 a) 52.5% b) 51.4%
 c) 62.5% d) 72.7% [CO-1][L-1]
- Q.23 In a row of boys there are 50 boys and all of them are facing North, Sahaj is 19th from the left end and fourth to the right of Mahak, what is the position of Mahak from the right end of that row?
 a) 28th b) 36th
 c) 37th d) 25th [CO-1][L-1]
- Q.24 During assembly the students are standing in a line. Salman Khan is 21st in order from both the ends. How many boys are there in the class?
 a) 21 b) 34
 c) 41 d) 30 [CO-2][L-1]
- Q.25 Raghuveer started walking towards South. After walking 10 m, he turned right-hand side and walked 20 m. He then turned right-hand side and walked 10 m. He again turned left-hand side and walked 25m. How far is he from his initial position?
 a) 5m b) 4m
 c) 10m d) 20m [CO-2][L-1]
- Q.26 Baibhav started walking towards South. After walking 3 km, he turned towards left-hand side and walked 4km. He then turned left-hand side and walked 3km. He again turned left-hand side and walked 5km. How far is he from his initial position?
 a) 5km b) 4km
 c) 1km d) 2km [CO-1][L-1]
- Q.27 Introducing Sonia, Aamir says, "She is the wife of only nephew of only brother of my mother." How Sonia is related to Aamir?
 a) Wife b) Son
 c) Sister-in-law d) Data is inadequate [CO-1][L-1]

- Q.28 A and B are children of D. Who is the father of A? To answer this question which of the statements (1) and (2) is necessary? C is the brother of A and the son of E.F is the mother B.
 a) Only (1) b) Only (2)
 c) Either (1) or (2) d) (1) and (2) both [CO-1][L-1]
- Q.29 Deepak said to Nitin, "That boy playing with the football is the younger of the two brothers of the daughter of my father's wife." How is the boy playing football related to Deepak?
 a) Son b) Brother
 c) Cousin d) Brother-in-law [CO-1][L-1]
- Q.30 A number 15 is divided into three parts which are in AP and the sum of their squares is 83. Find the smallest number.
 a) 3 b) 5
 c) 6 d) 8 [CO-2][L-1]
- Q.31 _____ is the coherence between how you are, think and act.
 a) Integrity b) Accountability
 c) Self-esteem d) Ethical-leadership [CO-5][L-2]
- Q.32 Identify the type of public speaking presented in the below situation:
 The student council president tries to convince school administrators to allow the students to have a dance after the final basketball game of the season.
 a) Ceremonial speaking b) Persuasive speaking
 c) Demonstrative speaking d) Informative speaking [CO-4][L-1]
- Q.33 Radhika experiences persistent difficulty in recognizing and understanding her own motions and those of others, recognize the defining source of her incapability from the below given choices.
 a) Moderate self-esteem b) Low on emotional-intelligence
 c) High on self-worth d) Low on self-control and regulation. [CO-5][L-2]
- Q.34 To promote a healthier employee work-life balance, what should be avoided necessarily from the below solution strategies?
 a) Don't overbook b) Prioritize vigorously
 c) Learn to say NO d) Organize [CO-5][L-2]
- Q.35 _____ is an essential cognitive and emotional skill of reframing negative thoughts and adverse circumstances.
 a) Mental strength b) Mental-toughness
 c) Adaptability d) Mindfulness [CO-4][L-1]
- Q.36 Identify the essential tips required for developing Interpersonal-skills at workplace:
 a) Being assertive and empathetic b) Cultivate positive-outlook
 c) Becoming self-critical d) Both A and B [CO-5][L-2]
- Q.37 "Values" are _____ beliefs that motivates people to act one way or other.
 a) Individual b) Group
 c) Team d) Country [CO-5][L-2]
- Q.38 _____ will seek to create an environment where there is a perceived threat – so that their behaviour and actions can become justified because of the external pressures.
 a) Susceptible followers b) Toxic leaders
 c) Transitional leaders d) Trustworthy leaders

- Q.39 Being able to handle intense emotions like frustration, disappointment, or embarrassment is an essential step to develop the skill of _____.
a) Self-confidence b) Self-esteem
b) Self-regulation d) Self-worth [CO-5][L-1]
- Q.40 _____ is an emotional state characterized by feelings of joy, satisfaction, contentment, and fulfillment.
a) Well-being b) Happiness
c) Confidence d) Mindfulness [CO-4][L-1]
- Q.41 _____ involves achieving tasks, managing individuals and overseeing groups and teams.
a) Task-oriented leadership b) Authoritative-centered leadership
c) Transactional leadership d) Action-centered leadership
- Q.42 _____ is the way we think about ourselves and the value we place on ourselves.
a) Accountability b) Empathy
c) Self-esteem d) Flexibility [CO-6][L-2]
- Q.43 What are the 3 C's of assertive communication?
a) Courtesy, Confidence, Clarity b) Confidence, Clear, Controlled
c) Command, Creativity, Courtesy c) Consistency, Confidence, Change [CO-4][L-1]
- Q.44 _____ is a universal problem-solving skill applied by effective leaders in the industry.
a) Brainstorming b) Identifying
c) Acknowledging d) Labeling [CO-5][L-2]
- Q.45 "Social media applications are free to us because we are the product being sold". This represents the concept of _____.
a) Dopamine-detox b) Escape loop of engagement
c) Attention-economy d) Addictive disorder [CO-4][L-1]
- Q.46 _____ guides us to tell the truth, keep our promises and take the right decisions that create positive impact.
a) Ethics b) Values
c) Integrity d) Conscience [CO-5][L-2]
- Q.47 Strong _____ can lead to a more collaborative workplace and healthy company culture.
a) Decision-making b) Team-dynamics
c) Ethical management d) Productivity [CO-6][L-2]
- Q.48 _____ allows us to anticipate how our actions and behaviors influence other people as well as our own.
a) Self-awareness b) Empathy
c) Integrity d) Assertiveness [CO-6][L-2]
- Q.49 _____ is a broad concept that refers to the cognitive and emotional reactions of an individual to the observed experiences of another.
a) Empathy b) Adaptability
c) Integrity d) Ethics [CO-5][L-2]
- Q.50 _____ is the process of making choices by identifying a decision, gathering information, and assessing alternative resolutions.
a) Problem-solving b) Conflict-resolution
c) Decision-making d) Accountability [CO-6][L-2]

End Semester Examination, May 2023
B. Tech. – Fourth Semester
QUANTITATIVE APTITUDE AND PERSONALITY DEVELOPMENT-I
(BHM-MC-006- /HM-403/HM-403A/HM-403B)

Time: 2 hrs.

Max Marks: **50**

No. of pages: 6

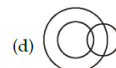
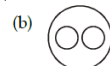
Note: All questions are compulsory. Each question has **FOUR** options with **ONE** correct answer. Select the correct answer. All questions are of **ONE** mark each. There is no **NEGATIVE** marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.

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

- Q.1 The sum of two numbers is 2490. If 6.5% of one number is equal to 8.5% of the other, then the numbers are: [CO-1][L-1]
a) 989, 150 b) 1011, 1479 c) 1401, 1089 d) 1411, 1079
- Q.2 1200 boy and 650 girls appeared in examination. If 70% of boys and 40% of girls failed. Find the approximate percentage of passed students? [CO-2][L-1]
a) 30% b) 41% c) 50% d) Can't determine
- Q.3 An article is sold at a discount of 20% on the marked price. In order to gain 60% on marked price at how much more per cent of the discounted price it should be sold? [CO-1][L-1]
a) 75% b) 25% c) 65% d) None of these
- Q.4 A shopkeeper marks his goods 20% above CP but allows 30% discount for cash. His net loss is? [CO-1][L-1]
a) 8% b) 20% c) 10% d) 16%
- Q.5 If a shopkeeper sells 25 articles at Rs. 45 per article after giving 10% discount and earns 50% profit. If the discount is not given the profit gained is? [CO-2][L-1]
a) 30% b) 32% c) 35% d) None of these
- Q.6 A pen was sold for a certain sum and there was a loss of 20%. Had it been sold for Rs. 12 more, there would have been a gain of 30%. What would be the profit if the pen was sold for Rs. 4.80 more than what it was sold for? [CO-3][L-1]
a) 15% b) 23% c) 29% d) no profit, no loss
- Q.7 By selling an article at 80% of its marked price, a shopkeeper makes a loss of 10%. What will be the profit percentage if he sells it at 95% of its marked price? [CO-1][L-1]
a) 6.9% b) 5% c) 5.9% d) 12.5%

- Q.8 Statements : Some books are mobiles.
Some calculators are mobile.
Conclusions : I. Some mobiles are calculators.
II. Some mobiles are books. [CO-2][L-1]
a) Only conclusion I follow b) Only conclusion II follows
c) Only conclusion I and II follows d) Neither conclusion I nor II follows
- Q.9 Statements : All pens are pencils.
No pencil is monkey.
Conclusions : I. No pen is monkey
II. Some pens are monkeys.
III. All monkey are pens.
IV. Some monkey are pens. [CO-1][L-1]
a) Either conclusion II or III follow Pavithran.
b) Either conclusion II or IV follow
c) Only conclusion I follows
d) All conclusion follow
- Q.10 Statements : All dolls are mats.
No mat is sofa.
Some sofas are rooms.
All rooms are hills.
Conclusions : I. Some hills are dolls.
II. Some rooms are dolls.
III. Some rooms are mats.
IV. Some hills are mats. [CO-1][L-1]
a) None follows b) Only I follows c) Only II follows d) Only III follows
- Q.11 Find the ratio of S.I. & C.I. on a certain sum of money at 5% per annum for 2 years [CO-1][L-1]
a) 50 : 51 b) 40 : 41 c) 30 : 31 d) 45 : 46
- Q.12 A man borrows Rs. 5100 to be paid back with compound interest at the rate of 4% pa by the end of 2 years in two equal yearly installments. How much will be each installment? [CO-1][L-1]
a) Rs. 2704 b) Rs. 2800 c) Rs. 3000 d) Rs. 2500
- Q.13 The difference between the simple and compound interest on a certain sum of money for 2 years at 4% per annum is Rs. 4. Find the sum? [CO-2][L-1]
a) Rs. 2500 b) Rs. 2400 c) Rs. 2600 d) Rs. 2000
- Q.14 A deposited Rs. 6000 in a bank at 5% per annum simple interest. B deposited Rs. 5000 at 8% p.a. compound interest. After 2 years, the difference between their interests will be: [CO-3][L-1]
a) Rs. 230 b) Rs. 232 c) Rs. 600 d) Rs. 832
- Q.15 The simple interest accrued on an amount of Rs. 19800 at the end of 3 years is Rs. 7128. What would be the compound interest accrued on the same amount at the same rate in the same period? [CO-1][L-1]
a) Rs. 8934.6784 b) Rs. 8017.5744 c) Rs. 7861.8754 d) Rs. 6871.6734

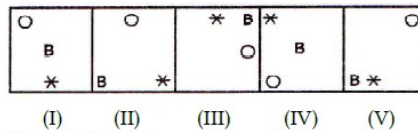
- Q.16 If a number is reduced by 40% it become two third of another number. What is ratio of the second number to first number? [CO-1][L-1]
 a) 6 : 10 b) None of these c) 8 : 9 d) 10 : 9
- Q.17 If Rs. 782 be divided into three parts, proportional to $1/2 : 2/3 : 3/4$, then the first part is: [CO-3][L-1]
 a) Rs. 182 b) Rs. 190 c) Rs. 196 d) Rs. 204
- Q.18 The ratio of the present age of Manoj to that of Wasim is 3 : 11. Wasim is 12 yr younger than Rehana. Rehana's age after 7 yr will be 85 yr. What is the present age of Manoj's father, who is 25 yr older than Manoj? [CO-1][L-1]
 a) 43 yr b) 67 yr c) 45 yr d) 69 yr
- Q.19 There are 3 tub which contains mixtures of Milk and Water in the ratio of 5 : 2, 4 : 3 and 3 : 1 respectively. If the mixtures be poured in a single tub. Find the Ratio Milk and Water? [CO-1][L-1]
 a) 13 : 3 b) 19 : 9 c) 17 : 9 d) Can't be determine
- Q.20 A mixture of a certain quantity of milk with 16 litres of water is worth 90 P per litre. If pure milk be worth Rs. 1.08 per litre. How much milk is there in the mixture? [CO-2][L-1]
 a) 40 litres b) 50 litres c) 60 litres d) 80 litres
- Q.21 A milk vendor has 2 cans of milk. The first contains 25% water and the rest milk. The second contains 50% water. How much milk should he mix from each of the containers so as to get 12 litres of milk such that the ratio of water to milk is 3: 5? [CO-1][L-1]
 a) 4 litres, 8 litres b) 6 litres, 6 litres c) 5 litres, 7 litres d) 7 litres, 5 litres
- Q.22 Pencils at Rs. 4.20 per dozen is mixed with pencils at Rs. 5.40 per dozen in the ratio 3 : 5. Find the price per dozen of the mixture? [CO-1][L-1]
 a) Rs. 4.95 b) Rs. 4.50 c) Rs. 5.00 d) Rs. 5.05
- Q.23 In what ratio must a person mix three kinds of tea costing Rs. 60 per kg, Rs. 75 per kg and Rs. 100 per kg so that the resultant mixture when sold at Rs. 96 per kg yields a profit of 20%? [CO-2][L-1]
 a) 1 : 2 : 4 b) 3 : 7 : 6 c) 1 : 4 : 2 d) 1 : 3 : 5
- Q.24 MKQO : LNPR :: ? : XVTZ [CO-1][L-1]
 a) YSUW b) SVWY c) VTWY d) WYTS
- Q.25 Bore : 10 :: Hotel : ? [CO-1][L-1]
 a) 12 b) 15 c) 18 d) 30
- Q.26 Which of the following diagrams represent the relationship among Steed, Adjutant and Aligator? [CO-3][L-1]



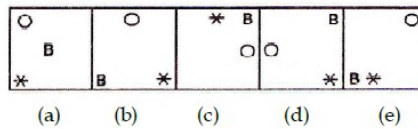
- Q.27 Two bus tickets from city A to B and three tickets from city A to C cost Rs. 77 but three tickets from city A to B and two tickets from city A to C cost Rs. 73. What are the fares for cities B and C from A? [CO-2][L-1]
a) Rs. 4, 23 b) Rs. 13, 17 c) Rs. 15, 14 d) Rs. 17,13

- Q.28 In the question given below which one of the five answer figure on the right should come after the problem figures if the sequence were continued? [CO-1][L-1]

Problem Figure

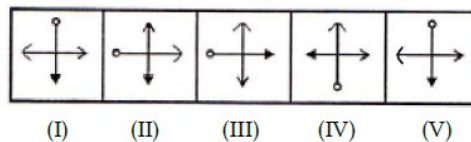


Answer Figure

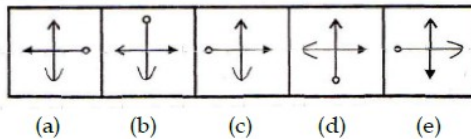


- Q.29 In the question given below which one of the five answer figure on the right should come after the problem figures if the sequence were continued? [CO-1][L-1]

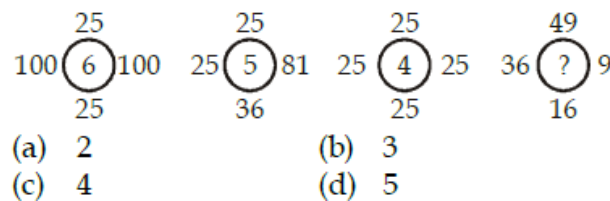
Problem Figure



Answer Figure



- Q.30 [CO-2][L-1]



- Q.31 Mental wellbeing includes our emotional, psychological and _____ wellbeing. [CO-4][L-2]
a) social b) intellectual c) spiritual d) physical

- Q.32 _____ is an emotional state characterized by feeling of joy, satisfaction, contentment, and fulfillment. [CO-4][L-3]
a) sorrow b) happiness c) upset d) misery

- Q.33 Effective leaders lead with _____, confidence, and compassion. [CO-4][L-2]
a) lies b) fraud c) honesty d) deceit

- Q.34 _____ are individual beliefs that motivate people to act one way or another. [CO-4][L-3]
a) morals b) standards c) ideals d) values

- Q.35 Integrity can be defined as having the inner strength to be _____ and trustworthy, acting justly and honorably and being consistent in words and actions. [CO-4][L-2]
a) truthful b) deceitful c) false d) lying
- Q.36 Emotional Intelligence is defined as the ability to perceive, use, _____, manage and handle emotions. [CO-4][L-2]
a) ignorant b) understand c) overlook d) disregard
- Q.37 Personal effectiveness can be defined as getting the _____ out of yourself. [CO-4][L-3]
a) worst b) least c) best d) poor
- Q.38 The 5 C formula for Personal Effectiveness includes _____, commitment, control, competence, and creativity. [CO-4][L-2]
a) compactness b) concrete c) compare d) consistency
- Q.39 Self Esteem is how we _____ and perceive ourselves. [CO -4][L-2]
a) value b) morals c) habits d) duty
- Q.40 Maslow's Hierarchy of needs include physiological needs, safety needs, love and belonging, _____ and self-actualization. [CO-4][L-2]
a) ridicule b) esteem c) scorn d) abuse
- Q.41 It is not your job to _____ me, it's mine. [CO-4][L-2]
a) hate b) approve c) love d) mock
- Q.42 An assertive person respectfully and clearly _____ their needs, wants, position and boundaries to others. [CO-4][L-3]
a) secret b) withheld c) hide d) communicates
- Q.43 Critical Thinking enhances your _____ solving skills. [CO-4][L-3]
a) problem b) investigate c) rational d) testing
- Q.44 The process of finding solutions to difficult or complex issues is called _____. [CO-4][L-2]
a) investigative b) problem solving c) logical d) searching
- Q.45 In the Six thinking Hats, white hat represents objectivity and _____. [CO-4][L-3]
a) doubting b) questioning c) fact finding d) probing
- Q.46 5 key Problem Solving skills include Identify, _____, explore, action and look back. [CO-3][L-3]
a) refine b) label c) assign d) define
- Q.47 In simple words _____ can be described as a serious disagreement or argument. [CO-4][L-3]
a) conflict b) discussion c) truce d) harmony

- Q.48 Conflict affects your _____, impacts team environment, hampers growth. [CO-4][L-3]
a) disregard b) direction c) performance d) failure
- Q.49 _____ divides the task and multiplies the success. [CO-4][L-2]
a) union b) help c) symbiosis d) team work
- Q.50 Being emotionally sound helps you to be better _____. [CO-4][L-3]
a) self-aware b) ignorant c) oblivious d) un-informed

End Semester Examination, May 2023

B. Tech. – Fifth Semester

QUANTITATIVE APTITUDE AND PERSONALITY DEVELOPMENT-II (BHM-MC-008/HM-505/ HM-505A/ HM-505B)

Time: 2 hrs.

Max Marks: **50**

No. of pages: 6

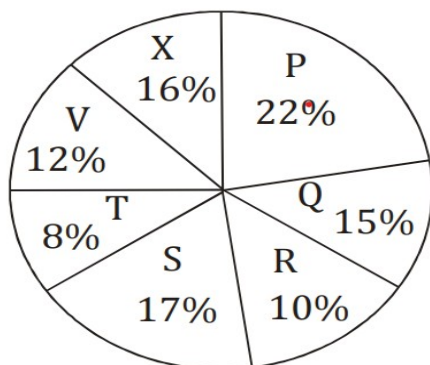
Note: All questions are compulsory. Each question has **FOUR** options with **ONE** correct answer. Select the correct answer. All questions are of **ONE** mark each. There is no **NEGATIVE** marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.

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.

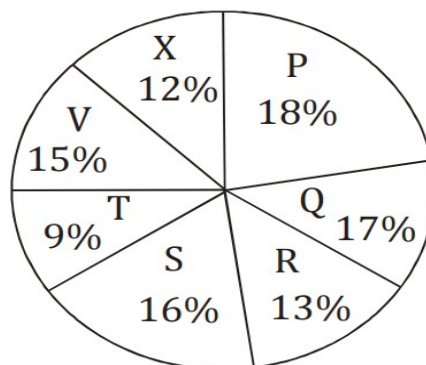
- Q.1 A and B can do a piece of work in 18 days, B and C in 24 days, A and C in 36 days. In what time can they do it all working together? [CO-3] [L-1]
a) 12 days b) 13 days c) 16 days d) 26 days
- Q.2 A and B can separately complete a piece of work in 20 days and 30 days respectively. They worked together for some time, then B left the work. If A completed the rest of the work in 10 days, then B worked for? [CO-3] [L-2]
a) 6 days b) 8 days c) 12 days d) 16 days
- Q.3 A can do a work in 6 days and B can do the same work in 5 days. The contract for the work is of Rs. 220. How much shall B get if both of them work together? [CO-3] [L-2]
a) Rs. 110 b) Rs. 120 c) Rs. 130 d) Rs. 150
- Q.4 P, Q and R undertake to do a work for Rs. 660. P and Q together do $\frac{8}{11}$ of the work and rest is done by R alone. How much should R get? [CO-3] [L-2]
a) Rs. 200 b) Rs. 160 c) Rs. 180 d) Rs. 190
- Q.5 A farmer can plough a field working 6 h per day in 18 days. The worker has to work how many hours per day to finish the same work in 12 days? [CO-3] [L-1]
a) 7 b) 9 c) 11 d) 13
- Q.6 12 pumps working 6 hours a day can empty a completely filled reservoir in 15 days. How many such pumps working 9 hours a day will empty the same reservoir in 12 days? [CO-3] [L-1]
a) 15 b) 9 c) 10 d) 12
- Q.7 A tank has a leak which would empty it in 8 hrs. A tap is turned on which admits 6 litres a minutes into the tank, and it is now emptied in 12 hrs. How many litres does the tank hold? [CO-3] [L-1]
a) 8260 litres b) 8450 litres c) 8640 litres d) 8660 litres
- Q.8 A tap can fill the cistern in 8 hours and another can empty it in 16 hours. If both the taps are opened simultaneously, the time (in hours) to fill the tank is? [CO-3] [L-1]
a) 16 hrs b) 8 hrs c) 10 hrs d) 12 hrs

- Q.9 If a person walks at 14 km/h instead of 10 km/h he would have walked 20 km more. The actual distance travelled by him is: [CO-3] [L-2]
a) 85 Km b) 50 Km c) 80 Km d) 70 Km
- Q.10 Train fare between Patna to Munger for one adult is three times the train fair of one child. If adult fair is 102 then. What will be the fare of 2 adult and 3 children together for same distance? [CO-3] [L-1]
a) 306 b) 212 c) 206 d) 214
- Q.11 A car travels a distance of 75 km at the speed of 25 km/h. It covers the next 25 km of its journey at the speed of 5 km/h and the last 50 km of its journey at the speed of 25 km/h. What is the average speed of car? [CO-3] [L-2]
a) 15 Km/h b) 12.5 Km/h c) 40 km/h d) 25 km/h
- Q.12 If the length of the train is 700 m and length of platform is 500 m. Find the time taken by the train moving at 54 km/h to cross platform. [CO-3] [L-2]
a) 75 sec b) 80 sec c) 85 sec d) 90 sec
- Q.13 Amit start to go to Delhi from Patna at speed of 50 km/h. Distance between Delhi and Patna is 1000 km. He takes rest of 20 minutes every 3 hours of journey. How much time will he take to arrive Delhi? [CO-3] [L-1]
a) 20 hours b) 21 hours c) 22 hours d) 23 hours
- Q.14 When the speed of a boat in still water is 4 km/h and the rate of stream is 2 km/h, find upstream speed of the boat ? [CO-3] [L-1]
a) 6 km/h b) 5 km/h c) 2 km/h d) 7 km/h
- Q.15 If the speed of a swimmer in still water is 9 km/h. Find the downstream speed of the swimmer, when the river is flowing with the speed of 6 km/h ? [CO-3] [L-2]
a) 15 km/h b) 18 km/h c) 3 km/h d) 12 km/h
- Q.16 A swimmer's speed in downstream is 11 km/h and speed of the stream is 1.5 km/h. Find the upstream speed of swimmer? [CO-3] [L-2]
a) 8 km/h b) 9.5 km/h c) 9 km/h d) 6.25 km/h

Directions: (Q.17-Q.21) Distribution of candidate who were enrolled in MBA and the candidate (out of those enrolled) who passed the exam in different institutes [CO-1] [L-2]



Total number of candidates enrolled = 8550



Total number of candidates who passed the exam = 5700

- Q. 17 What percentage of candidates passed the exam from institute T out of the total no. of candidate enrolled from the same institute?
a) 50% b) 62.5% c) 75% d) 80%

- Q.18 Which institute has the highest % of candidates passed to the candidates enrolled?
a) Q b) R c) V d) T
- Q.19 The no. of candidates passed from institute S and P together exceeds the no. of candidates enrolled from institutes T and R together by?
a) 228 b) 279 c) 399 d) 407
- Q.20 What is % of candidates passed to the candidate enrolled for institutes Q and R together?
a) 68% b) 80% c) 74% d) 65%
- Q.21 What is the ratio of candidates passed to the candidates enrolled from institute P?
a) 9:11 b) 14 : 17 c) 6 : 11 d) 9 : 17
- Q.22 If FISH is written as EHRG in a certain code, how would JUNGLE be written in that code? [CO-2] [L-1]
a) ITMFKD b) ITNFKD c) KVOHMF d) TIMFKD
- Q.23 In a certain code, TWINKLE is written as SVHOJKD then how would FILTERS be written in that code? [CO-2] [L-2]
a) EHKSDQR b) EHKUDQR c) EGHUQQR d) GJMSFST
- Q. 24. In a certain code, ROAD is written as URDG. How is SWAN written in that code? [CO-2] [L-1]
a) VXDQ b) VZDQ c) VZCP d) UXDQ
- Q.25 If in a certain code, FAVOUR is written as EBUPTS. How is DANGER written in that code? [CO-2] [L-2]
a) JOWJTJCMF b) JOWJTHAKD c) HMUHTJCMF d) HMUHTHAKD
- Q.26 In a certain code, FAVOUR is written as EBUPTS. How is DANGER written in that code? [CO-2] [L-2]
a) CBFFDS b) CBMHDS c) EBFHDS d) EBHHFS
- Q.27 On 8th Dec, 2007 Saturday falls. What day of the week was it on 8th Dec, 2006? CO-2][L-1]
a) Saturday b) Friday c) Monday d) Tuesday
- Q.28 A clock is set right at 8 a.m. The clock gains 10 minutes in 24 hours will be the true time when the clock indicates 1 p.m. on the following day? [CO-2][L-2]
a) 48 min. past 12. b) 46 min. past 12. c) 45 min. past 12. d) 47min.past 12.
- Q.29 Find the angle between the hour hand and the minute hand of a clock when the time is 3.25? [CO-2] [L-1]
a) 47.5 degrees b) 57.5 degrees c) 45.5 degrees d) 55.5degrees
- Q.30 An accurate clock shows 8 o'clock in the morning. Through how many degrees will the hour hand rotate when the clock shows 2 o'clock in the afternoon? [CO-2][L-1]
a) 360 b) 180 c) 90 d) 60

Directions Q.31-Q.35: Read the following passage and answer the question: [CO-6] [L-2]
Bacteria are extremely small living things. While we measure our own sizes in inches or centimeters, bacterial size is measured in microns. One micron is a thousandth of a

Even with an ordinary microscope, you must look closely to see bacteria. Using a magnification of 100 times, one finds that bacteria are barely visible as tiny rods or dots. One cannot make out anything of their structure. Using special stains, one can see that some bacteria have attached to them wavy - looking "hairs" called flagella. Others have only one flagellum. The flagella rotate, pushing the bacteria through the water. Many bacteria lack flagella and cannot move about by their own power while others can glide along over surfaces by some little understood mechanism.

Q.31 Which of the following is the main topic of the passage?
a) The characteristics of bacteria b) How bacteria reproduce
c) The various functions of bacteria d) How bacteria contribute to disease

Q.32 Bacteria are measured in
a) inches b) centimeters c) microns d) millimeters

Q.33 Which of the following is the smallest?
a) A pinhead b) A rounded bacterium
c) A microscope d) A rod-shaped bacterium

Q.34 According to the passage, someone who examines bacteria using only a microscope that magnifies 100 times would see
a) tiny dots b) small "hairs" c) large rods d) detailed structures

Q.35 The relationship between a bacterium and its flagella is most nearly analogous to which of the following?
a) A rider jumping on a horse's back b) A ball being hit by a bat
c) A boat powered by a motor d) A door closed by a gust of wind

Q.36 Ronnie agrees with the _____ that the grass is always greener on the other side of the fence.
a) perpetuity b) penchant c) maxim d) conformation

Q.37 Vikas Singh's creature was a(n) _____, detested by everyone he met.
a) itinerant b) anathema c) cosmopolitan d) mercenary

Q.38 Jaison Smith was at the _____ of his career when he received the Oscar for Best Actor.
a) detriment b) pinnacle c) oligarchy d) rogue

Directions Q.39-Q.40: Choose Antonyms:

[CO-4] [L-2]

- Q.39 Heartfelt
a) humorous b) loving c) insincere d) unhealthy
- Q.40 Secret
a) friendly b) overt c) hidden d) closed

Directions for Q.41 to Q.45: In each of the following sentences, there are two blank spaces. Fill up the sentences with the correct word from the given options to make the sentences grammatically correct. [CO-4] [L-1]

- Q.41 With borrowing costs set to rise and global trade tensions adding to uncertainties for India's exporters who are yet to capitalize on the rupee weakness, policymakers will need to _____ populism and stick to policy _____ if the tenuous momentum is to be sustained.
a) elude; imprudence b) elope; recklessness
c) eschew; prudence d) deteriorate; obedient
- Q.42 Due to the _____ quality of elections, the formerly fifth largest democracy is classified as an autocracy again. These developments are worrying for citizens because corruption, social exclusion and barriers to fair economic competition continue to be more _____ in autocracies.
a) ameliorate; dominant b) enhance; rebellious
c) deteriorate; obedient d) worsened; prevalent
- Q.43 In a country which has had three-decade-long military dictatorships, _____ caretaker governments are somewhat of a _____.
a) interim; novelty b) volatile; antiquated
c) permanent; complex d) eternal; innovative
- Q.44 Mandatory pre-litigation mediation puts the _____ in the court of the parties involved, rather than looking at external agencies like courts, and urges them to with and resolve disputes.
a) shuttle; release b) globe; involved c) ball; engage d) sphere; fasten
- Q.45 The youth climbed over the vehicle and started _____ it with stones, then the driver sensitively _____ to take the vehicle out of the crowd.
a) smashing; managed b) mashing; handle
c) break; involve d) defeat; directed

Directions for Q.46 to Q.50: In following questions, part of the sentence has been underlined. Select the correct alternative which may improve the construction of the sentence.

[CO-6] [L-1]

- Q.46. To get one's name in the Rowland Ward's book of hunting records was the extreme ambition of every serious hunter.

- a) hot b) burning c) reluctant d) No improvement needed

Q.47 Due to these reasons we are all in favor of universal compulsory education.

- a) Out of these reasons b) For these reasons
c) By these reasons d) No improvement needed

Q.48 shall not go until I am invited.

- a) till I am invited b) unless I am invited
c) if not I am invited d) No improvement needed

Q.49 Please remind me of posting these letters to my relatives.

- a) by posting b) to post c) for posting d) No improvement needed

Q.50 I would have waited for you at the station if I had known that you would come.

- a) knew b) was knowing c) have known d) No improvement needed

End Semester Examination, May 2023

B. Tech. – Sixth Semester

QUANTITATIVE APTITUDE AND PERSONALITY DEVELOPMENT-III (BHM-MC-009/HM-603/HM-603A/HM-603B)

Time: 1½ hrs.

Max Marks: **50**

No. of pages: 7

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 ABC University organize Mr. Fresher competition for the first year students of engineering. To qualify for the final round the participants have to clear first round. First Round consists of four events i.e. Dancing, Singing, Painting and Cooking. To pass the first round participant has to pass in Dancing and at least two other events. If the chances of passing the events of first round by a participant are $\frac{2}{3}$, $\frac{3}{4}$, $\frac{4}{5}$ and $\frac{5}{7}$ respectively, Find the probability that a participants qualifies for the final round of Mr. Fresher? [CO-1][L-2]
a) $\frac{17}{35}$ b) $\frac{13}{30}$ c) $\frac{17}{30}$ d) $\frac{2}{72}$
- Q.2 Three friends Satyam, Hitesh and Aman went for trekking from Dharamshala to Triund. The probability of reaching Triund is $\frac{1}{3}$, $\frac{1}{5}$ and $\frac{1}{4}$ respectively. Find the probability that exactly one of them reaches Triund? [CO-1][L-2]
a) $\frac{17}{30}$ b) $\frac{11}{30}$ c) $\frac{19}{30}$ d) $\frac{13}{30}$
- Q.3 Five friends having birthdays on the same day of the week. Find the probability that three of them have birthday on the same day of the week? [CO-1][L-2]
a) $\frac{240}{2401}$ B] $\frac{2}{7}$ C] $\frac{300}{7^5}$ D] $\frac{300}{2401}$
- Q.4 There are 8 hats in a box. Out of which 3 are Black, 3 are Grey and 2 are white. If 5 hats are taken out from the box by one after another and without replacement, what is the probability that 2 black 2 grey and 1 white hat is taken out? [CO-1] [L-2]
a) $\frac{3}{280}$ b) $\frac{9}{28}$ c) $\frac{3}{8}$ d) $\frac{5}{8}$
- Q.5 11 players of a cricket team assemble for a practice session. Every player has identical bats. After the practice all bats are kept in a store room so that next day everyone can pick theirs bat from the store. In how many ways 7 of them picks the correct bat. i.e. of his own bat. [CO-1][L-2]
a) 2244 b) 2170 c) 2540 d) 2970
- Q.6 How many different signals can be made by waving five different coloured flags one along the other when one or more of them can be waved at a time?[CO-1] [L-2]
a) 250 b) 225 c) 325 d) 125

- Q.7 Arjun a businessman has six hundred-rupee notes and five 500-rupee notes in his pocket. If 3 notes are taken at random, what are the odds against these being all five hundred rupees notes? [CO-1] [L-2]
 a) 31 : 2 b) 15 : 4 c) 2 : 31 d) 4 : 15
- Q.8 Find the sum of all numbers which are formed by at least one among the digits 0, 1, 2 and 3 without repetition. [CO-1] [L-2]
 a) 42726 b) 40912 c) 38664 d) 34912
- Q.9 In a school an event was organized for distribution of chocolate, a teacher has to give 9 chocolates from 12 chocolates in such a way that he must select at least three chocolates from first five chocolate. Find the number of choices of teacher to distribute the chocolate? [CO-1] [L-2]
 A] 125 B] 210 C] 400 D] 100
- Q.10 There is a phone that can make different musical sounds on every digit pressed on the phone. One day phone fall down and defected its musical sounds system now only two types musical sound is there when pressing the digits. What is the probability that same musical sound would be produced in first 5 times consecutively? [CO-1] [L-2]
 a) $1/2$ b) $1/8$ c) $1/16$ d) $1/32$

Directions (Q.11 –Q.15) Each of the questions below consists of a question and two/three statements given below it. You have to decide whether the data provided in the statements are sufficient to answer the question. Read all the three statements and give answer: [CO-3] [L-2]

- Q.11 Is the average of the largest and the smallest of four given numbers greater than the average of four numbers.
 I. The difference between the largest and the second largest number is less than the difference between the second largest and the second smallest number.
 II. The difference between the largest and the second largest number is greater than the difference between the second smallest and the smallest number
 III. The difference between the largest and the second smallest number is greater than the difference between the second largest and the smallest number.
 a) Only Statement I b) Either II or III
 c) I and Either II or III d) Only Statement II
- Q.12 A and B start walking towards each other simultaneously. What is the distance between them when they start?
 I. 20 min after crossing each other they were 1600 m apart.
 II. After crossing each other, A reaches the starting point of B in twice as much time as B takes to reach the starting point of A.
 a) Statement I is sufficient alone b) Statement II is sufficient alone
 c) Both Statement I and II are sufficient d) Neither Statement I nor Statement II
- Q.13 If a village is losing 10% of its water supply each day because of a burst water pipe, then what is the loss in rupees per day?
 I. The daily water supply to the village is 600 million gallon.
 II. The cost to the village for every 48000 gallons of water lost is Rs.50.

- a) Statement I is sufficient alone
- b) Statement II is sufficient alone
- c) Both Statement I and II are sufficient
- d) Either Statement I or Statement II is sufficient

Q.14 Total amount of Rs. 50600 was distributed among A, B and C. How much does each get?

- I A gets $\frac{2}{9}$ of what the other two together get.
- II.C gets $\frac{3}{11}$ of what the other two together get.

- a) Statement I is sufficient alone
- b) Statement II is sufficient alone
- c) Both Statement I and II are sufficient
- d) Either Statement I or Statement II is sufficient

Q.15 A and B start walking towards each other simultaneously. What is the distance between them when they start?

- I. 20 min after crossing each other they were 1600 m apart.
- II. After crossing each other, A reaches the starting point of B in twice as much time as B takes to reach the starting point of A.

- a) Statement I is sufficient alone
- b) Statement II is sufficient alone
- c) Both Statement I and II
- d) Neither Statement I nor Statement II

Direction Q.16-Q.20

[CO-3][L-2]

Due to covid-19 a group of ten faculties of an institute decide to take online classes of ten different batches of institute on five different days of the week starting from Monday to Friday of the same week. Each faculty has lecture at two different time slot, i.e. from 10:00 AM or 2:00 PM. Name of the faculties are Amit, Brijesh, Chetan, Dhiraj, Eqbal, Firoz, Geeta, Hema, Inayat and Jitendra not necessary in the same order.

Neither Eqbal nor Geeta have lecture on Friday. Only two faculties have lecture between Firoz and Jitendra. Inayat have a lecture on Tuesday at 10:00 AM. Hema doesn't have lecture at 2:00 PM. The number of faculties who have lecture between Geeta and Dhiraj is same as the number of faculties who have lecture between Chetan and Hema. Dhiraj does not have lecture on any one of the days after Eqbal. Firoz does not have lecture on any days after Hema. Brijesh has lecture immediately before Inayat. Inayat doesn't have lecture on any of the days before Geeta. The one who have lecture at 10:00AM is immediately before Jitendra. Dhiraj has lecture immediately after day of one who has lecture on Monday. Firoz doesn't have lecture at 2:00 PM. Only three faculties have lecture between Geeta and Eqbal.

Q.16 Who among the following take lecture at 10:00 AM Thursday?

- a) Eqbal
- b) Firoz
- c) Hema
- d) Geeta

Q.17 How many faculties have taken lectures at 2:00 PM between Eqbal and Hema?

- a) 4
- b) 3
- c) 2
- d) 1

Q.18. Three among the following form a group in a certain way. Which of the following does not belongs to Group?

- a) Hema – Thursday
- b) Amit – Wednesday
- c) Inayat – Monday
- d) Dhiraj – Tuesday

- Q.19 Which of the following is wrong?
- There are only one faculty between Dhiraj and Chetan.
 - The number of faculties between Brijesh and Eqbal is same as the number of faculties between Hema and Chetan.
 - Amit takes lecture on Wednesday at 11:00AM.
 - Chetan takes lecture on the day before Jitendra takes the lecture
- Q.20 If all the faculty names are arranged in dictionary order then how many faculties have taken lecture at the same time as compared to actual arrangement?
- 4
 - 5
 - 6
 - 3

Direction for Q.21 – Q.25

[CO-3] [L-2]

Eight students Manav, Samar, Anni, Manny, Ishan, Shiv, Sandy and Ronny are sitting around a circular table in such a way that some of them facing towards centre and some of them facing outside the centre. Each of them applied VISA for different countries USA, Germany, Canada, Australia, Newzealand, England, Italy and Japan. Manny who applied for USA sits third to the right of Samar who faces the centre. Ronny who is not an immediate neighbor of Manav, faces same direction as Manny and applied for Germany, sits second to the left of the person who applied for Canada. Anni is an immediate neighbor of the student who applied for Canada. The student who applied for Australia sits third to the left of the student who applied for USA. Samar sits third to the left of Manav who is not an immediate neighbor of Sandy. Immediate neighbor of Manav face same direction. The student who applied for Newzealand sits second to the left of the student who applied for England. Ronny sits third to right of Anni who is not an immediate neighbor of Samar or Manny. Shiv sits fourth to the right of Manny who sits immediate left of Ishan. The student who applied for Italy sits second to the left of the one who applied for Australia. Sandy sits second to the right of Samar, who does not applied for Newzealand. More than two students who are facing the same direction can't sit together.

- Q.21 Who applied VISA for Japan?
- Anni
 - Samar
 - Manav
 - Ronny
- Q.22 How many persons are facing outside?
- 5
 - 4
 - 3
 - Can't be determined
- Q.23 If Anni is related to England, Ishan is related to Newzealand and Ronny is related to Canada in the arrangement then Samar is related to?
- Australia
 - Japan
 - USA
 - Italy
- Q.24 Which Statement is wrong according to the arrangement?
- Samar is second to the right of Sandy
 - Shiv is second to the left of Ronny.
 - Manny is third to the right of Samar
 - There are only two persons between Anni and Sandy.
- Q.25 Find which pair is correct according to the arrangement?
- Samar – Germany
 - Shiv – Italy
 - Manny – USA
 - Manav – Australia

- Q.26 The length of a rectangle is twice its breadth. If its length is decreased by 5 cm and breadth is increase by 5 cm, the area of the rectangle is increased by 75 cm² .then the length of the rectangle is: [CO-2] [L-2]
 a) 20 cm b) 30 cm c) 40 cm d) 50 cm
- Q.27 The dimensions of the floor of a rectangular hall are 4m × 3m. The floor of the hall is to be tiled fully with 8 cm × 6 cm rectangular is without breaking tiles to smaller size. The number of tiles required: [CO-2] [L-2]
 a) 4800 b) 2600 c) 2500 d) 2400
- Q.28 The number of marble slabs of size 20 cm × 30 cm required to pave the floor of a square room of side 3 m, is: [CO-2] [L-2]
 a) 150 b) 100 c) 25 d) 225
- Q.29 If the perimeter of a rectangular field is 200 m and its breadth is 40 m then its area is (in m²): [CO-2] [L-2]
 a) 1200 b) 2400 c) 4800 d) 6000
- Q.30 Find the area of a triangle in which base is 1.5 m and height is 75 cm? [CO-2] [L-2]
 a) 5625 sq. cm. b) 5265 sq. cm. c) 5635 sq. cm d) 5525 sq. cm.

Directions Q.31-Q.35: Read the following passage and answer the question.

[CO-5] [L-2]

If by "suburb" is meant an urban margin that grows more rapidly than it's already developed interior, the process of suburbanization began during the emergence of the industrial city in the second quarter of the nineteenth century. Before that period the city was a small highly compact cluster in which people moved about on foot and goods were conveyed by horse and cart. But the early factories built in the 1830's and 1840's; were located along waterways and near railheads at the edges of cities, and housing was needed for the thousands of people drawn by the prospect of employment. In time, the factories were surrounded by proliferating mill towns of apartments and row houses that abutted the older, main cities. As a defense against this encroachment and to enlarge their tax bases, the cities appropriated their industrial neighbors. In 1854, for example, the city of Philadelphia annexed most of Philadelphia County. Similar municipal maneuvers took place in Chicago and in New York. Indeed, most great cities of the United States achieved such status only by incorporating the communities along their borders.

With the acceleration of industrial growth came acute urban crowding and accompanying social stress conditions that began to approach disastrous proportions when, in 1888, the first commercially successful electric traction line was developed. Within a few years the horse - drawn trolleys were retired and electric streetcar networks crisscrossed and connected every major urban area, fostering a wave of suburbanization that transformed the compact industrial city into a dispersed metropolis. This first phase of mass - scale suburbanization was reinforced by the simultaneous emergence of the urban Middle class whose desires for homeownership In neighborhoods far from the aging inner city were satisfied by the developers of single-family housing tracts.

- Q.31 Which of the following is the best title for the passage?
- a) The growth of Philadelphia
 - b) The Origin of the Suburb
 - c) The Development of City Transportation
 - d) The Rise of the Urban Middle Class
- Q.32 The author mentions that areas bordering the cities have grown during periods of
- a) industrialization b) inflation c) revitalization d) unionization
- Q.33 In line 10 the word "encroachment" refers to which of the following?
- a) The smell of the factories b) The growth of mill towns
 - c) The development of waterways d) The loss of jobs
- Q.34 Which of the following was NOT mentioned in the passage as a factor in nineteenth-century suburbanization?
- a) Cheaper housing b) The advent of an urban middle class
 - c) Urban crowding d) The invention of the electric streetcar
- Q.35 It can be inferred from the passage that after 1890 most people traveled around cities by:
- a) automobile b) cart
 - c) horse-drawn trolley d) electric streetcar

Directions Q.36-Q.40: Fill in the blanks below to form a meaningful sentence: [CO4][L1]

- Q.36 Although it is necessary to carry a relatively large number of provisions when traversing the Australian Outback, it is _____ that you keep your pack from becoming too _____.
- a) Crucial – Ponderous b) Helpful – Elongated
 - c) Mandatory – Insulated d) Important-Convolved
- Q.37 After living a life of depravity and transgression, the offender felt so _____ that he declared he would become a priest, and devote the remainder of his life to _____.
- a) Terrible – sin b) Tentative – Shame
 - c) Remorseful – Atonement d) Melancholy- Sadness
- Q.38 He vowed to embrace a newfound _____ once the trial began; nonetheless the accused resorted to his typical manner of _____ as soon as he took the stand.
- a) Passion – Exuberance b) Candor – Duplicity
 - c) Residence – Decrepitude d) Hobby- Deceitfulness
- Q.39 Despite some members of the Board of Education admitting to the _____ of his argument, Proposition G6 was still denied by a vote of 4 to 3.
- a) Force b) Negligence c) Cogency d) Brusqueness
- Q.40 Mr. Plainview is a man of secrecy. He deals with the mob and other _____ organizations, and regularly participates in their _____ activities.
- a) Amiable– Illegitimate b) Anarchistic – Fraudulent
 - c) Disdainful – Scrupulous d) Clandestine – Unlawful

Directions Q.41-Q.50: Choose the correct option: [CO-6] [L-2]

- Q.41 An Interview gives you an opportunity to _____ whether your qualifications and career ambitions align with the job you are applying for.
a) assess b) assist c) neglect d) guess
- Q.42 The Interview checklist includes copy of your resume, pen, passport size photograph, _____ proof.
a) document b) Identity c) important d) secure
- Q.43 The three P's while preparing for an Interview stand for _____ prepare and perform.
a) proposition b) program c) plan d) ploy
- Q.44 6 types of Employee grooming implementation includes _____ care, dental care, body scent, clothing hygiene, hair hygiene, body hygiene.
a) derma b) complexion c) peel d) skin
- Q.45 Employment Interview types include _____ interview, group interview, board interview, stress interview.
a) direct b) straight c) immediate d) nonstop
- Q.46 A proverb says," it is not what you say, it is _____ you say it."
a) when b) how c) where d) which
- Q.47 Group discussion is conducted to assess how _____ are you and how graceful you are when you have to disagree.
a) developed b) cultured c) matured d) advanced
- Q.48 In VUCA world v stands for _____
a) volume b) vicious c) victorious d) vague
- Q.49 _____% of job success comes from having well-developed soft skills and people skills.
a) 85 b) 95 c) 75 d) 65
- Q.50 Research shows _____% companies believe soft skills matter as much or more than hard skills.
a) 82 b) 92 c) 72 d) 62

End Semester Examination, May 2023

B. Tech. – First Semester MATHEMATICS-I (BMA-101)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following in brief:

a) Are the following vectors linearly dependent? If so, find a relation between them.

$$x_1 = (1, 2, 1), x_2 = (1, 2, 1), x_3 = (1, 2, 1)$$

[CO:1:L-2]

b) Is \mathbb{R} is not a vector space over \mathbb{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 Function is Symmetrical.

[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) Show that the matrix $A = \begin{pmatrix} \cos \theta & 0 & \sin \theta \\ 0 & 1 & 0 \\ -\sin \theta & 0 & \cos \theta \end{pmatrix}$ is orthogonal.

[CO:4:L-2]

g) Find the nth derivative of $\cos 2x$.

[CO:2,L:3]

h) Evaluate $\lim_{x \rightarrow 0} \frac{e^x - e^{\sin x}}{x - \sin x}$

[CO:1,L:2]

i) Evaluate: $\lim_{x \rightarrow 0} [\ln_{\tan x} (\tan 2x)]$

[CO:1,L:2]

j) For what value of k , the given matrix has rank 2

$$A = \begin{bmatrix} 1 & 5 & 4 \\ 0 & 3 & 2 \\ k & 13 & 10 \end{bmatrix}$$

[CO:5:L-2] **2×10**

PART-A

$$A = \begin{pmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 0 & -1 & -1 \end{pmatrix}$$

Q.2 a) For the matrix A , 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**

P. T. O.

- b) Find the volume of the solid obtained by revolving one arc of the cycloid
 $x = a(t + \sin t); y = a(1 + \cos t)$ about x-axis. [CO-1] [L-2] **10**

- Q.3 a) 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] **10**

- b) Find the maximum and minimum values of $f(x) = 8x^5 - 15x^4 + 10x^2$ [CO- 2] [L-2] **10**

- Q.4 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) more than one solution [CO-3] [L- 4] **10**

- b) Solve using Gauss Jordan method:

$$-x + 3y - 2z = 5;$$

$$4x - y - 3z = -8$$

$$2x + 2y - 5z = 7$$

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

PART-B

- Q.5 a) Verify Rank Nullity theorem for the linear transformation $T(x, y)$ where
 $T: R^2 \rightarrow R^3$ is defined by $T(x, y) = (x + y, x - y, y)$. [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**

- Q.6 a) Find the Eigen values and Eigen vectors of the matrix: $\begin{bmatrix} 4 & 2 & -2 \\ -5 & 3 & 2 \\ -2 & 4 & 1 \end{bmatrix}$ [CO-5][L-3] **10**

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

- b) Express: as a sum of symmetric and skew symmetric matrix. [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

$$(f + g)x = f(x) + g(x) \text{ for every } x, f(x), g(x) \in V$$

$$(\alpha f)x = \alpha f(x) \text{ for every } \alpha \in R$$

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

End Semester Examination, May 2023
 B. Tech. — First / Second Semester
MATHEMATICS-I (FOR ALL OTHER BRANCHES EXCEPT CSE & BT)
(BMA-102/BSC-MA-102)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

- Q.1 a) Evaluate: i) $\Gamma\left(\frac{7}{2}\right)$ ii) $B(8, 7)$ [CO1][L2]
- b) Evaluate: $\int_0^{\frac{\pi}{2}} \sqrt{\tan \theta} d\theta$ [CO1][L3]
- 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. [CO2][L2]
- d) Find the nth derivative of $f(x)=\sin(5x+3)$ [CO2][L3]
- e) For what value of a , the vector $\vec{V}=(x+7y)i+(2y-3z)j+(x+az)k$ is solenoidal. [CO3][L3]
- f) What is the half range sine series for $f(x)=k$ in $(0, \pi)$ [CO3][L4]
- g) What are the sufficient conditions for the existence of fourierseries ? [CO4][L1]
- h) Find $\frac{\partial u}{\partial r}$ and $\frac{\partial u}{\partial \theta}$, if $u=r \cos(r \sin \theta)$ [CO4][L3]
- i) If $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & -7 & 5 \\ 0 & 0 & 5 \end{bmatrix}$ what are the eigen values of A^{-1} . [CO5][L3]
- j) For what value of k , the given matrix has rank 2, where $A = \begin{bmatrix} 1 & 1 & 4 \\ 0 & 0 & 2 \\ k & 5 & 10 \end{bmatrix}$ [CO5][L2] **2×10**

PART-A

- Q.2 a) Evaluate: $\int_{-\infty}^{-1} \frac{1}{x^3} dx$ [CO1][L3] **5**
- b) Using the applications of beta and gamma function, evaluate $\int_0^1 x^5(1-x^3)^{12} dx$ [CO1][L3] **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. [CO1][L2] **10**
- Q.3 a) Find the extreme value of the function $x^3 + y^3 - 3axy$ [CO2][L3] **7**
- b) Find the value of a and b such that $\lim_{x \rightarrow \infty} \left[\frac{x(1 + a \cos x) - b \sin x}{x^3} \right] = 1$ [CO2][L3] **5**

P. T. O.

c) Prove that:

$$\cos(m \sin^{-1} x) = 1 - \frac{m^2}{2!} x^2 - \frac{m^2(2^2 - m^2)}{4!} x^4 - \frac{m^2(2^2 - m^2)(4^2 - m^2)}{6!} x^6 + \dots$$

$$f(x) = \log(1-x), \forall x \in \dot{D}. \quad [\text{CO2}][\text{L4}] \quad \mathbf{8}$$

Q.4 a) Discuss the convergence of series: $1 + \frac{x}{2} + \frac{2!}{3^2} x^2 + \frac{3!}{4^3} x^3 + \frac{4!}{5^4} x^4 + \dots$ [CO3][L3] **8**

b) Expand $f(x) = x \sin x; 0 < x < 2\pi$ in terms of fourier series. [CO3][L4] **12**

PART-B

Q.5 a) If $u = \log(x^3 + y^3 + z^3 - 3xyz)$, show that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = \frac{-9}{(x+y+z)^2}$ [CO4][L3] **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 $\hat{i} - \hat{j} + 2\hat{k}$ [CO4][L3] **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. [CO5][L4] **8**

b) Find the eigen values and the corresponding eigen vectors of $A = \begin{bmatrix} 11 & 3 \\ 15 & 1 \\ 3 & 11 \end{bmatrix}$

$$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$

[CO5][L3] **12**

Q.7 a) If $u = \cos e c^{-1} \left(\frac{x^{\frac{1}{2}} + y^{\frac{1}{2}}}{x^{\frac{1}{3}} + y^{\frac{1}{3}}} \right)^{\frac{1}{2}}$, find $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$ [CO4][L3] **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 $A^5 - 4A^4 - 7A^3 + 11A^2 - A - 10I$. [CO5][L4] **10**

End Semester Examination, May 2023

B. Tech. – First Semester

MATHEMATICS FOR BIO-TECHNOLOGY-I (BMA-103 / MA-103 / BSC-MA-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

a) Is the given matrix A, a skew-symmetric matrix, $A = \begin{bmatrix} 0 & -1 \\ 1 & -2 \end{bmatrix}$ $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$
[CO-2] [L-2]

b) For what value of k , the given matrix has rank 2. $A = \begin{bmatrix} 3-34 & \\ 2-34 & \\ 0 & k \ 1 \end{bmatrix}$
[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 $\sin 55^\circ$.
[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 $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots$
[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 $\int_0^{\pi} \sqrt{x} dx$
[CO-3] [L-2]

j) Find dy/dx . When $(\cos x)^y = \dots$
[CO-3] [L-3] **2×10**

PART-A

Q.2 a) For what values of K the equation $x+y+4z=1$; $2x+y+4z=k$; $4x+y+10z=k^2$ have a solution. Also, solve them completely in each case.
[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**

P. T. O.

- 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: $\cos \frac{5\pi}{9} + \cos \frac{7\pi}{9}$ [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) $\frac{1}{2}x + x^2 + \frac{9}{8}x^3 + x^4 + \frac{25}{32}x^5 \dots$ [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 $\cos 320$ upto 4 decimal places using Taylor's series. [CO-3] [L-3] **10**
- b) Expand $\sin(m \sin^{-1} x)$ by Maclaurin's theorem as far as x^5 . [CO-3] [L-3] **10**

- Q.6 a) If $u = \cos e c^{-1} \left[\frac{x^{\frac{1}{2}} + y^{\frac{1}{2}}}{x^{\frac{1}{3}} + y^{\frac{1}{3}}} \right]^{\frac{1}{2}}$, Prove that $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = \frac{\tan u}{144} (13 + \tan^2 u)$. [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 $\int_0^{2a} \int_{\sqrt{2ax-x^2}}^{\sqrt{2ax}} f(x,y) dx dy$ [CO3][L3] **10**
- b) Using triple integral, find the volume of the sphere $x^2 + y^2 + z^2 = a^2$ [CO-3] [L-3] **10**

End Semester Examination, May 2023

B. Tech. – 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**. Each question carries equal marks.

Q.1 Answer the following in brief:

- Find the coefficient of correlation between x and y , when the lines of regression are:
 $2x - 9y + 6 = 0$ and $x - 2y + 1 = 0$ {CO:2:L-2}
- 6 parts are selected randomly without replacement from a bin of 50 parts. The bin contains 3 defective parts and 47 non-defective parts. What is the probability that the second part is defective given that the first part is defective? {CO:1:L-1}
- A manufacturer claims that only 4% of his products supplied by him are defective. A random sample of 600 products contained 36 defectives. Test the claim of the manufacturer at 5% level of significance. {CO:3:L-2}
- Write the normal equation for second degree polynomial. {CO:2:L-1}
- Calculate first four moments about mean for the series: 5,5,5,5,5,5. {CO:1,2: L-1}
- Find the area under the normal curve in each of the case:
 - $z = -0.39$ and 4.21
 - To the left of $z = -1.28$ {CO:1:L-2}
- For two events A and B, let $P(A)=0.4$, $P(B)=p$ and $P(A \cup B)=0.6$, Find p so that A and B are independent events. {CO:1:L-2}
- A binomial variate X satisfies the relation ${}^9P(X=4) = P(X=2)$ when $n=6$. Find the value of parameter P and $P(X=1)$. {CO:1:L-2}
- A random variable X has the following Probability Distribution:

x	0	1	2	3	4	5	6	7
P(x)	K	4K	5K	9K	9K	11K	13K	15K

- Determine the value of K.
 - What is the smallest value of X for which $P(X < x) > 0.5$. {CO:2:L-2}
- Each sample of water has a 10% chance of containing a particular organic pollutant. Assume that samples are independent with regard to the presence of the pollutant. Find the probability that in the next 18 samples.
 - Exactly 2 contain the pollutant.
 - At least 4 samples contain the pollutant. {CO:1:L-2} **2×10**

PART-A

- Q.2
- An e-mail filter is planned to separate valid e-mails from spam. The word free occurs in 60% of the spam messages and only 4% of the valid messages. Also, 20% of the messages are spam. Determine the following probabilities:
 - The message contains word free.
 - The message is spam given that it contains word free.
 - The message is valid given that it does not contain word free. {CO:1:L-3} **6**
 - Suppose that a day's production of 850 manufactured parts contains 50 parts that do not conform to customer requirements. Two parts are selected at random, without replacement, from the batch. Let the random variable X equal the number of nonconforming parts in the sample.
 - What is the cumulative distribution function of X.

ii) Determine the mean and variance of X.

{CO:1:L-2} **4**

- c) The number of content changes to a Web site follows a Poisson distribution with a mean of 0.25 per day.
- i) What is the probability of two or more changes in a day?
 - ii) What is the probability of no content changes in five days?
 - iii) What is the probability of two or fewer changes in seven days? {CO:1:L-3} **10**

- Q.3 a) The probability density function for the diameter of a drilled hole in millimeters is $10e^{-10(x-5)}$ for $x > 5$ mm. Although the target diameter is 5 millimeters; but vibrations, tool wear, and other nuisances produce diameters greater than 5 millimeters.
- i) Determine the mean and variance of the diameter of the holes.
 - ii) Determine the probability that a diameter exceeds 5.1 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	1.5	1.5	2.5	3
y	1	2	3	4	5
$f_{XY}(x, y)$	1/4	1/8	1/4	1/4	1/8

Determine the following:

- a) $P(x < 2.5, y < 3)$
- b) $P(x < 2.5)$
- c) $P(y < 3)$
- d) $P(x > 1.8, y > 4.7)$
- e) $E(x)$, $E(y)$, $V(x)$ and $V(y)$.
- f) Marginal probability distribution of x
- g) Conditional probability distribution of y given that $x = 1.5$
- h) Conditional probability distribution of x given that $y = 2$
- i) $E(y/x = 1.5)$
- j) Are x and y independent?

{CO:1,2:L-3} **20**

PART-B

Q.5 a) Find out the Kurtosis of the data given below:

x	5	7	8	10	11	13	16
f	33	30	28	20	18	16	9

b) Calculate rank correlation coefficient from the following data:

x	67	68	64	68	72	70	69	70
y	65	66	67	67	68	69	71	73

{CO:1,3:L-3} 10

Q.6 a) 500 articles from a factory are examined and found to be 2% defective. 800 similar articles from a second factory are found to have only 1.5% are defective. Can it reasonably be concluded that the product of the first factory are inferior to those of second? (level of significance is 10%).

{CO:2:L-3} 10

b) Using the principle of least squares, find an equation of the form $y = ae^{bx}$ that fits the following data:

x	1	2	3	4	5	6
y	7.209	5.265	3.846	2.809	2.052	1.499

{CO:2:L-3} 10

Q.7 a) From the following table regarding the colour of eyes of fathers and sons test if the colour of son's eye is associated with that of the father:

Eye Colour of son-----→ Eye colour of father-----↓	Light	Not Light
Light	471	51
Not Light	148	230

Tabulated value of χ^2 at 5% level is 3.841.

{CO:3:L-3} 10

b) Memory capacity of 9 students was tested before and after a course of meditation for a month. State whether the course was effective or not from the data below (in same units):

Before	10	15	9	3	7	12	16	17	4
After	12	17	8	5	6	11	18	20	3

At 5% level of significance, $t_{0.05} = 2.31$.

{CO:3:L-3} 10

Tables are attached:



End Semester Examination, May 2023

B. Tech. — Second Semester

MATHEMATICS-II (FOR ALL OTHER BRANCHES EXCEPT CSE AND BT) (BMA-202/BSC-MA-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following in brief:

- a) Find the work done by the vector $\vec{V} = (x)i + (3x)j + (4x)k$ from $x = 0$ to $x = 2$ [CO:3]L:2]
- b) Find the zeros of $f(z) = \frac{z-7}{2}$ [CO:2]L:3]
- c) Find the complimentary function of the equation: $\frac{d^2y}{dx^2} - 4y = 7$ [CO:1]L:3]
- d) Find the particular integral of the equation: $(D^2 + 4D + 3)y = 25e^{-x}$ [CO:1]L:3]
- e) What is the necessary condition for a differential equation to be exact. [CO:1]L:1]
- f) Express $x^2 + 2$ in terms of legendre polynomial. [CO:1]L:4]
- g) Find the poles of $f(z) = \frac{z}{z^2 + 9}$ [CO:2]L:3]
- h) State Cauchy-Riemann equation for an analytic function in cartesian and polar form. [CO:2]L:1]
- i) State residue theorem. [CO:2]L:1]
- j) Find the solution of the differential equation: $ydx - xdy = 0$ [CO:1]L:2] **2×10**

PART-A

Q.2 a) Using double integration, find the area lying between the parabola $y = 4x - x^2$ and the line $y = x$. [CO:3]L:3] **10**

b) Evaluate $\iint_S \vec{F} \cdot \hat{n} dS$, where $\vec{F} = 18z\hat{i} - 12\hat{j} + 3y\hat{k}$ and S is the surface of the plane $2x + 3y + 6z = 12$ in the first octant. [CO:3]L:4] **10**

Q.3 Solve the following differential equations:

- a) $\left[y \left(1 + \frac{1}{x} \right) + \cos y \right] dx + (x + \log x - x \sin y) dy = 0$ [CO:1]L:3] **10**
- b) $p^3 + 2xp^2 - y^2p^2 - 2xy^2p = 0$ [CO:1]L:3] **10**

Q.4 Solve the following differential equations:

- a) $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = \cos^2 x + 2$ [CO:1]L:3] **10**

b) $x^2 \frac{d^2 y}{dx^2} - 2x \frac{dy}{dx} - 4y = x^2 + 2 \log x$

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

PART-B

Q.5 a) Determine analytic function $f(z) = u + iv$ whose real part is:
 $e^x [(x^2 - y^2) \cos y - 2xy \sin y]$.

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

b) If $f(z)$ is a regular function of z , prove that:
 $\left\{ \frac{\partial}{\partial x} |f(z)| \right\}^2 + \left\{ \frac{\partial}{\partial y} |f(z)| \right\}^2 = |f'(z)|^2$.

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

Q.6 a) State and prove Cauchy's integral formula and hence evaluate $\oint_C \frac{1}{z^2 + 9} dz$, Where C is $|z + 3i| = 2$.
 [CO:2]L:3] **10**

b) Using the residue theorem, evaluate $\oint_C \frac{z-3}{z^2 + 2z + 5} dz$, where C is the circle:
 i) $|z + 1 + i| = 2$. ii) $|z + 1 - i| = 2$.
 [CO:2]L:4] **10**

Q.7 a) Show that the function $f(z) = \frac{(x^3 - y^3) + i(x^3 + y^3)}{x^2 + y^2}$, $z \neq 0$ satisfies C-R equations at the origin but does not have a derivative at origin.
 [CO:2]L:3] **10**

b) Expand the function in Laurent's series $\frac{1}{z^2 - 3z + 2}$ for $1 < |z| < 2$
 [CO:2]L:3] **10**

End Semester Examination, May 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**. Each question carries equal marks.

- Q.1 a) Give an example of each monotonic increasing/ decreasing convergent sequence. [CO-3][L-2]
- b) Solve for 'x', $y = 2xp + yp^2$. [CO-3][L-2]
- c) Solve if possible: $y dx + x dy = e^x$ [CO-4][L-2]
- d) Solve the following:
 $\frac{d^2 y}{dx^2} + y = \cos 2x$. [CO-4][L-3]
- e) Show that the series -1-2-3-4-5-.....diverges to $+\infty$. [CO:1][L-1]
- f) If $u = x^2 + xyz + z$ find u_{xyz} (1,1,1). [CO-2][L-1]
- g) Find $\nabla \phi$, if $\phi = \sin(x^2 + y^2 + z^2)$. [CO-2][L-2]
- h) Find vector normal to the surface $f(x, y, z) = 3xyz + e^z x$ at the point (1,1,0). [CO-1][L-2]
- i) Expand e^x in powers of x. [CO-2][L-1]
- j) Test the convergence of the series $\sum_{n=1}^{\infty} \frac{n}{n^2 + 1}$ [CO-1] [L-2] **2×10**

PART-A

- Q.2 a) Discuss the convergence of the series:
 $\frac{1}{3} + \left(\frac{2}{3}\right)^2 + \left(\frac{1}{3}\right)^3 + \left(\frac{2}{3}\right)^4 + \left(\frac{1}{3}\right)^5 + \left(\frac{2}{3}\right)^6 + \dots$ [CO-1] [L-2] **10**
- b) Discuss the convergence of the series: $\sum \frac{(-1)^n 2^n}{n^2}$ [CO-1] [L-3] **10**
- Q.3 a) If $\frac{x^2}{a^2+u} + \frac{y^2}{b^2+u} + \frac{z^2}{c^2+u} = 1$,
prove that $u_x^2 + u_y^2 + u_z^2 = 2(x u_x + y u_y + z u_z)$ [CO-2][L-2] **10**
- b) If the directional derivative of $\phi = ax^2y + by^2z + cz^2x$ at the point (1,1,1) has maximum magnitude 15 in the direction parallel to the line $\frac{x-1}{2} = \frac{y-3}{-2} = \frac{z}{1}$. Find the value of a, b, c. [CO-2][L-2] **10**

- Q.4 a) Find the values of x for which the series $x - \frac{x^3}{3} + \frac{x^5}{5} - \dots$ is absolutely convergent and conditionally convergent. [CO-1][L-3] **10**
 b) Compute the value of $\sin 31^\circ$ to four decimal places. [CO-1][L-2] **10**

PART-B

- Q.5 a) Solve $2y \, dx + (2x \log x - xy) \, dy = 0$. [CO-3][L-3] **10**
 b) Solve Bernoulli's differential equation: $x \frac{dy}{dx} + y \log y = xy e^x$ [CO-3][L-2] **10**

- Q.6 a) Solve Cauchy's Linear differential equations / Legendre's Linear differential equations:

$$x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = \sin(\log x^2) \quad \text{[CO-4][L-3] } \mathbf{10}$$

- b) Find the complete solution of following differential equation:

$$\frac{d^2 y}{dx^2} - 2 \frac{dy}{dx} + y = 8e^{2x} \cos x \quad \text{[CO-4][L-3] } \mathbf{10}$$

- Q.7 a) Using method of Variation of parameters, solve: $\frac{d^2 y}{dx^2} + y = \sec x$ [CO-4][L-3] **10**
 b) Solve Linear Differential equations:

$$x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = (\log x) \sin(\log x) \quad \text{[CO-3][L-3] } \mathbf{10}$$

End Semester Examination, May 2023

B. Tech. – Fourth Semester MATHEMATICS-III (BMA-306)

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) Find the Z-transform of $\{3^k\}$? [CO-1,2][L-2]

b) Find the Laplace transform of $t^2 \cos at$. [CO-1][L-1]

c) Write the normal equations for the Least square straight line. [CO-3][L-1]

d) Determine the median of the following data: [CO-4][L-2]

Marks	10-15	15-20	20-25	25-30
No. of students	5	11	22	12

e) Find the first three moments about the number '5' for the following series: 2, 4, 8, 9, 19. [CO-4][L-2]

f) Find the correlation coefficient, if

$$\sum_{i=1}^{25} x_i = 125; \sum_{i=1}^{25} y_i = 100; \sum_{i=1}^{25} x_i^2 = 650; \sum_{i=1}^{25} y_i^2 = 460; \sum_{i=1}^{25} x_i y_i = 508$$
 [CO-3][L-3]

g) For normal curve, prove that the maximum value of the ordinate is $\frac{1}{\sigma\sqrt{2\pi}}$. [CO-5][L-2]

h) Evaluate: $\int_0^{\infty} t e^{-2t} \sin t dt$. [CO-1][L-1]

i) A small electronic component of a given brand with average weigh 0.35 gm with a standard deviation of 0.015 gm. What is the probability that two lots of 200 components each will differ in weight by more than 3 gm? [CO-5][L-2]

j) The number of cars passing a point on a country lane has a mean 1.6 per minute. Using the Poisson distribution, find the probability that in any one minute how many cars will be there? [CO5] [L3] **2×10**

PART-A

Q.2 a) Using Convolution Theorem, evaluate: $L^{-1}\left\{\frac{S}{(s^2+16)(s^2+9)}\right\}$ [CO1] [L4] **10**

b) Find the Laplace transform of the square-wave function of the period $2a$ define as:

$$f(t) = \begin{cases} a & 0 \leq t \leq a \\ -a & a < t < 2a \end{cases}$$
 [CO1] [L2] **10**

Q.3 Solve the following equation by using Laplace transform:

$$x''(t) + 9x(t) = \cos 3t \quad \text{with} \quad x(0) = 1, x\left(\frac{\pi}{2}\right) = -1$$
 [CO1] [L4] **20**

Q.4 State and prove Convolution theorem of Laplace transform.

[CO1, 2] [L5] **20**

PART-B

- Q.5 a) Calculate the coefficient of Skewness and Kurtosis of the following frequency distribution:

x	1	2	3	4	5	6	7	8	9
f	2	7	14	26	31	23	10	6	3

[CO4, 5] [L2] **10**

- b) Calculate rank correlation coefficient from the following data:

x	78	89	97	69	59	79	68
y	124	136	155	111	106	135	123

[CO4, 5] [L2] **10**

- Q.6 a) 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

[CO3, 5] [L2] **10**

- b) A sample of 6000 members has mean of 2.2 cms and Standard deviation of 1.2cms. Verify that the mean is 3.05 cm from given sample of 6000. [CO5, 6] [L1] **10**

- Q.7 a) The table gives the number of aircraft accidents that occurs during various days of the week:

Days	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
No. of Accidents	12	14	10	10	9	7	12

Find whether the accidents are uniformly distributed over the week. [CO5, 6] [L3] **10**

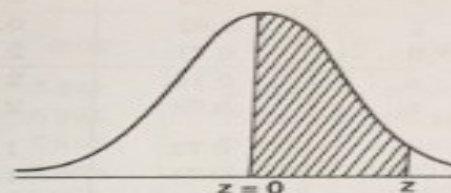
- b) Two independent samples of 9 and 10 items respectively had the following values of the variables (weight in kgs):

Sample 1: 9, 11, 13, 11, 15, 9, 12, 14, 16 and Sample 2: 10, 12, 10, 14, 9, 8, 10, 8, 11, 13.

Is the difference between the means of the samples significant? [CO5, 6] [L3] **10**

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	.3729	.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	.4960	.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	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993

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	33.196	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	35.563	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 normal variate with unit variance.

End Semester Examination, May 2023

B. Tech. – Third Semester

MATHEMATICS -III (BMA-308)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

- Q.1 a) Find the Z- transform of $\left\{ 2^{|k|} \right\}$? [CO-1,2] [L-2] **2**
b) Find the Laplace transform of $t^2 \cos at$. [CO-1][L-3] **2**
c) Write the normal equations for the least square parabola. [CO-3][L-1] **2**
d) Find the inverse Laplace transform of $s \log \frac{(s-1)}{s^2 + 4}$ [CO-1][L-3] **3**
e) Find the Z- transform of $\left\{ \left(\frac{1}{2} \right)^k \right\}$ [CO-1,2] [L-3] **3**
f) Find the Z- transform of unit impulse function: $\delta(k) = \begin{cases} 1, k = 0 \\ 0, k \neq 0 \end{cases}$ [CO-1,2][L-3] **1**
g) For normal curve, prove that the maximum value of the ordinate is $\frac{1}{\sigma\sqrt{2\pi}}$. [CO-5][L-2] **2**
h) Evaluate: $\int_0^{\infty} t^3 e^{-t} \cos t dt$ [CO-1][L-1] **2**
i) A manufacturer knows that the electrical gadget he makes, contains an average 0.2% of defectives. He packs them in packets of 5. What is the probability that a packet picked at random will contain 2 or more faulty electrical gadget? [CO-3][L-3] **3**

PART-A

- Q.2 a) Solve the following equation by using Laplace transform:

$$x''(t) + 9x(t) = \cos 2t \quad \text{with} \quad x(0) = 1, x\left(\frac{\pi}{2}\right) = -1 \quad [\text{CO-1}][\text{L-4}] \quad \mathbf{10}$$

- b) Using convolution theorem to evaluate: $L^{-1} \left\{ \frac{s^2}{(s^2+a^2)(s^2+b^2)} \right\}$ [CO-1][L-4] **10**

- Q.3 Solve the difference equation:

$$y_{k+2} + 4y_{k+1} + 3y_k = 2^k \quad \text{with} \quad y_0 = 0 \text{ and } y_1 = 1 \quad [\text{CO-1,2}] [\text{L-5}] \quad \mathbf{20}$$

- Q.4 a) Solve the integral equation $\int_0^{\infty} f(x) \cos \alpha x dx = e^{-\alpha}$ [CO-1][L- 4] **10**

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

[CO-1,2] [L-4] **10**

PART-B

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

$$\bar{x} = 12 \text{ hours}, \sigma = 3 \text{ hours}$$

Assuming that the data is normally distributed, what percentage of the battery cells are expected to have life

- i) more than 15 hours.
ii) between 10 and 14 hours.

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

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

x	1	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-3][L-2] **10**

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

Days	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
No. of accidents	14	16	8	12	11	9	14

Find whether the accidents are uniformly distributed over the week. [CO-4][L-5] **10**

- b) Two independent samples of 8 and 7 items respectively had the following values of the variables (weight in kgs):

sample 1: 9, 11, 13, 11, 15, 9, 12, 14 and sample 2: 10, 12, 10, 14, 9, 8, 10.

Is the difference between the means of the samples significant? [CO-4][L-5] **10**

- Q.7 a) Using method of least squares, fit a straight line to the following data:

x	-4	1	2	3
y	4	6	10	8

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

- b) Intelligence test of two groups of boys and girls gives the following results:

	Mean	Standard 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-4][L-4] **10**

Tables are attached:

Table 1 : NORMAL TABLE
AREAS UNDER THE STANDARD NORMAL

$$\text{CURVE} = \frac{1}{\sqrt{2\pi}} \int_0^z e^{-\frac{z^2}{2}} dz$$

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	.3729	.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	.4960	.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	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993

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

d.f. (v)	Probability (Level of Significance)					
	0.50	0.10	0.05	0.02	0.01	0.001
1	1.00	6.31	12.71	31.82	63.66	636.62
2	0.82	0.92	4.30	6.97	6.93	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	2.65	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 $\chi^2 (\alpha)$ 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 normal variate with unit variance.

End Semester Examination, May 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:

- How Richard Petri revolutionized the culture techniques?
- Name methods to preserve industrial important microbes.
- Mention the name of diseases caused by microbes in plant and animals.
- Name the culture collection centers.
- Describe molecular characterization methods used in identification.
- What are phytoplanktons?
- Why protozoa are important?
- Describe actinomycetes.
- Define differential media with an example.
- Discuss different methods of sterilization.

2×10

PART-A

- Q.2 Louis Pasteur is known as "Father of Bacteriology". Explain his major inventions and achievements in the same. [CO-1] [L-2] **20**
- Q.3 Explain how bacteria are placed in manual of systematic bacteriology. [CO-2] [L-5] **20**
- Q.4 a) Determine the role of Spallanzani's experiment to resolve the conflicts over spontaneous generation theory. [CO-1] [L-4] **10**
b) Mycoplasmas are wall less forms. Define their structure, characteristics and economic importance. [CO-3] [L-3] **10**

PART-B

- Q.5 Classify general characteristics of algae and how these are important for industry and medicinal point of view? [CO- 3] [L-4] **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? [CO-2] [L-1] **10**
b) Microorganisms are present in almost every habitat. Analyze how they are beneficial to us? [CO-4] [L-5] **10**

End Semester Examination, May. 2023
B. Sc. (Hons.) Microbiology – First Semester
BACTERIOLOGY AND SYSTEMATICS (BMB-DS-102)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- a) Differentiate between 'monotrichous' and 'lophotrichous'.
- b) Explain LPS and L-forms.
- c) Compare between the structure of gram-positive and gram-negative bacteria.
- d) Define 'sporulation'.
- e) Mention all the components of culture media.
- f) Give the logarithmic representation of bacterial population.
- g) Explain systematics and taxonomy briefly.
- h) What are the general characteristics of archaeobacteria?
- i) Elaborate the generation time and specific growth rate in bacteria.
- j) What is the concept of species? Give an example.

2×10

PART-A

Q.2 Explain the following in detail:

- a) Ribosomes.
- b) Mesosomes.

[CO-1] [L-2] **10×2**

Q.3 a) Elaborate the physical methods of microbial control in detail with their types and mode of action.

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

b) What are nutritional requirements in bacteria and mention their categories?

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

Q.4 Mention the asexual methods of reproduction and logarithmic representation of bacterial populations.

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

PART-B

Q.5 a) Explain rRNA oligonucleotide sequencing and its importance in detail.

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

b) Describe evolutionary chronometers.

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

Q.6 a) Give a detailed study of Nanoarchaeota and Crenarchaeota.

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

b) Elaborate the classes of methanogens in detail.

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

Q.7 Elaborate the following in detail:

- a) *Thermococcus* and *Pyrococcus*
- b) *Meningococcus* and *Helicobacter*

[CO-4] [L-2] **10×2**

End Semester Examination, May 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 cell membrane proteins. | [CO1] [L1] |
| b) What are microtubules and microfilaments? | [CO3] [L1] |
| c) Define 'apoptosis'. | [CO2] [L1] |
| d) Illustrate the term exocytosis. | [CO2] [L2] |
| e) Explain the functions of nucleus. | [CO1] [L2] |
| f) Explain 'nerve cell'. | [CO4] [L1] |
| g) What two types of transport mechanisms across the cell membrane? | [CO1] [L1] |
| h) Compare phagocytosis and pinocytosis. | [CO2] [L5] |
| i) Explain the neurotransmitters. | [CO4] [L2] |
| j) Define 'extracellular matrix'. | [CO3] [L1] 2×10 |

PART-A

- Q.2 Compare the structure and functions of Endoplasmic reticulum and Golgi complex. [CO2][L4] **20**
- Q.3 Describe the fluid mosaic model of cell membrane with diagram. [CO2][L2] **20**
- Q.4 a) Distinguish between 'prokaryotic and eukaryotic cell'. [CO1] [L4] **10**
b) Compare animal and plant cell. [CO1] [L4] **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 functions of the muscle cells. [CO4] [L6] **10**

End Semester Examination, May 2023
B. Sc. (Microbiology) – First Semester
HEREDITARY AND EVOLUTION (BMB-DS-121)

Time: 3 hrs.
100

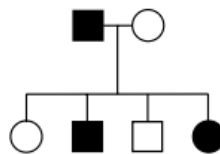
Max Marks:

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:

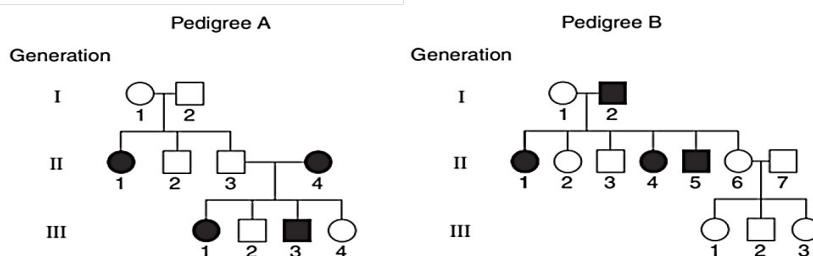
- a) Are all the genes of the same linkage group linked? [CO3][L3]
- b) Allelic dominance and dominant epistasis are the same! Comment. [CO2][L2]
- c) Are sister chromatids same as the paired homologous chromosomes? [CO2][L2]
- d) Identify the inheritance pattern of the following pedigree: [CO1][L2]



- e) The genes on fourth chromosome of Drosophila show a complete linkage. Why? [CO6][L2]
- f) "Mutations belonging to the same complementation group do not show complementation": Is this 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? (1) Chromatid formation, (2) spindle formation, (3) chromosome condensation, (4) chromosome movement to poles, (5) 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**

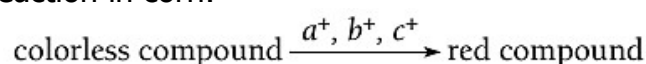
PART-A

Q.2 a) What possible mode(s) of inheritance can explain the pattern of affected individuals in each of Pedigrees A and B?



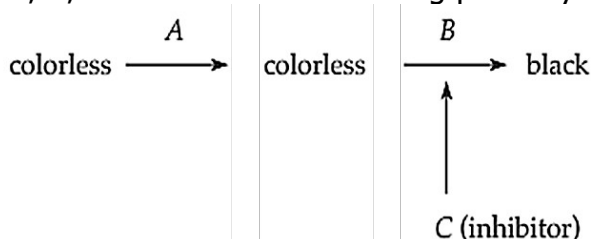
[CO5][L4] **20**

Q.3 Three genes on different chromosomes are responsible for three enzymes that catalyze the same reaction in corn:



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
$y/y R/R, y/y R/r, \text{ and } y/y r/r$ = 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? **10**
- b) What will be the flower colors in the offspring of a cross of orange-red x pale yellow? **5**
- 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] **5**

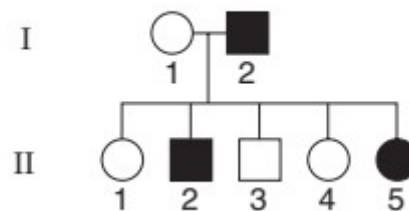
- Q.6 In the Chinese primrose, slate-colored flower (*s*) is recessive to blue flower (*S*), red stigma (*r*) is recessive to green stigma (*R*), and long style (*l*) is recessive to short style (*L*). All three genes involved are on the same chromosome. The F1 of a cross between two true-breeding strains, 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? [CO6][L6] **10**
- b) Make a map of these genes, showing their order and the distances between them. [CO6][L6] **10**

- 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
- the F1 generation;
 - the F2 generation;
 - the progeny of a cross of the F1 plants back to the white, spiny parent; and
 - 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):

Generation



- What is the genotype of the mother?
- What is the genotype of the father?
- What are the genotypes of the children?
- 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, May 2023

B. Sc. (Microbiology) – Second Semester

BIOMOLECULES (BMB-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 Answer the following in brief:

- a) Give examples of homopolysaccharides and heteropolysaccharides and list their functions. [CO-2] [L-1]
- b) Why do monosaccharides form ring structures? [CO-1][L-1]
- c) Compare the structures of following two hexose sugars, D-glucose and D-fructose. [CO-1][L-1]
- d) Summarize the different types of glycosaminoglycans. [CO-2][L-2]
- e) Describe the ionic state of an amino acid when it is dissolved in water. [CO-3] [L-2]
- f) Briefly explain how are lipids classified? [CO-3] [L-1]
- g) Describe the structure and functions of simple lipids. [CO-1][L-2]
- h) How do the factors such as pH, temperature and substrate concentration affect enzyme activity? [CO-3] [L-2]
- i) What are fatty acids? Name two essential fatty acids. [CO-2] [L-1]
- j) Distinguish between nucleoside and nucleotide. [CO-4] [L-2] **2×10**

PART-A

- Q.2 Compare the structure, function and distribution of the three polymers of glucose: Glycogen, starch and cellulose. [CO-2] [L-3] **20**
- Q.3 Describe the various forms of isomerism found in monosaccharides. [CO-1] [L-2] **20**
- Q.4 Explain the structural composition and the functions of various types of phospholipids. [CO-2] [L-2] **20**

PART-B

- Q.5 Describe a competitive inhibitor and explain how it would affect V_{\max} and K_m of an enzyme. [CO-3] [L-3] **20**
- Q.6 Analyze a typical amino acid titration curve and explain what information about the properties of the amino acid can be derived from it. [CO-3] [L-4] **20**
- Q.7 Name a vitamin that is produced by the gut-resident bacteria in humans. Describe its chemical composition and role in metabolism. [CO-4] [L-2] **20**

End Semester Examination, May 2023
B. Sc. (Microbiology) – Second Semester
MICROBIAL TECHNIQUES AND INSTRUMENTS (BMB-DS-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief.

- a) Distinguish between linearity and sensitivity of an instrument. [CO1][L1]
- b) Define 'calibration of an instrument'. [CO1][L1]
- c) Mention the formula to calculate linear magnification of a lens. [CO1][L1]
- d) What is the function of phase ring in a phase contrast microscope? [CO2][L1]
- e) What is an ultracentrifuge? [CO2][L1]
- f) Identify the nature of stationary and mobile phase in liquid- liquid chromatography. [CO3][L1]
- g) Which types of molecules are separated through ion-exchange chromatography? [CO3][L1]
- h) What is the use of ethidium bromide and why is it harmful? [CO4][L1]
- i) Which buffers are used in agarose gel electrophoresis? [CO4][L1]
- j) Define the principle of colorimeter. [CO-1] [L-1] **2×10**

PART-A

- Q.2 a) Discuss the properties of standard deviation and compute its formula. [CO-2] [L-2] **10**
 b) Explain various types of errors in an analytical instrument. [CO-2] [L-2] **10**
- Q.3 a) Illustrate magnification in a light microscope through ray diagram. [CO-2] [L-3] **10**
 b) Compare bright field and dark field microscopy. [CO-2] [L-5] **10**
- Q.4 a) Calculate the relative centrifugal force on the particle under centrifugation, if rpm=7,000 and radius of rotation r = 2.5 (initial) and 5.0 cm (final). [CO-3] [L-6] **10**
 b) Compare a fixed angle rotor centrifuge and a swinging bucket centrifuge. [CO-3] [L-3] **10**

PART-B

- Q.5 a) Explain the principle of gel filtration chromatography. [CO-3] [L-2] **10**
 b) Deduce the formula for resolution of peaks in an HPLC chromatogram. [CO3] [L-5] **10**
- Q.6 a) Enlist the components required for SDS-PAGE and mention the role of each. [CO-4] [L-2] **10**
 b) Analyze the importance of discontinuous PAGE. [CO-4][L-4] **10**
- Q.7 a) Discuss the principle of a UV-VIS spectrophotometer. [CO-4] [L-2] **10**
 b) Determine the application of UV-VIS spectroscopy in qualitative analysis of analytes. [CO-4][L-3] **10**

End Semester Examination, May 2023
B. Sc. (Microbiology) – Second Semester
FOOD AND DAIRY MICROBIOLOGY (BMB-DS-203)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- a) Emphasize the scope of processed food materials. [CO1][L2]
- b) Set a comparative using suitable example between raw and processed food. [CO2][L2]
- c) Enlist any two intrinsic parameters that determines spoilage of food. [CO4][L1]
- d) Emphasize the need of dairy starter cultures. [CO3][L2]
- e) When grapes are kept outside for too long then you observe some spoilage then you understand them to be unfit for consumption. However, you use the same grapes and rot them to make alcoholic beverages. Justify with suitable explanation. [CO4][L3]
- f) Necessitate the importance of food intoxication. [CO3][L3]
- g) Yogurt is distinct from curd. Justify. [CO2][L1]
- h) Is sodium benzoate a boon or a bane to the food preservation technology? [CO1][L2]
- i) Enlist any two precautions in preserving milk against spoilage. [CO3][L1]
- j) Discuss the relevance of microbial enzymes in dairy industry. [CO4, L2] **2×10**

PART-A

Q.2 Emphasize the relevance of each intrinsic as well as extrinsic factors that affect growth and survival of microbes in foods. Support your answer with an example wherever necessary. [CO-1] [L-1] **20**

- Q.3
- a) Elaborate the probiotics health benefits, types of microorganisms used, probiotic foods available in market. [CO- 2] [L-2] **10**
 - b) Why proteins are a way to utilize the by-products of dairy industry? Justify with proper explanation. [CO- 2] [L-2] **10**

Q.4 Outline the salient features of the following chemicals in food preservation:

- a) Salt.
- b) Sugar.
- c) Vinegar.
- d) Sodium benzoate. [CO-3] [L-3] **5×4**

PART-B

Q.5 Explain different types of modeling utilized in predictive microbiology. Explain with examples. [CO-4] [L-6] **20**

Q.6 What are the two major methods for rapid detection of food borne pathogens. Explain their differences and utility areas. [CO-4] [L-5] **20**

Q.7 a) What are the factors that stress upon the need for nutraceuticals? How do they find utilization? [CO-3] [L-3] **10**

b) Give an overview of HACCP Guidelines.

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

End Semester Examination, May 2023
B. Sc. (Microbiology) – Second Semester
BIOINFORMATICS (BMB-DS-221)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- | | |
|---|------------------------|
| a) List different types of sequence alignment. | [CO1][CO1] |
| b) What is DBMS? Mention the four main types of data organization? | [CO1][CO1] |
| c) Define 'PUBMED'. | [CO2][CO1] |
| d) Illustrate the tools available for gene finding. | [CO3][CO2] |
| e) Explain the functions of BIOMART TOOL. | [CO4][CO2] |
| f) Write any two methods available for alignment of pair of sequence. | [CO3][CO1] |
| g) What are Primary biological databases? Give examples. | [CO1][CO1] |
| h) Compare cDNA and Oligonucleotide microarray. | [CO2][CO5] |
| i) Explain the Genomics. | [CO4][CO2] |
| j) Define FASTA format? Give an example of nucleotide sequence in FASTA format. | [CO1][CO1] 2×10 |

PART-A

- Q.2 Illustrate the classification of biological databases and discuss their applications in molecular biology. [CO2][L2] **20**
- Q.3 Describe genome specific databases in details. [CO1][L2] **20**
- Q.4 Explain how large scale data is generated in molecular biology? [CO1][L4] **20**

PART-B

- Q.5 Explain various databases that deal with DNA and protein structure. [CO3][L2] **20**
- Q.6 Describe alignment i.e. local, global and multiple sequence alignment. [CO3][L2] **20**
- Q.7 a) Illustrate a motif and how can we search them with MEME tools. [CO4][L2] **10**
b) Discuss the approach of proteomics and its types. [CO4][L6] **10**

End Semester Examination, May 2023

B. Sc. (Microbiology) – Third Semester

VIROLOGY (BMB-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:

- Differentiate between 'viroid and virion'.
- Are prognosis and diagnosis same? Why do you think so?
- Expand HIV and AIDS.
- What are early genes? When are they produced?
- Define 'infection'.
- How bacteriophages are different from other viruses?
- Mention the strategies for antiviral targets.
- How Influenza virus is transmitted?
- Expand 'CRISPR'.
- Differentiate between 'inhibition and inactivation of viruses'. [CO1-4, L2] **2×10**

PART-A

- Q.2 a) Enlist the different classes of viruses. How are they classified and what are their specific features? [CO-1] [L-1] **10**
b) What is the significance of viral quantification? How do we achieve that? [CO-1] [L-2] **10**

- Q.3 Give a detailed analysis of bacteriophages, their life cycle and utilization in virology. [CO-2] [L-2] **20**

- Q.4 "mRNA is the central point for all viral classes". Explain and illustrate it with diagrams. [CO-2] [L-2] **20**

PART-B

- Q.5 Explain different types of transmission methods utilized by viruses. [CO-3] [L-3] **20**

- Q.6 What are vaccines? Explain their types, mode of selection and design. What are the types of immunoglobulins that get raised by vaccines? Show them on graph. [CO-4] [L-5] **20**

- Q.7 a) What are the factors that stress upon the need antivirals in the era of vaccines? How do we design them? [CO-3] [L-3] **10**
b) Explain Genome editing and what tools can be used for the same. [CO-4] [L-3] **10**

End Semester Examination, May 2023

B. Sc. (Microbiology) – Third Semester

MYCOLOGY & 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 questions in brief:
- a) List four silent features of Algae. [CO1][L1]
 - b) Names the various modes of nutrition in fungi. [CO3][L1]
 - c) What are plastids? [CO2][L1]
 - d) What are mycotoxins? [CO3][L1]
 - e) Draw the labeled diagram of spirulina. [CO3][L3]
 - f) List four silent features of Fungi. [CO1][L1]
 - g) What is archaea bacteria? [CO3][L1]
 - h) Draw the diagram of basidiocarp. [CO2][L1]
 - i) Write any two symptoms of rust disease. [CO3][L3]
 - j) Draw the labeled diagram of Chlamydomonas. [CO3][L3] **2×10**

PART-A

- Q.2 Describe general features, structure, nutrition and reproduction in Zygomycetes. [CO1][L2] **20**
- Q.3 Describe the life cycle of rust fungi. [CO3][L2] **20**
- Q.4 Explain the diversity of habitat in fungi. [CO4][L4] **20**

PART-B

- Q.5 Explain the application of algae in SCP production. [CO1][L2] **20**
- Q.6 Describe the various modes of sexual reproduction in fungi. [CO4][L2] **20**
- Q.7 Explain the heterothallism in fungi. [CO3][L2] **20**

End Semester Examination, May 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) Who is known as Father of Plant Pathology? [CO- 1] [L- 1]
 - b) What is the difference between local and systemic resistance? [CO- 1] [L- 1]
 - c) Give examples of soil borne and seed borne diseases. [CO- 1] [L- 3]
 - d) What do you mean by hydathodes? [CO- 1] [L- 1]
 - e) Define 'mycorrhizae'. [CO- 1] [L- 1]
 - f) What are ratoon crops? [CO- 2] [L- 1]
 - g) Explain the mechanism of dual culture technique. [CO- 3] [L- 1]
 - h) What are inducible defenses? [CO- 1] [L- 1]
 - i) Illustrate horizontal resistance. [CO- 1] [L- 2]
 - j) What do you mean by T-toxin? [CO- 1] [L- 1] **2×10**

PART-A

- Q.2 a) Describe the important events in the development of the disease. [CO- 1] [L-2] **10**
 b) What are the different types of resistance? Explain with the help of few examples. [CO-4] [L-1] **10**
- Q.3 Explain the role of:
- a) Toxins in pathogenesis. [CO-3] [L-1] **10**
 - b) Enzymes in plant defense. [CO-3] [L-2] **10**
- Q.4 a) Give a comprehensive account of host pathogen interaction. [CO-4] [L-1] **10**
 b) Write a short note on: 'Gene for Gene Hypothesis'. [CO-3] [L-1] **10**

PART-B

- Q.5 What do you mean by agrochemicals? How they are used for plant disease control? Elaborate the different types of classification of agrochemicals. [CO-1] [L-2] **20**
- Q.6 a) What are the different biocontrol mechanisms evolved by Trichoderma against phytopathogens? [CO-4] [L-2] **15**
 b) Discuss the two ways of dispersal of infectious plant pathogens. [CO-2] [L-2] **5**
- Q.7 a) Effective plant protection regulations like quarantine are important in safeguarding the bio-security and world's future. Comment and Justify. [CO-2] [L-1] **10**
 b) Give the causal organism, host and symptoms of Red rot of sugarcane and Loose smut of wheat disease causing substantial losses to crops. [CO-2] [L-1] **10**

End Semester Examination, May 2023

B. Sc. (Hons.) Microbiology – Fourth Semester

MOLECULAR BIOLOGY (BMB-DS-401)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Briefly explain the following:

- Find the linking number (Lk) for a closed-circular DNA molecule of 10,000 base pairs in the fully relaxed form. [CO1 L3]
- What are histones and what is their principal role in chromatin structure? [CO2 L2]
- Which base is modified in t-RNA and what is the significance of this modification? [CO3 L3]
- DNA replication is much more accurate than RNA transcription. In replication, only one base in every ten billion, on average, is inaccurately placed. Why is it so? [CO3, L3]
- How N linked glycosylation is different from O linked glycosylation? [CO4, L3]
- What do you understand by positive and negative regulation? [CO3 L2]
- Information in DNA cannot be decoded directly into proteins. Indicate whether true or false. Justify your answer. [CO4 L3]
- A piece of double stranded DNA contains 26% adenine. Determine the percentage of Guanine bases. [CO1 L3]
- What do you understand by gratuitous inducers? [CO3 L2]
- Briefly explain C-value paradox. [CO3 L2] **2×10**

PART A

- Q.2 a) Calculate values for the following topological properties of a closed-circular DNA molecule containing 2,000 base pairs (for simplicity, assume there are 10 base pairs per turn in the relaxed DNA).
- The linking number when the DNA is relaxed
 - The linking number when the DNA has been underwound by 10 enzymatic turnovers of DNA gyrase.
 - The linking number when the DNA has been underwound by binding five nucleosomes followed by complete relaxation by a eukaryotic topoisomerase. [CO-1][L-3] **10**
- b) How complexity of eukaryotic genome can be ascertained? [CO-1][L-3] **10**
- Q.3 How transcription termination occurs in prokaryotes? How the promoters of prokaryotes are different from that of eukaryotes. [CO-2] [L-2] **20**
- Q.4 a) Explain how self splicing occurs in introns. Also explain the requirement of spliceosomes in the splicing of other introns. [CO-2] [L-3] **10**
- b) Most prokaryotic mRNAs have well defined 3' ends terminating in poly A tail .Explain how it occurs and what is its significance? [CO-2] [L-3] **10**

P.T.O.

PART B

- Q.5 a) In the presence of high concentrations of tryptophan, only short transcript of the Trp operon are synthesized because of attenuation of transcription 5' to the structural genes. This is mediated by the recognition of two Trp codons in the leader sequence. If these codons were mutated to be amber UAG nonsense mutations, what effect would this have on the regulation of the operon in the presence or absence of tryptophan? Explain. [CO-3][L5] **10**
- b) Regulation of transcription in eukaryotes is a result of the combined effects of structural properties (how DNA is "packaged") and the interactions of proteins called transcription factors. Justify. [CO-3][L5] **10**
- Q.6 Explain any two post-translational modifications with respect to their mechanism and importance. [CO-4][L-3] **20**
- Q.7 How intracellular proteins are hydrolyzed to their constituent amino acids and replaced by new synthesis? What happens in case of extracellular proteins? [CO-4][L-2] **20**

End Semester Examination, May 2023

B. Sc. (Microbiology) – Fourth Semester MICROBIAL GENETICS (BMB-DS-402)

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.

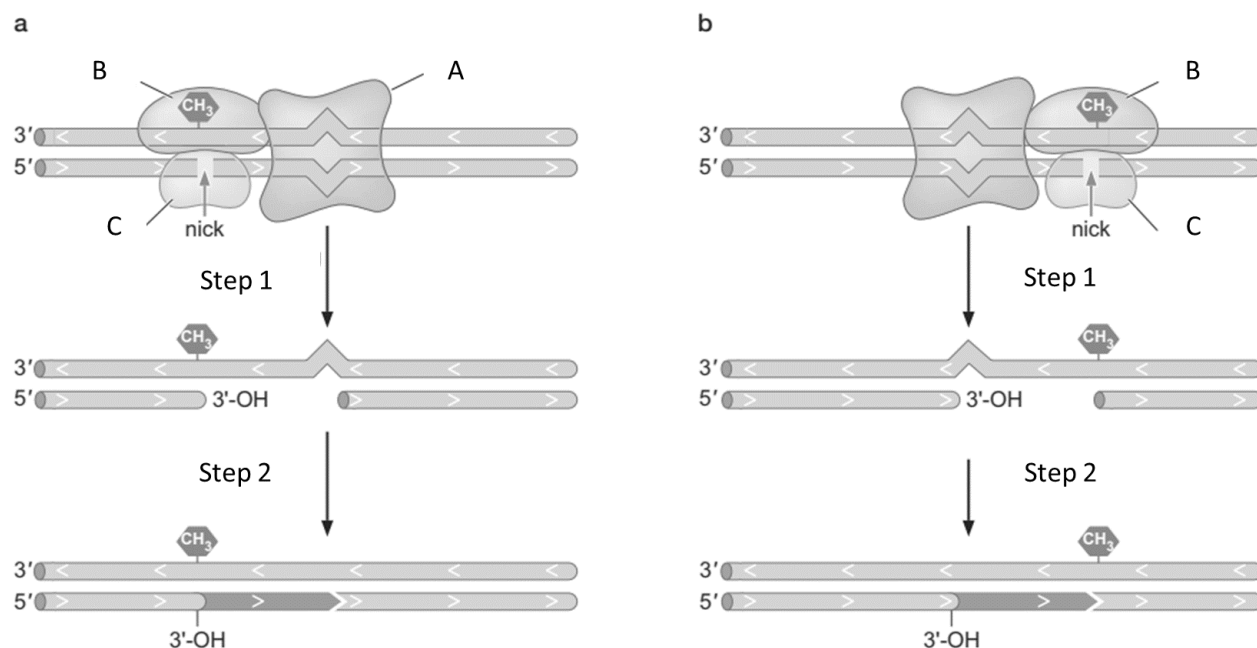
Q.1 Answer the following in brief:

- What is the difference between spontaneous and induced mutations?
- "Mutations are rare events, and of course those that have deleterious effects are selected against during evolution". How?
- "Chemical modification of DNA directly changes one base into a different base". Give one example.
- Differentiate between 'transversions' and 'transitions'.
- Base mispairing usually occurs as an aberration resulting from.
- Differentiate between 'horizontal' and 'vertical' gene transfer.
- Studies of bacterial recombination began in 1946, when _____ and Edward Tatum showed that bacteria undergo _____.
- What are auxotrophs and prototrophs?
- Physical interaction is the initial stage of the process of conjugation and is mediated by a structure called the _____.
- The process of transformation consists of numerous steps that achieve two basic outcomes. What are they?

[CO-2,3,4] [L1.3.5] **2×10**

PART-A

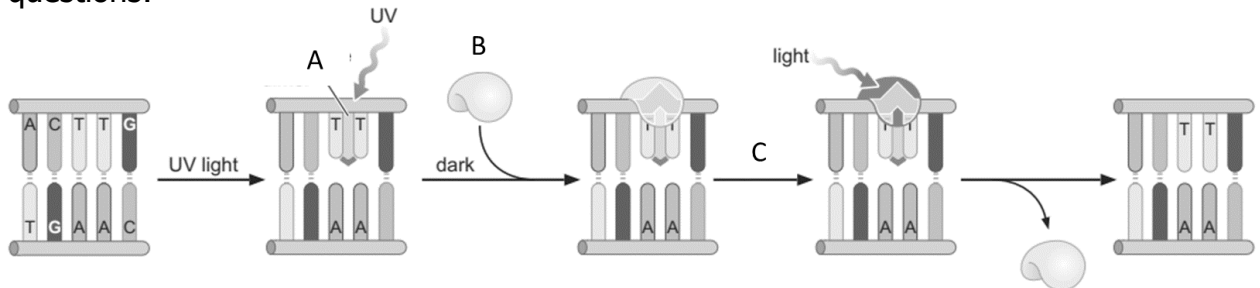
Q.2 Identify the DNA repair pathway shown in the figure below and answer the following questions.



- What is the difference between the two pathways shown in figure a and b?
- Identify the major components A, B and C involved in the pathway?

- c) Explain the steps (1 and 2) and major components involved in carrying out these steps.
- d) Why do you think the kink exist in the DNA and how is it formed?
- e) What is the importance of the methyl group and what protein is involved in catalyzing the methylation step?
[CO1] [L4] **4×5**

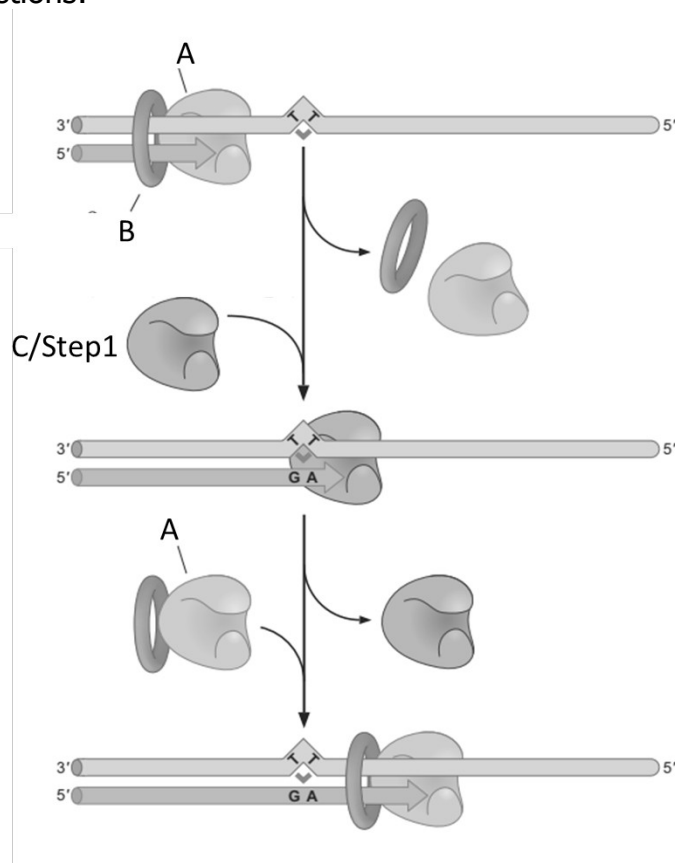
Q.3 Identify the DNA repair pathway shown in the figure below and answer the following questions:



- a) Identify the major components (B and C) of the pathway.
- b) What is A and how is it formed. Draw the molecular structure of A?
- c) What is the importance of dark and light components in the following pathway?
- d) What is the function of the UV rays?
- e) What is the function of B enzyme?
[CO-] [L-] **4×5**

Q.4 a) Differentiate between homologous recombination and non-homologous end joining? Elaborate using diagrams.
[CO-] [L-] **10**

b) Identify the DNA repair pathway shown in the figure below and answer the following questions:



Identify the components and state their functions.

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

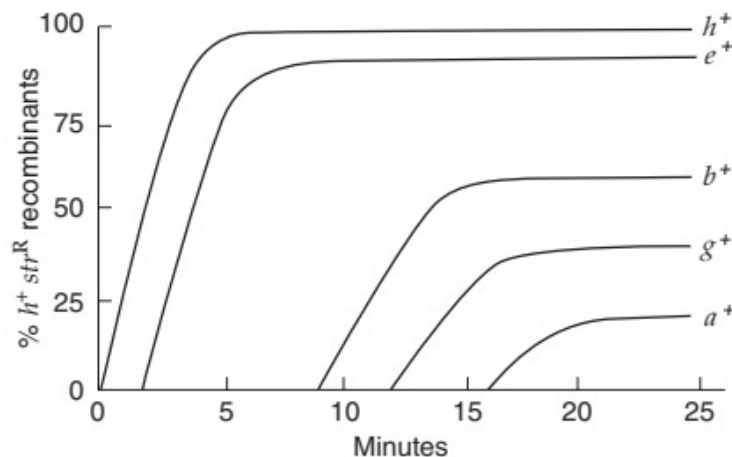
PART-B

- Q.5 At time zero, an Hfr strain (Hfr 1) was mixed with an F⁻ strain, and at various times after mixing, samples were removed and agitated to separate conjugating cells. The cross may be written as:

Hfr 1: $a^+ b^+ c^+ d^+ e^+ f^+ g^+ h^+ str^S$

F⁻: $a b c d e f g h str^R$

The samples were then plated onto selective media to measure the frequency of h⁺ str^R recombinants that had received certain genes from the Hfr cell. A graph of the number of recombinants against time is shown in the accompanying figure.



- a) Indicate whether each of the following statements is **TRUE** or **FALSE**:
- All F⁺ cells that received a⁺ from the Hfr in the chromosome transfer process must also have received b⁺.
 - The order of gene transfer from Hfr to F⁻ was a⁺ (first), then g⁺, then b⁺, then e⁺, and, finally, h⁺.
 - Most e⁺ str^R recombinants are likely to be Hfr cells.
 - None of the b⁺ str^R recombinants plated at 15 minutes are also a⁺.

[CO6] [L6] **10**

- b) Draw a linear map of the Hfr chromosome, indicating:
- The point of nicking (the origin) and the direction of DNA transfer.
 - The order of the genes a⁺, b⁺, e⁺, g⁺, and h⁺.
 - The shortest distance between consecutive genes on the chromosomes.

[CO6] [L6] **10**

- Q.6 a) In a transformation experiment, donor DNA from an a⁺ b⁺ strain was used to transform a recipient strain of genotype a⁻ b⁻. The transformed classes were isolated and their frequencies determined to be:

$a^+ b^+$ 307

$a^+ b^-$ 215

$a^- b^+$ 278

The total number of transformants was 800. What is the frequency with which the b locus is co-transformed with the a locus?

[CO6] [L5] **8**

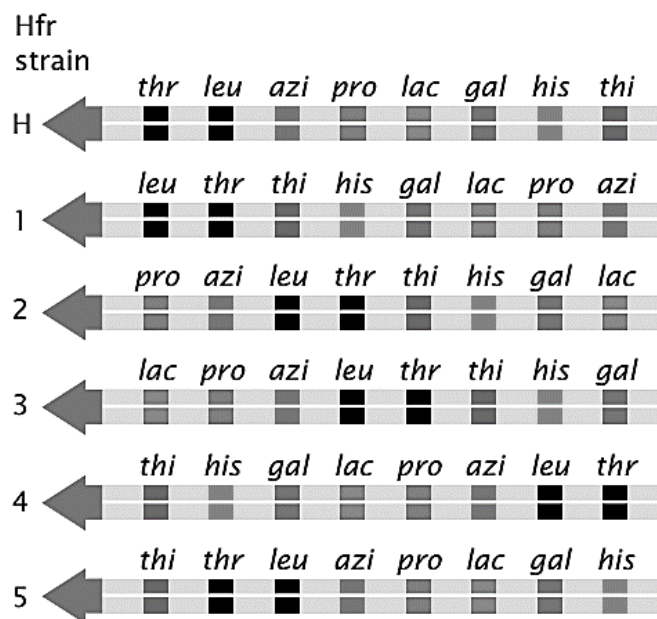
- b) In a transduction experiment, the donor was $c^+ d^+ e^+$ and the recipient was $c^- d^- e^-$. Selection was for c^+ . The four classes of transductants from this experiment are shown in the following table:

Class	Genetic Composition	Number of Individuals
1	$c^+ d^+ e^+$	57
2	$c^+ d^+ e^-$	76
3	$c^+ d^- e^-$	365
4	$c^+ d^- e^+$	<u>2</u>
		Total 500

- Determine the co-transduction frequency for c^+ and d^+ .
 - Determine the cotransduction frequency for c^+ and e^+ .
 - Which of the cotransduction frequencies calculated in i) and ii) represents the greater actual distance between genes? Why?
- [CO6] [L5] **12**

- Q.7 a) Given below is a figure that depicts the order of gene transfer in a conjugation event between multiple Hfr strains and the F⁻ cells.

(a) Order of gene transfer (unaligned)



Align the genes, identify the overlaps and provide the genetic map. [CO4] [L5] **5**

- b) A strain of Hfr cells that is sensitive to the antibiotic streptomycin (str^s) has the genotype $gal^+ his^+ bio^+ pur^+ gly^+$. These cells were mixed with an F⁻ strain that is resistant to streptomycin (str^r) and has genotype $gal^- his^- bio^- pur^- gly^-$. The cells were allowed to undergo conjugation. At regular intervals, a sample of cells was removed and conjugation was interrupted by placing the sample in a blender. The cells were then plated on medium that contains streptomycin. The cells that grew on this medium were then tested for the presence of genes transferred from the Hfr strain. Genes from the donor Hfr strain first appeared in the recipient F⁻ strain at the times listed here. On the basis of these data, give the order of the genes on the bacterial chromosome and indicate the minimum distances between them:

[CO4] [L5] **5**

<i>gly</i> ⁺	3 minutes
<i>his</i> ⁺	14 minutes
<i>bio</i> ⁺	35 minutes
<i>gal</i> ⁺	36 minutes
<i>pur</i> ⁺	38 minutes

- c) *E. coli* cells are simultaneously infected with two strains of phage. One strain has a mutant host range, is temperature sensitive, and produces clear plaques (genotype = *h st c*); another strain carries the wild-type alleles (genotype = *h⁺ st⁺ c⁺*). Progeny phage are collected from the lysed cells and are plated on bacteria. The genotypes of the progeny phage are:

Progeny phage genotype	Number of plaques
<i>h⁺ c⁺ t⁺</i>	321
<i>h c t</i>	338
<i>h⁺ c t</i>	26
<i>h c⁺ t⁺</i>	30
<i>h⁺ c t⁺</i>	106
<i>h c⁺ t</i>	110
<i>h⁺ c⁺ t</i>	5
<i>h c t⁺</i>	6

- Determine the order of the three genes on the phage chromosome.
- Determine the map distances between the genes. [CO4] [L5] **10**

End Semester Examination, May 2023
B. Sc. (Microbiology) – Fourth Semester
INDUSTRIAL MICROBIOLOGY (BMB-DS-403)

Time: 3 hrs.

Max Marks:

100

No. of pages: 1

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

- Q.1
- a) What is whey and how it is useful? [CO-1] [L-1]
 - b) Compare glycerol and lyophilization method of cell preservation. [CO-1] [L-1]
 - c) Define impellers and its significance. [CO-2] [L-1]
 - d) How do different types of bioreactors work? [CO-2] [L-1]
 - e) Name any two media and discuss their potential use. [CO-1] [L-1]
 - f) What is streptomycin and name the microorganisms producing it? [CO-4] [L-1]
 - g) Define solvent and their use in extraction and purification of a molecule. [CO-4] [L-1]
 - h) How protease is important for an industry? [CO-3] [L-1]
 - i) What do you mean ABE pathway? [CO-3] [L-1]
 - j) What are mutagens? [CO-1] [L-1] **2×10**

PART-A

- Q.2 How production of an industry can be increased by exploiting microbial strains? [CO-1] [L-5] **20**
- Q.3 Explain different types of fermentation processes. [CO- 2] [L- 2] **20**
- Q.4
- a) Determine isolation and purification methods of an industrially important microbe. [CO-1] [L-4] **10**
 - b) Discuss the measurement and control parameters of a reactor. [CO-2] [L-3] **10**

PART-B

- Q.5 Classify 'cellulase'. How cellulase can be produced at large scale and why it is an important enzyme? [CO- 3] [L-4] **20**
- Q.6 Explain the down streaming processing used for an enzyme. [CO-4] [L-4] **20**
- Q.7
- a) What are cell disruption methods? Discuss in detail. [CO-4] [L-1] **10**
 - b) Discuss the cultivation of mushroom and its health benefits. [CO-3] [L-3] **10**

End Semester Examination, May 2023
B. Tech. – Fourth Semester
VETERINARY MICROBIOLOGY (BMB-DS-422)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Name the immune cells involved in phagocytosis. [CO-1] [L-1]
- b) What is a toxoid? [CO-2] [L-1]
- c) Compare clinical and sub-clinical infection. [CO-2] [L-2]
- d) Mention any two characteristic features of Leptospira species. [CO-3] [L-1]
- e) What is Histoplasmin? [CO-4] [L-1]
- f) What is a systemic infection? Give example. [CO-4] [L-1]
- g) Mention any two protozoan diseases and the causative organism. [CO-2] [L-1]
- h) What are the symptoms of Leishmaniasis? [CO-3] [L-1]
- i) What is corona and mention the full scientific name of the coronavirus. [CO-3] [L-1]
- j) Which microbe causes rabies? [CO-1] [L-1] **2×10**

PART-A

- Q.2 a) Compare prokaryotic and eukaryotic cells with well labeled diagrams. [CO-1] [L-2] **10**
b) Give five examples of prokaryotic and eukaryotic cells with the disease caused. [CO-1] [L-2] **10**
- Q.3 Define immunity. Classify the types of immunity. Compare innate and acquired immunity. [CO-3] [L-2] **20**
- Q.4 Cattle have been affected with a disease, which is rapidly spreading resulting in fatal septicemia. From your understanding of the course,
a) Identify the disease, causative organism and its characteristic features. [CO-4] [L-3] **10**
b) Describe its pathogenesis in various species, diagnosis and treatment. [CO-4] [L-3] **10**

PART-B

- Q.5 a) What is dimorphism? Give two examples each of dimorphic and unicellular fungi and the name the disease caused by them. [CO-2] [L-2] **10**
b) Draw and label the different stages in the life cycle of Plasmodium sps. [CO-2] [L-2] **10**
- Q.6 a) What are the characteristic features of protozoa? Classify and explain the methods to identify protozoan infections. [CO-3] [L-2] **10**
b) Fruit bats cause lethal viral infection. Explain the pathogenesis, treatment and species infected. [CO-3] [L-3] **10**
- Q.7 From your understanding of the course, explain the significance of studying veterinary microbiology. [CO-4] [L-5] **20**

End Semester Examination, May 2023

B. Tech. — Third Semester

ENGINEERING MECHANICS (BME-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.

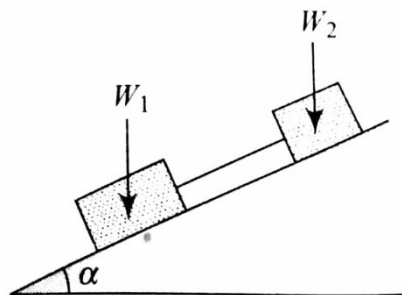
Q.1 Answer the following in brief:

- Define 'tensor'.
- State law of machine.
- What is angle of repose?
- Differentiate between 'free vector' and 'force vector'.
- What is point of contraflexure?
- What is mass moment of inertia?
- Differentiate 'statically determinate truss' and 'statically indeterminate truss'.
- Define 'instantaneous centre of rotation'.
- What is continuum concept?
- What is gyroscope?

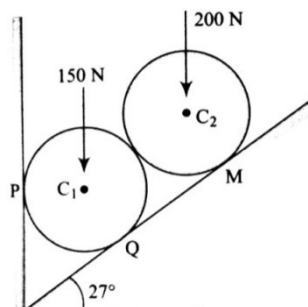
2×10

PART-A

- Q.2 a) Following forces act at a point P, $F_1 = 50 \mathbf{i}$, $F_2 = 30 \mathbf{i} - 15 \mathbf{j}$, $F_3 = -25 \mathbf{i} - 10 \mathbf{j} + 5 \mathbf{k}$. Determine the resultant forces and its magnitude. Also compute the inclination with all axes. (CO-1, CO-2) (L-5) **10**
- b) Discuss about the symmetric and anti symmetric tensors. (CO-1) (L-1, L-2) **10**
- Q.3 a) Two blocks of weights W_1 and W_2 connected with a string rest on a rough incline as shown in figure. If the coefficient of friction are 0.2 and 0.3 for the blocks, respectively, and $W_1 = W_2 = 50 \text{ N}$, find the value of α for which sliding will impend. (CO-2, CO-4) (L-4, L-5) **10**

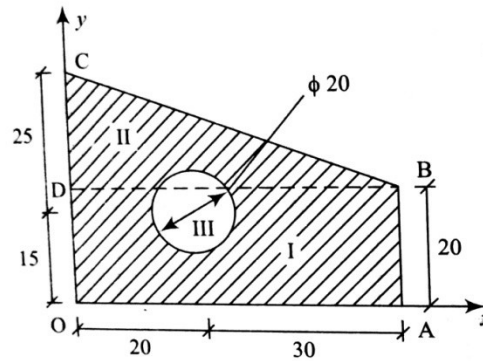


- b) Two spheres are kept within a conical channel, as shown in figure. All contact surfaces are smooth. Determine all contact reactions. Size of sphere are same but with different weight.



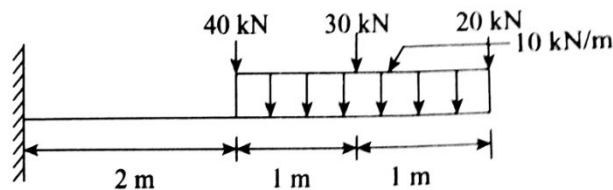
(CO-2, CO-4) (L-4, L-5) **10** 380

Q.4 a) Determine the centroid of the shaded area shown in figure.



(CO-2, CO-4) (L-3, L-5) **10**

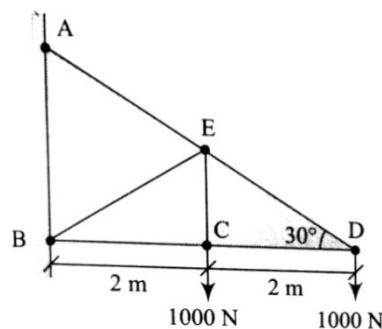
b) Draw SF and BM diagram for the loaded cantilever beam as shown in figure.



(CO-2, CO-4, CO-6) (L-4, L-5) **10**

PART-B

Q.5 a) For the plane truss AEDCB shown in the figure, determine the induced axial forces in members AE, BE, and BC.



(CO-2, CO-4, CO-6) (L-4, L-5) **14**

b) State the assumption made in the analysis of trusses. (CO-6)(L-1, L-2) **6**

Q.6 a) State the equation of equilibrium of a rigid body experiencing a planar motion.

(CO-2, CO-5) (L-1, L-3) **10**

b) A flywheel of 550 mm diameter is brought uniformly from rest up to a speed of 350 rpm in 20 s. Find the velocity and the acceleration of a point on its rim 3 s after starting from rest. (CO-2, CO-5) (L-5) **10**

Q.7 a) State principle of conservation of energy. Discuss about the work-energy principle for rigid body. (CO-2, CO-5) (L-1, L-2, L-3) **10**

b) Write a brief note on momentum method for a rigid body.

(CO-2, CO-5) (L-2, L-3) **10**

End Semester Examination, May 2023

B. Tech. - Third Semester

THERMODYNAMICS (BME-DS-302)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following in brief:

- State the Zeroth law of thermodynamics.
- Write the expression of work done for polytropic process.
- Draw the P-V and T-S diagram of Rankine cycle.
- Write the expression of steady flow energy equation.
- Draw the P-V and T-S diagram of vapour compression refrigeration cycle.
- What do you mean by dryness fraction?
- What are the limitations of first law of thermodynamics?
- What do you mean by entropy?
- Define 'the enthalpy of a substance'.
- What is availability and unavailable energy? [CO-1, 2, 3][L-1, 2, 3] **2×10**

PART-A

- Q.2 a) Derive the expression for work done in adiabatic process. [CO-1,2][L-1] **10**
b) The properties of the closed system change following the relation between pressure and volume as $PV=2.0$, Where p is in bar V is in m^3 . Calculate the work done when the pressure increases from 2 bar to 5.5 bar. [CO-3][L-5] **10**

- Q.3 a) Explain the following terms:
i) Throttling process.
ii) First law of thermodynamics. [CO-3][L-3] **5×2**

- b) 3 kg of air kept at an absolute pressure of 100kPa and temperature of 300K is compressed polytropically until the pressure and temperature become 1500kPa and 500K respectively. Evaluate the polytropic exponent, the final volume, the work of compression and the heat interaction. Take gas constant $R=287J/kg\ K$. [CO-4][L-5] **10**

- Q.4 a) State the Kelvin-Planck and Clausius statements of the second law of thermodynamic and establish the relation between refrigerator and heat pump. [CO-3][L-4] **10**
b) A heat engine working on Carnot cycle absorbs heat from three thermal reservoirs at 1000K, 800K and 600K. The engine does 10kW of net work and rejects 400kJ/min of heat to a heat sink at 300K. If the heat supplied by the reservoir at 1000K is 60% of heat supplied by the reservoir at 600K. Make calculations for the quantity of heat absorbed by each reservoir. [CO-4][L-5] **10**

PART-B

- Q.5 a) A reversible heat engine receives heat from two sources at 500k and 400k and rejects heat to the reservoir at 300K. It draws 1500kJ/min of energy from the source at 500K and develops 200kJ/min of work:

- i) Determine the heat interaction with the other two sources of heat.
- ii) Evaluate the entropy change due to each heat interaction with the engine.
- iii) Total entropy change during the cycle. [CO-3][L-5] **10**
- b) Define the available energy and unavailable energy and derive the equation for increase in unavailable energy. [CO-4][L-4] **10**

- Q.6 a) Define the following terms:
- i) Phase of substance.
 - ii) Saturated liquid.
 - iii) Saturated vapour.
 - iv) Saturation temperature.
 - v) Saturation pressure. [CO-2][L-2] **2×5**
- b) Steam enters an engine at a pressure 10 bar absolute and 400°C. It is exhausted at 0.2 bar. The steam at exhaust is 0.9 dry. Find:
- i) Drop in enthalpy.
 - ii) Change in entropy. [CO-3][L-5] **10**

- Q.7 a) Describe with a neat schematic arrangement the working of a simple vapor compressor refrigeration cycle. Represent the cycle on p -h and T -s plots. [CO-2][L-2] **10**
- b) In a Rankine Cycle, the steam at inlet to turbine is saturated at a pressure of 35 bar and exhaust pressure is 0.2 bar. Determine:
- i) The pump work.
 - ii) The turbine work.
 - iii) Rankine efficiency.
 - iv) The condenser heat flow.
 - v) The dryness at the end of expansion. [CO-3][L-6] **2×5**

End Semester Examination, May 2023
B. Tech. - Fourth Semester
APPLIED THERMODYNAMICS (BME-DS-401)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following:

- a) Define calorific value of a fuel. What is the difference between higher calorific value (HCV) and lower calorific value (LCV)? [CO3][L2]
- b) Draw the P-V and T-S diagram of a dual cycle. Also mention the processes. [CO3][L1]
- c) Draw the P-V and T-S diagram of a brayton cycle. Also mention the processes. [CO3][L1]
- d) Discuss the effects of operating parameters on rankine cycle efficiency. [CO4][L2]
- e) What are fuels? Classify fuels. [CO4][L1]
- f) Explain the difference between reaction turbine and impulse turbine. [CO3][L2]
- g) Describe the desirable properties of the refrigerants. [CO4][L2]
- h) Draw the P-h and T-S diagram of a VCRS cycle. Also mention the processes. [CO4][L2]
- i) Draw the velocity diagram of simple impulse turbine. [CO3][L2]
- j) Define the critical pressure ration of the steam nozzle. [CO4][L1] **2×10**

PART-A

- Q.2
- a) What is Bomb calorimeter? Where is it used? Explain its construction and working with neat labeled diagram. [CO3][L-2] **10**
 - b) A sample of coal supplied to a boiler has the following composition by mass: C= 87%; H₂= 5%; O₂= 3 %; N₂=1%; S= 0.5% and rest is incombustible matter.
Calculate:
 - i) Mass of air required for complete combustion of 1 kg of coal.
 - ii) Dry analysis by mass of the products of combustion when 15% excess air is supplied. [CO4][L-5] **5×2**

- Q.3
- a) Derive an expression for the air standard efficiency of Otto Cycle with p-V and T-s diagram. [CO3][L-3] **10**

- b) The stroke and cylinder diameter of a diesel engine are 250 mm and 150 mm respectively. If the clearance volume is 0.0004m³ and fuel injection takes place at constant pressure at 5% of stroke, determine the thermal efficiency of the engine. Assume the working cycle to be a diesel cycle. [CO3][L-2] **10**

- Q.4 In a Rankine cycle, the steam at inlet to turbine is saturated at a pressure of 30 bar and exhaust pressure is 0.1 bar.

Determine:

- a) The pump work.
- b) The Turbine work.
- c) Rankine efficiency.
- d) The condenser heat flow.
- e) The dryness at the end of expansion.

[CO4][L-4] **4×5**

PART-B

- Q.5 a) What do you understand by critical pressure and choked flow? [CO2][L2] **5**
b) Derive the following relation for a nozzle and thus also interpret for various cross-section of diffuser depending upon mach number. $dA/A = (M^2 - 1) dV/V$
[CO3][L-6] **15**

- Q.6 In a De-laval turbine steam issues from the nozzle with a velocity of 1200m/s. The nozzle angle is 20° and mean blade velocity is 400m/s. Assuming equiangular blades, determine the following for a mass flow rate of 1000 kg/hr:
- a) Blades angle.
 - b) Relative velocity of steam entering the blades.
 - c) Power developed.
 - d) Blade efficiency.
- Take blade velocity of coefficient as 0.8.

[CO3][L-6] **20**

- Q.7 a) Describe with a neat schematic arrangement the working of a simple vapor compressor refrigeration cycle. Represent the cycle on $p-h$ and $T-s$ plots.
[CO3][L-3] **10**
- b) Define and explain the physical significance of the following terms:
- i) Relative humidity.
 - ii) Sensible heating.
 - iii) Specific humidity.
 - iv) Heating and humidification.

[CO2][L-3] **2½×4**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

STRENGTH OF MATERIAL (BME-DS-402)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

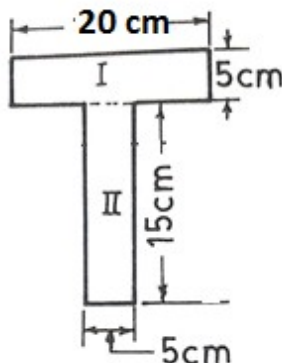
Q.1 Answer the following in brief:

- Differentiate between 'working stress' and 'proof stress'.
- Why thin cylinder is pre-stressed by winding with a wire under tension?
- What is volumetric strain and write down the formula of volumetric strain for spherical pressure vessel subjected to an internal pressure p ?
- Differentiate between 'UDL load' and 'UVDL load'.
- Draw stress- strain diagram for a brittle material.
- Write down the formula of thermal strain.
- What is principal stress?
- Write down the difference between thick cylinders and thin cylinder pressure vessel.
- What is the significance of factor of safety?
- What is polar modulus?

2×10

PART-A

- Q.2 a) A steel bar 20 mm square in section is subjected to an axial compressive load of 60 kN. Find the percentage change in volume if the bar is 500 m long. What are the equal stresses that must be applied to the sides of the bar if the volumetric change is to be zero? $E = 200$ GPa and $\nu = 0.3$ [CO-1] [L-4] **10**
- b) Derive an expression for total elongation, when a uniformly tapered bar having diameter d_1 on one end and d_2 on other end ($d_2 > d_1$) is subjected to axial load P . [CO-1] [L-5] **10**
- Q.3 a) The state of stress at a point in a stressed material is given by $\sigma_x = 25$ MPa, $\sigma_y = 15$ MPa and $\tau_{xy} = 30$ MPa. Determine the direction and magnitude of the principal stresses in the material. Also locate the plane of maximum shearing stress and calculate the normal and shearing stress on these planes. [CO-2] [L-4] **20**
- Q.4 a) A T beam has the dimension as shown in figure. The beam is subjected to a bending moment of 500 N.m. Determine the maximum tensile and compressive stresses in the beam.

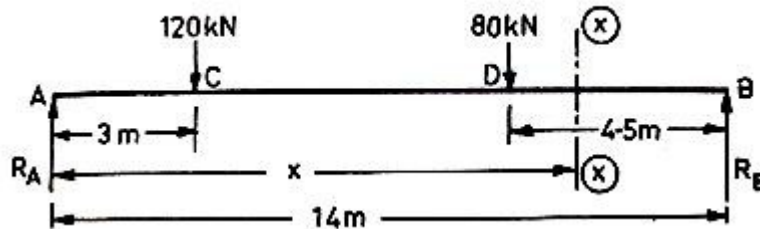


[CO-3] [L-3] **10**

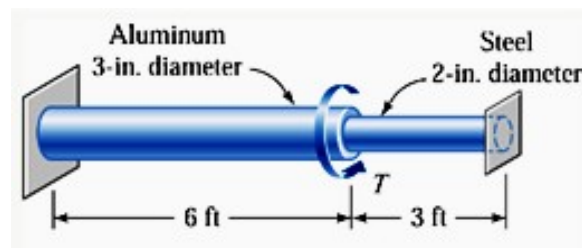
- b) Explain the simple bending theory and derive its equation with its all assumption.

PART-B

- Q.5 a) Explain Maxwell's reciprocal theorem with its derivation. [CO-1] [L-2] **10**
 b) A horizontal girder of steel having uniform section is 14 m long and is simply supported at its ends. It carries concentrated load of 120 kN and 80 kN at two points 3 m and 4.5 m from the two respectively. $I = 16 \times 10^4 \text{ cm}^4$ and $E = 210 \text{ GPa}$. Calculate the deflection of the girder at points under the two loads.

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

- Q.6 a) The shaft in the figure. consists of a 3-in. diameter aluminum segment that is rigidly joined to a 2-in. diameter steel segment. The ends of the shaft are attached to rigid supports. Calculate the maximum shear stress developed in each segment when the torque $T = 10 \text{ kip-in.}$ is applied. Use $G = 4 \times 10^6 \text{ psi}$ for aluminum and $G = 12 \times 10^6 \text{ psi}$ for steel.

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

- b) Derive the torsion formula applied to circular shafts.

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

- Q.7 a) A cylinder is 4 m long, 0.95 m in diameter and 12.5 thick at atmospheric pressure. Calculate the dimension when subjected to an internal pressure of 1.5 MPa. What is then the maximum shear stress in the shell? [CO-5] [L-3] **10**
 b) Derive the formula for the change in volume of the thin cylindrical pressure vessel subjected to an internal pressure 'p'. [CO-6] [L-5] **10**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

STRENGTH OF MATERIAL (BME-DS-402A)

Time: 3 hrs.

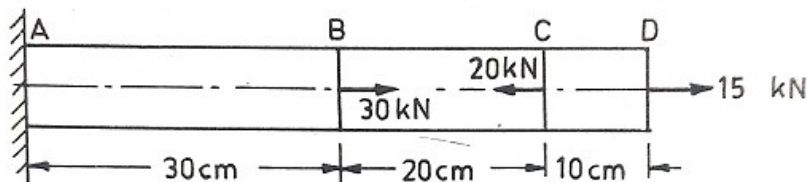
Max Marks: **100**

No. of pages: 2

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

- Q.1
- What is poisson's ratio and also write its maximum value. [L-1] CO1]
 - Differentiate thick pressure vessel and thin pressure vessel. [L-2] CO1]
 - Define 'Hooke's law'. [L-1] CO1]
 - What is the solid length of a spring? [L-1] CO1]
 - Why stresses acting on oblique plane are calculated? [L-2] CO1]
 - Draw a stress-strain diagram for any brittle material. [L-2] CO1]
 - Differentiate statically indeterminate and statically determinate system. [L-2] CO1]
 - What is thermal stress and write down the formula of thermal strain. [L-1] CO1]
 - Differentiate tension spring and compression spring. [L-2] CO1]
 - Write down the formula of plane of shear stress and principle plane. [L-1] CO1] **2×10**

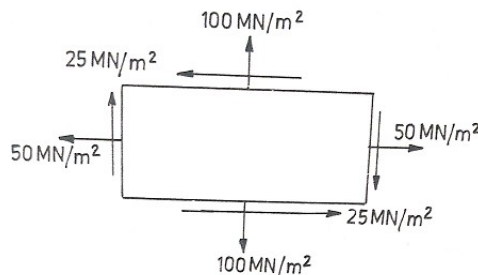
- Q.2
- A steel bar of 30 mm diameter is loaded as shown in the figure. Determine the stress in each portion and the total elongation. $E = 210 \text{ GPa}$.



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

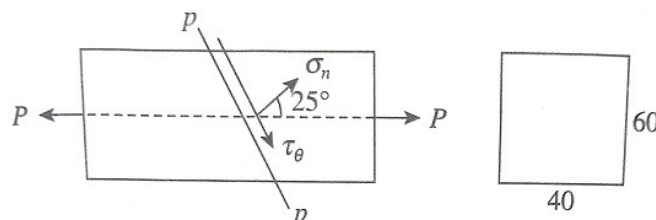
- Explain stress-strain diagram for a ductile material and explain its all limits. [CO-1] [L-2] **10**

- Q.3
- A point in a material is subjected to a stress as shown in figure. Calculate i) principal stresses, ii) maximum shear stress, and also the plane along which it act.



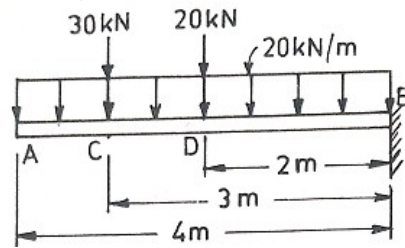
[CO3] [L-3] **10**

- Consider the bar (40 mm x 60 mm) as shown in the figure. Determine the maximum value of load P if the stresses on plane p-p shown are limited to a normal stress of 30 N/mm^2 and a shear stress of 18 N/mm^2 .



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

- Q.4 a) A cantilever beam is loaded as shown in figure. Draw the B.M. and S.F. diagrams.



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

- b) Explain and derive simple bending theory with its all assumption made

[CO3] [L-3] **10**

- Q.5 a) A simply supported beam carries a UDL load having intensity ' w ' kN/m over the whole span (X meter). Derive the expression for slope and deflection at the end supports and also calculate the maximum deflection.

[CO4][L-3] **12**

- b) State Maxwell's reciprocal theorem and derive its equation.

[CO4][L-3] **8**

- Q.6 a) A helical spring, in which the mean diameter of the coils is 8 times the wire diameter, is to be designed to absorb energy 200 N-m of energy with an extension of 10 cm. The maximum shear stress is not to exceed 125 MPa. Determine the mean diameter of the helix, diameter of the wire and the diameter of turns. Also find the load with which an extension of 4 cm could be produced in the spring. $G = 84$ GPa.

[CO2] [L-4] **10**

- b) Explain about theory of pure torsion and also derive pure torsion equation with its all assumption made.

[CO2][L-3] **10**

- Q.7 a) The wall thickness of a boiler shell of 10 mm internal diameter and 3 m long is 10 mm. If the shell is subjected to an internal pressure of 2.5 MPa, find the change in dimension of the shell. Take $E = 205$ GPa and poisson's ratio = 0.3.

[CO2] [L-3] **10**

- b) Derive the expression for hoop stress and longitudinal stress for a thin cylindrical pressure vessel and thin spherical pressure vessel when subject to fluid pressure ' P '.

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

End Semester Examination, May 2023
B. Tech. – Fourth Semester
MANUFACTURING TECHNOLOGY (BME-DS-403A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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) Recall the salient features of a single point cutting tool. [CO-2] [L-1]
- b) Identify the reason for generation of heat in metal cutting. [CO-1] [L-2]
- c) Summarize the desirable properties of cutting fluid. [CO-2] [L-2]
- d) State the functional principle of machine tool operations. [CO-2] [L-1]
- e) Express the function of a "half nut mechanism." [CO-2] [L-2]
- f) Define 'Machinability'. [CO-2] [L-1]
- g) Express the role of cutting fluids in Grinding. [CO-2] [L-2]
- h) Value the need of "unconventional machining processes." [CO-3] [L-6]
- i) How does it normal NC machine differ from traditional NC machines? [CO-3] [L-4]
- j) Name the mechanisms of CNC system. [CO-1] [L-1] **2×10**

PART-A

- Q.2 Organize the force relations by constructing a merchant circle diagram. Also, state the equations from mechanics of orthogonal cutting:
- a) Velocity relations.
 - b) Shear strain and shear stress.
 - c) Power consumed in metal cutting. [CO-1,4] [L-5] **20**
- Q.3 Illustrate the following mechanism of lathe machines.
- a) Apron mechanism for moving carriage and cross slides. [CO-1,2] [L-3] **10**
 - b) Cone pulley and back gear drive mechanism for variation of speeds. [CO- 2] [L-3] **10**
- Q.4 a) Analyze and relate about the information on (T=Tool Life; V=cutting speed; n= Tool Life Exponent and C=Taylor's constant) given by Taylor's Tool Life Equations $VT^n = C$ in the context of HSS, carbide, ceramic and an ideal tool material. [CO-2,4] [L- 4] **10**
- b) Discuss "Machinability" and "Machinability criteria" in the context of Cutting forces/power; surface finish and chip formations [CO-1,4] [L- 4] **10**

PART-B

- Q.5 During a grinding wheel operation, it was observed that the grinding wheel does more rubbing on the surface and less of cutting action on a "cylindrical part". The dimensions issues of the cylindrical part obtained were related to "taper" and "ovality."
- a) Conclude and discuss the problem associated.
 - b) Recommend methods to overcome the problem. [CO-3, 4] [L-6] **10×2**
- Q.6 a) Outline the unconventional machining process based on energy type, source of energy, transfer of energy medium. [CO-3] [L-4] **10**
- b) Write short notes on Ultrasonic machining. [CO-3] [L-4] **10**
- Q.7 Explain the following in the context of numerically controlled machines:
- a) NC Machine tools.
 - b) CNC machines.
 - c) DNC system.
 - d) Controlled axes.

e) Point-to-point and continuous system.

[CO-3] [L-2] **4×5**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

MATERIAL SCIENCE (BME-DS-404)

Time: 3 hrs.

Max Marks:

100

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Distinguish between Frenkel and Schoottky defects. [CO1] [L-4]
- b) Sketch the HCP structure. [CO1] [L-6]
- c) Differentiate between the 'Toughness and Resilience'. [CO2] [L-2]
- d) State briefly the significance of secondary stage in an ideal creep curve. [CO2][L1]
- e) What is tensile testing? [CO2] [L-1]
- f) In a binary system of P and Q a liquid of 20%P (80%Q) is coexisting with a solid of 70%P (30%Q). What will be the fraction of solid for an overall composition having 40%P? [CO2] [L-5]
- g) Differentiate between 'annealing and normalising'. [CO3] [L-4]
- h) Draw a T-T-T diagram for plain carbon steel. [CO3] [L-6]
- i) What is the main difference between a brass and a bronze? [CO4] [L-1]
- j) What are cupronickels? [CO4] [L-2] **2×10**

PART-A

- Q.2 a) Draw a neat sketch of simple cubic crystal structure and calculate its atomic radius, packing factor, coordination number. [CO1] [L-6] **10**
- b) Molybdenum has BCC structure and a density of $10.2 \times 10^3 \text{ kg/m}^3$. Calculate its atomic radius. The atomic weight of molybdenum is 95.94 g/mol and Avogadro's number is 6.023×10^{23} atoms/mol. [CO1] [L-3] **10**
- Q.3 a) Shear Modulus 'G' (GPa) obeys the proportionality with elastic modulus 'E' (GPa). If $E=117$ for a metal and Poisson's ratio (μ)=0.31, find the value of 'G' for the metal. [CO2] [L-3] **10**
- b) Draw and explain the S-N curve. Discuss fatigue fracture mechanism in details. [CO2] [L-1] **10**
- Q.4 Write the short notes on:
- a) Hardness testing.
 - b) Radiographic testing. [CO2] [L-2] **10×2**

PART-B

- Q.5 a) Explain Gibb's phase rule. Enumerate the degree of freedom of a three component system with various numbers of possible phases. [CO2] [L-5] **5**
- b) Explain eutectic, eutectoid and peritectic reactions with references to iron-carbon equilibrium diagram. [CO3] [L-2] **15**
- Q.6 Explain the following processes with neat sketches:
- a) Austempering.
 - b) Martempering.
 - c) Carburizing.
 - d) Cyaniding. [CO3] [L-2] **5×4**
- Q.7 a) Explain the composition, properties and applications of steel. [CO4] [L-2] **10**
- b) Explain the composition, properties and uses of four types of cast iron. [CO4] [L-1] **10**

End Semester Examination, May 2023

B. Tech. - Fourth Semester

THERMAL ENGINEERING (BME-DS-405)

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 open system, closed system and isolated system. [CO1][L1]
- b) What is meant by reversible and irreversible process? [CO2][L2]
- c) Write the expression for the first law of thermodynamics applied for closed system. [CO1][L2]
- d) Explain the throttling process. [CO3][L1]
- e) What is meant by superheated region and sub cooled region? [CO2][L1]
- f) What do you mean by dryness fraction of steam? [CO2][L1]
- g) Draw the P-V and T-S diagram of dual cycle. [CO3][L2]
- h) Define the clausius inequality. [CO3][L2]
- i) Describe the desirable properties of the refrigerant. [CO4][L1]
- j) Draw the P-V and T-S diagram of vapor compression refrigeration cycle. Also mention the processes. [CO3][L2] **2×10**

PART-A

- Q.2
- a) Explain the characteristic of an adiabatic process and also derive the expression for work done in an adiabatic process. [CO2][L-1,2] **10**
 - b) The pressure-volume correlation for a non-flow quasi-static process is given by $P = (8-4V)^b$, where p is in bar, where V is in m^3 . If 140 kJ of work is supplied to the system, determine the final pressure and volume of the system. Take the initial volume as $0.6m^3$. [CO3][L-4,5] **10**

- Q.3
- a) State the first law of thermodynamics. What are the limitations of the first law of Thermodynamics and how are they overcome by second law of thermodynamics. [CO3][L-3] **10**

- b) In a gas turbine the gas enters at the rate of 5 kg/s with velocity of 50 m/s and the enthalpy of 900 KJ/kg and leaves the turbine with the velocity of 110m/s and enthalpy of 400 KJ/kg. The loss of heat from the gases to the surroundings is 25 KJ/kg. Assume for gas $R=0.285$ KJ/kgK and $C_p=1.004$ KJ/kgK and the inlet condition to be at 100 kPa and 27°C. Determine the power output of the turbine and the area of the inlet pipe. [CO4][L-6] **10**

- Q.4 a) A reversible heat engine operates between 875K and 310K and derives a reversible refrigerator operating between 310K and 255K. The engine receives 2000kJ of heat and the net Work output from the arrangement equals 350kJ. Make calculations for refrigeration effect. [CO4][L-6] **10**
- b) State the Kelvin-Planck and Clausius statements of the second law of thermodynamic. [CO3][L-3] **10**

PART-B

- Q.5 a) Derive an expression for the air standard efficiency of Diesel Cycle with p-V and T-s Diagram. [CO3][L-5] **10**
- b) A gas engine operating on the ideal Otto cycle has a compression ratio of 8:1. The pressure and temperature at the commencement of compression are 1 bar and 30°C. Heat added during the constant volume combustion process is 2000 kJ/kg. Determine the following:
- Peak pressure and temperature.
 - Air standard efficiency.
- Assuming $C_p = 1.005$ KJ/Kg and $C_v = 0.717$ KJ/Kg for air. [CO4][L-3] **10**
- Q.6 a) Define the following terms:
- Phase of substance.
 - Saturated liquid.
 - Saturated vapour.
 - Saturation temperature.
 - Saturation pressure.
- [CO2][L-3] **2×5**
- b) Saturated liquid at high pressure P_1 and enthalpy of saturated liquid as 1000 kJ/kg is throttled into a lower pressure P_2 . The enthalpy of saturated liquid and saturated vapor at P_2 is 800 kJ/kg and 2800 kJ/kg. Find the dryness fraction of vapor after throttling. [CO4][L-4] **10**
- Q.7 a) Define and explain the physical significance of the following terms:
- Relative humidity.
 - Sensible heating.
 - Specific humidity.
- [CO4][L-2] **10**
- b) Describe with a neat schematic arrangement the working of a simple vapor compressor refrigeration cycle. Represent the cycle on $p-h$ and $T-s$ plots. [CO1][L-2] **10**

End Semester Examination, May 2023
B. Tech. - Fourth Semester
ELECTRIC VEHICLE SAFETY AND STANDARDS (BME-DS-412)

Time: 3 hrs.

Max. Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 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) Bumper (material) is made up of _____, _____ and _____. [CO-1] [L-3]
- b) The airbag's inflation system reacts _____ with _____ to produce nitrogen gas. [CO-2] [L-2]
- c) Passive safety features are those that help to protect vehicle _____ from further injury once a _____ has occurred. [CO-1] [L-1]
- d) NCAP means _____. [CO-1] [L-1]
- e) Typically, crumple zones are located in the _____ part of the vehicle, in order to absorb the impact of a _____ collision. [CO-2] [L-2]
- f) EV Standard AIS-38 caters to which safety feature? [CO-3] [L-2]
- g) Measurement of electrical energy consumption is done by which AIS standard? [CO-3] [L-1]
- h) AIS-123 (Part 2) caters to which features of electric vehicle? [CO-4] [L-1]
- i) AIS-102 (Part 1) caters to which features of vehicles? [CO-4] [L-2]
- j) What role is played by AISC for preparation of the standards? [CO-3] [L-1] **2×10**

PART-A

Q.2 What are the design techniques / strategies followed while designing a car body to reduce the impact of crash and increase the safety of the car and passengers? [CO-1][L-2] **20**

Q.3 Classify the traffic signs and explain the importance of each. [CO-2] [L-4] **20**

Q.4 Explain the functioning of air bag safety system in detail. [CO-1] [L-5] **20**

PART-B

Q.5 Compare EV standard AIS-40 with AIS-41. [CO-3] [L-5] **20**

Q.6 Explain the different tests carried out in standard, AIS-048: battery operated vehicles - safety requirements of traction batteries. [CO-4] [L-6] **20**

Q.7 What are the different aspects covered in AIS-123 (Part 3): CMVR type approval of electric propulsion kit intended for conversion of vehicles for pure electric operation? [CO-4] [L-4] **20**

End Semester Examination, May 2023

B. Tech. – Fifth Semester

THEORY OF MACHINES (BME-DS-501)

Time: 3 hrs.

Max Marks: **100**

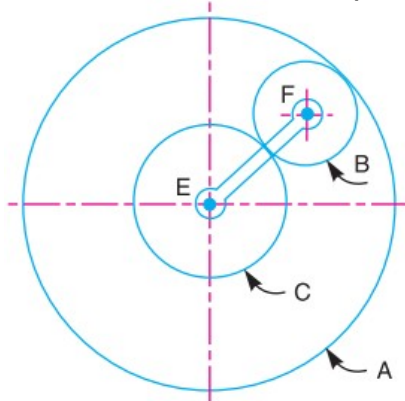
No. of pages: 2

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 Explain the following in brief:
- a) Sensitivity of Governor. [CO-4 L-2]
 - b) Variation of tractive force. [CO-1,5 L-2]
 - c) Classification of synthesis problem in three categories. [CO-1,3 L-1]
 - d) Law of Gears. [CO-1,2 L-2]
 - e) Types of Followers for Cams. [CO-1,3 L-1] **4×5**

PART-A

- Q.2 a) Explain the terms: 1) Lower pair, 2) Higher pair, 3) Kinematic chain, and 4. inversion. [CO-1] [L-2] **8**
- b) A four bar mechanism is to be designed, by using three precision points, to generate the function $y=x^{2.5}$, for the range $1 \leq x \leq 4$. Assuming 30° starting position and 120° finishing position for the input link and 90° starting position and 180° finishing position for the output link, find the values of x , y , θ and ϕ corresponding to the three precision points. [CO-1] [L-5] **12**
- Q.3 An epicyclic gear consists of three gears A, B and C is shown in the figure. The gear A has 72 internal teeth and gear C has 32 external teeth. The gear B meshes with both A and C and is carried on an arm EF which rotates about the centre of A at 18 r.p.m.. If the gear A is fixed, determine the speed of gears B and C.



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

- Q.4 Elaborate the displacement, velocity and acceleration diagrams when the follower moves with simple harmonic motion. [CO-3] [L-5] **20**

PART-B

- Q.5 The three cranks of a three-cylinder locomotive are all on the same axle and are set at 120° . The pitch of the cylinders is 1 metre and the stroke of each piston is 0.6 m. The reciprocating masses are 300 kg for inside cylinder and 260 kg for each outside cylinder and the planes of rotation of the balance masses are 0.8 m from the inside crank. If 40% of the reciprocating parts are to be balanced, find:

- a) The magnitude and the position of the balancing masses required at a radius of 0.6 m.
b) The hammer blow per wheel when the axle makes 6 r.p.s. [CO-1,4] [L-2] **20**

Q.6 a) A Proell governor has equal arms of length 300 mm. The upper and lower ends of the arms are pivoted on the axis of the governor. The extension arms of the lower links are each 80 mm long and parallel to the axis when the radii of rotation of the balls are 150 mm and 200 mm. The mass of each ball is 10 kg and the mass of the central load is 100 kg. Determine the range of speed of the governor.

[CO-5,6][L-4] **10**

- b) Derive an expression for the equilibrium speed of a Porter governor in terms of governor height and other relevant parameters. [CO-5][L-4] **10**

Q.7 a) Describe the gyroscopic effect on sea going vessels. [CO-4,6][L-5] **10**

- b) What do you understand by gyroscopic couple? Derive a formula for its magnitude. [CO-6][L-2] **10**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

DESIGN OF MECHANICAL SYSTEMS (BME-DS-601)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

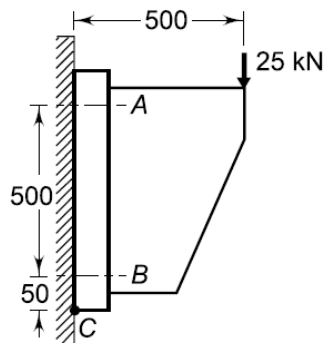
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

(Machine Design Data Book Allowed)

- Q.1
- a) Enlist the general purpose machine elements. [CO-1] [L-1]
 - b) Differentiate in clearance and interference fit. [CO-3] [L-3]
 - c) Enlist threads mostly used for power screws. [CO-1] [L-1]
 - d) Why stress relieving method is preferred to reduce the residual stresses? [CO-2] [L-2]
 - e) Differentiate in maximum principal stress and maximum shear stress theory. [CO-2] [L-1]
 - f) Enlist various types of bearing. [CO-2] [L-2]
 - g) Define the module and pitch circle diameter of gears. [CO-2] [L-1]
 - h) What is meant by spring rate and spring index? [CO-2] [L-1]
 - i) Enlist type of stress is induced in helical extension spring. [CO-2] [L-1]
 - j) Enlist the types of brake systems. [CO-2] [L-2] **2×10**

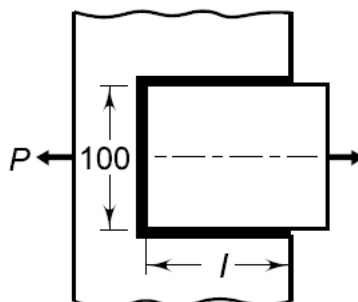
PART-A

- Q.2
- a) Analyze the factors which influence the value of factor of safety. [CO-4][L-4] **10**
 - b) Explain the procedure, advantages and disadvantages. [CO-2][L-2] **10**
- Q.3
- a) A wall bracket is attached to the wall by means of four identical bolts, two at A and two at B, as shown in the figure. Assuming that the bracket is held against the wall and prevented from tipping about the point C by all four bolts and using an allowable tensile stress in the bolts as 35 N/mm^2 , determine the size of the bolts on the basis of maximum principal stress theory.



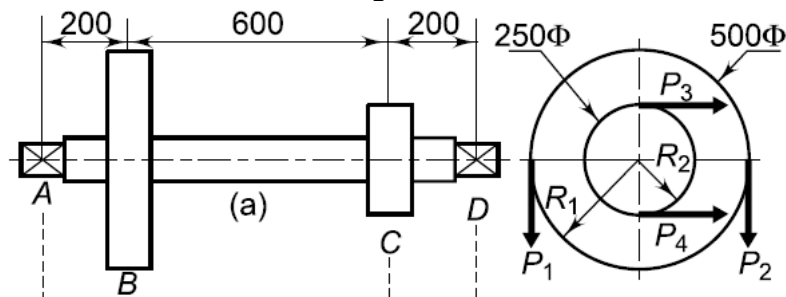
[CO-4] [L-4] **10**

- b) A steel plate, 100 mm wide and 10 mm thick, is joined with another steel plate by means of single transverse and double parallel fillet welds, as shown in the figure. The strength of the welded joint should be equal to the strength of the plates to be joined. The permissible tensile and shear stresses for the weld material and the plates are 70 and 50 N/mm^2 respectively. Find the length of each parallel fillet weld. Assume the tensile force acting on the plates as static.



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

- Q.4 The layout of a transmission shaft carrying two pulleys B and C and supported on bearings A and D is shown in figure. Power is supplied to the shaft by means of a vertical belt on the pulley B, which is then transmitted to the pulley C carrying a horizontal belt. The maximum tension in the belt on the pulley B is 2.5 kN. The angle of wrap for both the pulleys is 180° and the coefficient of friction is 0.24. The shaft is made of plain carbon steel 30C8 ($S_{yt} = 400 \text{ N/mm}^2$) and the factor of safety is 3. Determine the shaft diameter on strength basis.



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

PART-B

- Q.5 A single dry plate clutch is to be designed to transmit 7.5 kW at 900 r.p.m. Find:
- Diameter of the shaft.
 - Mean radius and face width of the friction lining assuming the ratio of the mean radius to the face width as 4.
 - Outer and inner radii of the clutch plate.
 - Dimensions of the spring, assuming that the number of springs are 6 and spring index = 6.

The allowable shear stress for the spring wire may be taken as 420 MPa. [CO4]L4]

5×4

- Q.6 a) It is required to design a helical compression spring subjected to a maximum force of 7.5 kN. The mean coil diameter should be 150mm from space consideration. The spring rate is 75 N/mm. The spring is made of oil-hardened and tempered steel wire with ultimate tensile strength of 1250 N/mm^2 . The permissible shear stress for the spring wire is 30% of the ultimate tensile strength ($G = 81\,370 \text{ N/mm}^2$). Calculate:
- Wire diameter.
 - Number of active coils. [CO-6] [L-6] **12**
- b) A taper roller bearing has a dynamic load capacity of 26 kN. The desired life for 90% of the bearings is 8000 h and the speed is 300 rpm. Calculate the equivalent radial load that the bearing can carry. [CO-4][L-4] **8**

- Q.7 It is required to design a pair of spur gears with 20° full-depth in volute teeth based on the Lewis equation. The velocity factor is to be used to account for dynamic load. The pinion shaft is connected to a 10 kW, 1440 rpm motor. The starting torque of the motor is 150% of the rated torque. The speed reduction is 4:1. The pinion as well as the gear is made of plain carbon steel 40C8 ($S_{ut} = 600 \text{ N/mm}^2$). The factor of safety can be taken as 1.5. Design the gears, specify their dimensions and suggest suitable surface hardness for the gears. [CO-6] [L-6] **20**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

HEAT TRANSFER (BME-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:

- Which law governs the rate of heat transfer through convection? Write its expression. [CO-1, L-1]
- What do you understand by regenerative heat exchanger? [CO-1, L-1]
- Explain briefly, the significance of Prandtl no. and Reynolds No. [CO-1, L-2]
- Give three examples of thermal conductors and insulators each. [CO-1, L-1]
- Explain using practical examples, the various modes of heat transfer. [CO-1, L-1]
- How do fins increase the heat transfer rate? [CO-1, L-2]
- State briefly the significance of critical thickness of insulation. [CO-1, L-2]
- Explain Kirchoff's law of thermal radiation. [CO-1, L-1]
- State the characteristics of black body. [CO-1, L-1]
- What do you understand by Shape Factor? [CO-1, L-1] **2×10**

PART-A

- Q.2 a) Derive an expression for generalized heat conduction equation in Cartesian coordinates. [CO-1][L- 2] **10**
- b) Steam at $T_{\infty 1} = 320^\circ\text{C}$ flows in a cast iron pipe ($k = 80 \text{ W/m}^\circ\text{C}$) whose inner and outer diameters are $D_1 = 5 \text{ cm}$ and $D_2 = 5.5 \text{ cm}$, respectively. The pipe is covered with 3-cm-thick glass wool insulation with $k = 0.05 \text{ W/m}^\circ\text{C}$. Heat is lost to the surroundings at $T_{\infty 2} = 5^\circ\text{C}$ by natural convection and radiation, with a combined heat transfer coefficient of $h_2 = 18 \text{ W/m}^2\text{C}$. Taking the heat transfer coefficient inside the pipe to be $h_1 = 60 \text{ W/m}^2\text{C}$, determine the rate of heat loss from the steam per unit length of the pipe. Also determine the temperature drops across the pipe shell and the insulation. [CO-2] [L-3] **10**

- Q.3 Derive an expression for the heat transfer rate through an infinitely long fin. Also state the assumptions made in the derivation. [CO-3] [L-2] **20**

- Q.4 a) What do you understand by lumped system? Derive the expression: **10**

$$\frac{T_i - T}{T - T_\infty} = e^{-\frac{hA}{\rho V C_p} \tau}$$

- b) A person is found dead at 5 PM in a room whose temperature is 20°C . The temperature of the body is measured to be 25°C when found, and the heat transfer coefficient is estimated to be $h = 8 \text{ W/m}^2\text{C}$. Modeling the body as a 30-cm-diameter, 1.70-m-long cylinder, estimate the time of death of that person.

Note:

- The person was healthy and his body temperature was 37°C when he passed

away.

- ii) Thermal properties of the body and heat transfer coefficient are constant.
- iii) Radiation effects are negligible.
- iv) Specific heat and thermal conductivity of water are 4.187 KJ/Kg-K and 0.6 W/mK. [CO-4] [L-3] **10**

PART-B

- Q.5 A 120 mm diameter steam pipe loses heat through convection. It is placed horizontally in ambient at 30°C. If Nusselt number is 30 and thermal conductivity of air is 0.02 W/mK then find the convection heat transfer coefficient. [CO-4] [L-3] **20**
- Q.6 Explain the following in detail:
a) Stefan boltzman Law.
b) Absorptivity, reflectivity and transmissivity.
c) Gray body and black body. [CO-1] [L-2] **20**
- Q.7 Derive an expression for logarithmic mean temperature difference (LMTD) for parallel flow heat exchanger. [CO-3] [L-4] **20**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

ROBOTIC ANALYSIS (BME-DS-603)

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:

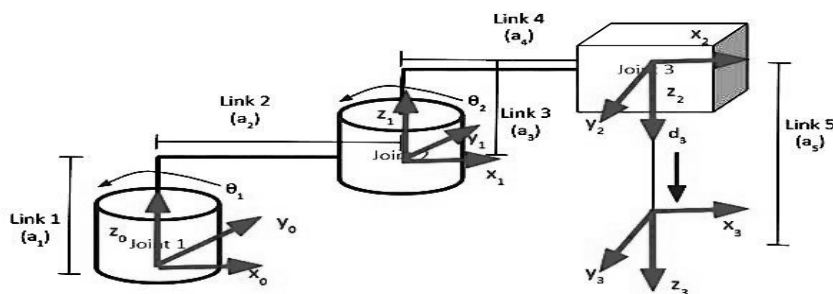
- Differentiate between mobility of a spatial and planar robots.
- What are the disadvantages of robots?
- Elaborate upon composite matrix.
- What are the desired characteristics of a robot?
- Differentiate between 'forward and inverse kinematics'.
- What are the factors to be kept in mind while selecting a gripper?
- Mention the advantages of vacuum based grippers.
- Justify that Lagranges and Newtons method produce same equation of motion.
- Determine the forces used in gripper force analysis.
- State the applications of tools as end effectors.

2×10

PART-A

- Q.2 a) Explain in detail the various components of a robot with a neat sketch. [CO-1][L-2] **12**
b) Prove that the rotation matrices are not commutative in nature. [CO-5][L-5] **8**

- Q.3 a) Find the homogenous transformation matrix for the following robotic system:



$a_1 = 20, a_2 = 30, a_3 = 10, a_4 = 35, a_5 = 50$

Angle of rotation for Joint 1 = 45, Joint 2 = 60

Linear movement of joint 3 is a maximum of 20 mm.

[CO-2] [L-2] **15**

- b) Describe the various types of joints used in robotics.

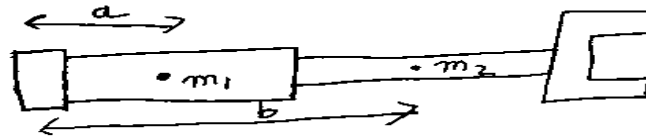
[CO-2] [L-4] **5**

- Q.4 a) Derive the equation for rotation matrix across the z-axis. [CO-2] [L-4] **10**
b) Explain the most commonly used robot coordinate systems. [CO-4] [L-4] **10**

PART-B

- Q.5 a) An industrial robot is used to vertically lift an object of weight $W = 100$ Kgs i.e. total load (gripper plus payload) using a frictional type gripper. If the coefficient of friction μ , between the gripper and load is 0.2, and the maximum acceleration is $g/2$, what is the holding force that must be exerted by the gripper? (Assume g) [CO-4] [L-4] **8**
b) What are the various steps while designing a gripper? [CO-6] [L-4] **12**

- Q.6 a) Explain the working of a hydraulic actuators and state its advantages over other actuators. [CO-5] [L-3] **10**
b) Find the equation of motion for the following prismatic robotic arm.



[CO-5] [L-3] **10**

- Q.7 A robotic arm moves from 5° to 25° in 10 seconds and then from 25° to 50° in the next 10 seconds and from 50° to 180° within the next 40 seconds.
a) Find the angle of the arm at 30 seconds using parabolic blend.
b) Find the angle of the arm at 15 seconds using 3rd order polynomial. [CO-6] [L-5] **20**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

REFRIGERATION AND AIRCONDITIONING (BME-DS-621)

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 is the function of compressor in vapour compression system? [CO1][L-3]
- b) Write down refrigerant no for following chemical formula. [CO3][L-1]
 $\text{CF}_4, \text{CH}_2\text{Cl}_2$
- c) i) Air cooled condenser.
ii) Water cooled condenser. [CO3][L-3]
- d) What is necessity of cooling load calculation? [CO4][L-2]
- e) What do you mean by wet bulb temperature? [CO5][L-1]
- f) What is dew point temperature? [CO3][L-5]
- g) Name two sources of heat generally considered in a room each of which emits latent and sensible heat. [CO4][L-1]
- h) Define 'cascade system'. [CO2][L-1]
- i) What do you mean by COP of refrigeration system? How is it related to electrical power input in case of vapour compression refrigeration system? [CO5][L-2]
- j) What is the difference between sensible cooling and latent cooling? [CO4][L-3] **2×10**

PART-A

Q.2 The cockpit of a jet plane flying with speed of 1200 km/hr is to be cooled by simple air cooling system. The cockpit is to be maintained at 25°C and the pressure in the cockpit is 1 bar. The ambient air pressure and temperature are 0.85 bar and 30°C. The other data available is as follows:

Cockpit cooling load=10TR, main compressor pressure ratio=4, Ram efficiency=90%, temperature of air leaving the heat exchanger and entering the cooling turbine=60°C, pressure drop in the heat exchanger =0.5 bar. Pressure loss between the cooling turbine and cockpit=0.2 bar.

Assuming the isentropic efficiency of the main compressor and cooling turbine as 80%, find the quantity of air passed through the cooling turbine and COP of the system. Take $\gamma=1.4$ and $C_p = 1 \text{ KJ/Kg K}$. [CO2][L-4] **20**

Q.3 Draw pressure-enthalpy diagram of vapour compression refrigeration system indicating sub cooling and superheating and describe the system in detail. [CO3][L4] **20**

- Q.4 a) Describe vapour absorption refrigeration system with detailed diagram of the cycle. [CO3][L-2] **10**
- b) Describe 3-stage cascade refrigeration system with cycle diagram and pressure-enthalpy diagram. [CO1][L-3] **10**

PART-B

- Q.5 a) The air enters a duct at 10°C and 80% relative humidity at the rate of 150 m³/minute and is heated to 30°C without adding or removing any moisture. The pressure remains constant at 1 atmosphere. Determine the relative humidity of air at exit from the duct and the rate of heat transfer. [CO2][L-4] **10**
- b) Derive an expression for degree of saturation and relative humidity. [CO2][L-2] **10**

- Q.6 a) An air-conditioning system is to be designed for a restaurant with the following data:
Outside design conditions= 40°C DBT, 28°C WBT
Inside design conditions= 25°C DBT, 50% RH
Solar heat gain through wall, roof & floor=5.87 KW
Solar heat gain through glass=5.52 KW
Occupants=25
Sensible heat gain per person=58W
Latent heat gain per person=58W
Internal lighting load=15 lamps of 100W
10 fluorescent tubes of 80W
Sensible heat gain from other sources=11.63KW
Infiltrated air= $15\text{ m}^3/\text{min}$
If 25% fresh air & 75% recalculated air is mixed and passed through the conditioner coil, Find:
i) The amount of total air required in m^3/hr
ii) The dew point temperature of the coil
iii) The condition of supply air to the room
iv) The capacity of the conditioning plant
Assume the by-pass factor equal to 0.2.

[CO4][L-4] **20**

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

- Apparatus dew point (ADP).
- Bypass factor.
- Expansion valves.

[CO4][L-6] **10×2**

End Semester Examination, May 2023

B. Tech. – Sixth Semester CAD/CAM (BME-DS-622)

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 specific advantages of using CAD in product development cycle. [CO-1] [L-2]
- b) What exactly do you mean by homogeneous coordinate? [CO-1] [L-2]
- c) What is meant by "local and global control points in a curve"? [CO-2] [L-1]
- d) Write down the parametric equation of circle. [CO-2] [L-2]
- e) List out the essential properties of a CAD surface model. [CO-3] [L-1]
- f) Write any two functions of a graphic package. [CO-3] [L-2]
- g) What are the prospects for CAM in India in the future? [CO-4] [L-1]
- h) How G-code is different from M-code in programming? [CO-4] [L-2]
- i) What are the primary components of a CNC machine? [CO-5] [L-1]
- j) What are the factors that influence line efficiency? [CO-6] [L-2] **2×10**

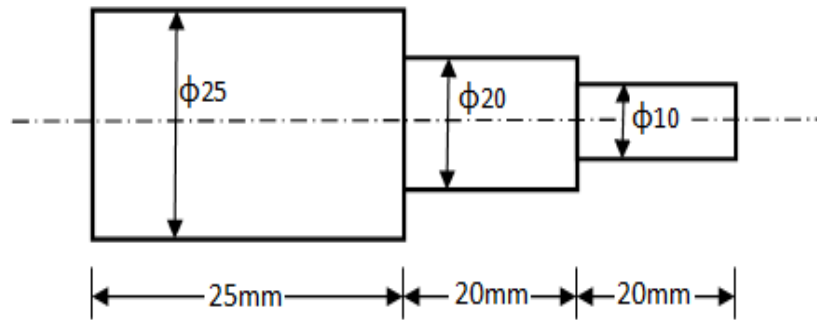
PART-A

- Q.2 a) Suppose you are a design engineer in CNC cylindrical grinding machines manufacturing company. How will you use CAD to improve your design productivity? [CO-1] [L-5] **10**
b) A line having end points (3,3) and (5,5) is reflected about a line with equation $y = 2x+3$. Find the final position of the line. [CO-1] [L-6] **10**
- Q.3 a) Differentiate between 'analytical and synthetic curves'. Give examples of each curve with their parametric equations. [CO-2] [L-3] **10**
b) Generate a Bezier curve with following control points (1,2), (3,4), (6,-6) and (10,8). [CO-2] [L-6] **10**
- Q.4 a) Make a comparative analysis of the wire frame, surface and solid modelling. [CO-3] [L-4] **10**
b) What is B-rep technique in solid modelling? Explain the basic building blocks used for boundary representation. [CO-3] [L-2] **10**

PART-B

- Q.5 a) In NC machines, distinguish between open and closed loop systems. [CO4][L-3] **10**
b) Describe the primary goals of NC machines and major automation strategies that have been implemented. [CO- 4][L-4] **10**
- Q.6 a) What exactly is part programming? Discuss the process for creating a manual part programme. [CO-5][L-2] **10**
b) Write a part program for a shaft of 30 mm diameter to make a stepped shaft with dimensions as shown in figure below. Use appropriate speed and feed when material of the shaft is mild steel. [CO-5][L-6] **10**

P. T. O.



- Q.7 a) What is group technology? Explain part classification and create different coding system. [CO-6] [L-3] **10**
- b) Write short notes on:
- i) CAPP
 - ii) MRP-II
 - iii) MPS
 - iv) BOM
- [CO-6] [L-1] **10**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
PROCESS PLANNING AND COST ESTIMATION (BME-DS-624)

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) Enlist various dimensions of quality of a product. [CO1][L2]
- b) Differentiate between 'primary and secondary' manufacturing processes. [CO1][L1]
- c) Explain process planning. [CO1][L2]
- d) Discuss significance of process planning. [CO2][L1]
- e) Demonstrate significance of drill jig. [CO6][L1]
- f) Describe the significance of inventory control. [CO6][L2]
- g) Explain depreciation. [CO1][L1]
- h) Differentiate between 'cost estimation' and 'cost accounting'. [CO2][L1]
- i) Enlist various steps of welding process. [CO3][L1]
- j) Distinguish between drilling and boring process. [CO3][L2] **2×10**

PART-A

- Q.2 Explain the significance of Chawing interpretation using a sketch. Also discuss various steps and decisions included in scope of process planning. [CO-1,3,6][L-2] **20**
- Q.3 a) Evaluate various quality assurance methods in detail with help of an example [CO-1,2,4] [L-2] **10**
b) Analyze the set of documents required for process planning. [CO-1,2,4][L-2] **10**
- Q.4 A company has been offered a chance to buy between Machine A and Machine B. You are required to compute:
a) BEP of each machine.
b) The level of sales at which both machine earn equal profits?
The following data is given:

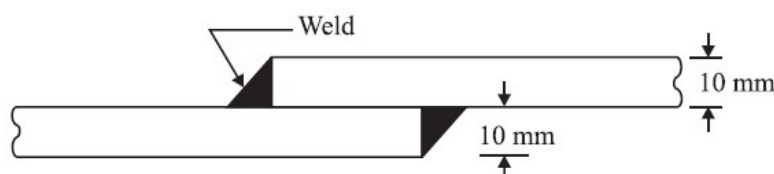
	Machine A	Machine B
Annual output (in units)	10,000	10,000
Fixed costs	30,000	16,000
Profit at above level	30,000	24,000

The market price of product is expected to be ` 10/unit.

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

PART-B

- Q.5 a) Analyze overhead expenses in a product. Also distinguish between various expenses of a product. [CO4,6][L-3] **10**
b) Formulate the factors affecting the total cost of a product. [CO4,6][L-4] **10**
- Q.6 Estimate the cost of weld from following data in a lap weld.



Estimate the cost of weld from the following data:

Thickness of plate	=	10 mm
Electrode diameter	=	6 mm
Minimum arc voltage	=	30 Volts
Current used	=	250 Amperes
Welding speed	=	10 meters/hours
Electrode used per meter of weld	=	0.350 kgs
Labour rate	=	Rs. 40 per hour
Power rate	=	Rs. 3 Per kWh
Electrode rate	=	Rs. 8.00 per kg
Efficiency of welding m/c	=	50 percent
Connecting ratio	=	0.4
Overhead charges	=	80 percent of direct charges
Labour accomplishment factor	=	60 percent

[CO3,5,6] [L-4] **20**

- Q.7 a) Distinguish between machining time calculation for lathe, milling and shaping Process. [CO-1,6] [L4] **10**
- b) Evaluate the methods of calculation of machining time for drilling and boring machine. [CO-1,6][L4] **10**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

RENEWABLE ENERGY RESOURCES AND UTILISATION (BME-DS-625)

Time: 3 hrs.

Max Marks:

100

No. of pages: 1

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

Q.1 Discuss the following:

- a) OTEC system. [CO1][L1]
- b) Solar cell and battery. [CO1][L1]
- c) Calorific value of biomass samples. [CO2][L1]
- d) Principle of tidal energy conversion. [CO2][L2]
- e) Site selection for biogas plant. [CO2][L1] **4×5**

PART-A

- Q.2 a) Discuss the methods for energy storage and concept of smart energy. [CO-1][L-2] **10**
b) Discuss the role of energy consumption used as a measure for energy consumption. [CO-1,2][L-1] **10**
- Q.3 a) What are solar collectors? Discuss the design considerations of flat plate collector in water heating application. [CO-2][L-3] **10**
b) Elaborate the optical properties required to select the material for solar collectors and tracking system. [CO-2][L-3] **10**
- Q.4 Describe the constructional features and components of wind mills. [CO-1,3][L-4] **20**

PART-B

- Q.5 What are MHD systems? Explain the construction and working of thermionic converters with suitable applications. [CO-4][L-4] **20**
- Q.6 a) Elaborate the biogas generation plants including its advantages and constructional details. [CO-1,5][L-6] **10**
b) Design a biogas plant for rural application. [CO-1,5][L-6] **10**
- Q.7 a) List the advantages, limitations and scope of tidal energy. [CO-3][L-6] **10**
b) Discuss the construction and working of Geo-Thermal Power Plant. [CO-3][L-6] **10**

End Semester Examination, May 2023
OPEN ELECTIVE – COMMON FOR ALL BRANCHES
SIX SIGMA TECHNIQUES (BME-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.

Draw neat diagrams and Sketches to support your answer

Q.1 Answer the following in brief:

- a) Describe the number of defectives in a six sigma process.
- b) Describe the aim of six sigma project.
- c) Explain six sigma with sketch.
- d) Describe the meaning of DMAIC.
- e) Describe application areas of six sigma in manufacturing.
- f) Describe the type of variations in six sigma process.
- g) Enlist the key players in six sigma project.
- h) Describe application areas of six sigma in services.
- i) Describe the strategies of reducing variations.
- j) What are the product characteristics critical for customers? [CO2,6, L2] **2×10**

PART-A

- Q.2 Demonstrate significance of define phase. In addition, discuss various phases of six sigma dmaic methodology with help of a case study. [CO1, L4] **20**
- Q.3 Evaluate the role of six sigma green belts, black belts and other key players in organizational structure, with their contribution in detail. [CO4, L3] **20**
- Q.4 Discuss, various tools used in a six sigma projects and discuss in detail the process mapping used in define phase. [CO3, L3] **20**

PART-B

- Q.5 Distinguish between chance causes and assignable cause present in any process with help of a case study. [CO5, L3] **20**
- Q.6 Demonstrate the significance of reducing variations in any process. Discuss in detail any three tools to describe variations in any process. [CO2, L2] **20**
- Q.7 Discuss various methods to stratify the data available with help of a case study and demonstrate any two methods in detail. [CO6, L3] **20**

End Semester Examination, May 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.

Draw neat diagrams and Sketches to support your answer.

Q.1 Answer the following in brief:

- a) List the importance of maintenance in the present-day industrial context. [CO-3][L-1]
- b) Interpret the term availability in maintenance aspect. [CO-2][L-4]
- c) Explain the term breakdown and its impacts on organizational overall performance. [CO-6][L-2]
- d) Outline the various challenges in implementing TPM in Industry. [CO-1][L-4]
- e) Differentiate between manual and automated maintenance planning activities. [CO-1][L-3]
- f) Appraise the root cause analysis strategy in failure analysis. [CO-3][L-3]
- g) Discuss role of manpower management in maintenance control. [CO-1][L-2]
- h) List the importance of cost reduction approach in spares management. [CO-6][L-3]
- i) Discuss failures and its impact on engineering equipment's. [CO-5][L-1]
- j) Discuss the routine maintenance activities. [CO2,6][L2] **2×10**

PART-A

- Q.2 Explore the challenges associated with maintenance functions in an organization. [CO1][L4] **20**
- Q.3 Is it important to have a special department for maintenance related activities in all manufacturing industries? Discuss. [CO4][L3] **20**
- Q.4 List out and explain in brief the various factors considered for formulating and designing the maintenance strategies in a cost-effective manner for industrial operations. [CO3][L3] **20**

PART-B

- Q.5 Explain the various types of failures. Also, point out its tangible and intangible impacts on industries. [CO5][L3] **20**
- Q.6 Justify the importance of logical and sequential fault identification in equipments. Also discuss the failure mode effect analysis technique with neat sketch. [CO2][L2] **20**
- Q.7 Discuss TPM in detail with a neat sketch for TPM pillars. [CO6][L3] **20**

End Semester Examination, May 2023
B. Tech. – First Semester
INTRODUCTION TO ELECTROMAGNETIC THEORY
(BPH-101/BSC-PH-101)

Time: 3 hrs.

Max. Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Write Poisson's and Laplace equations.
- b) Give two uses of Faraday's cage.
- c) Explain the term linear dielectrics.
- d) Differentiate between free charges and bound charges.
- e) Give the origin of magnetic vector potential.
- f) What is auxiliary magnetic field?
- g) Derive the relation between 'magnetic susceptibility' and 'relative permeability'.
- h) Show how equation of continuity represents the law of conservation of energy.
- i) Differentiate between 'longitudinal waves' and 'transverse waves' with examples.
- j) Discuss the properties of electromagnetic waves in free space. **2×10**

PART-A

- Q.2 a) What is method of images? Determine the electric field and electric potential due to a point charge above a grounded conducting plane. [CO-1] [L3] **10**
b) Derive expressions for divergence and curl of electrostatic field and specify their significance. [CO-1] [L2] **10**
- Q.3 a) Calculate an electric potential and electric field at a point at a distance r from the center of the dipole and making an angle θ between the direction r and the dipole axis. [CO-2][L4] **12**
b) Derive boundary relations for static electric fields and displacement vector across a common boundary separated by two different perfect dielectric media. [CO-2] [L2] **8**
- Q.4 a) Calculate the value of magnetic field at a point due to a long straight current carrying wire. [CO-3][L3] **8**
b) Explain divergence of static magnetic field and derive an expression of $\text{div } B$. [CO3][L3] **6**
c) Give the expression for vector potential of a solenoid carrying current using Stoke's theorem. [CO-3] [L4] **6**

PART-B

- Q.5 a) Calculate the magnetic field due to bar magnet along the axis and on the equatorial plane of the bar magnet. [CO-4] [L3] **12**
b) Derive Faraday's law in differential form and explain motional emf. [CO-4] [L2] **8**
- Q.6 a) State Ampere's circuital law. How could Maxwell corrected and presented Ampere's law in its generalized form? [CO-5] [L2] **8**
b) State and prove Poynting theorem. Explain the term pointing vector. [CO-5] [L3] **12**
- Q.7 a) Calculate reflection and transmission coefficients for electromagnetic wave when it travels from one medium to another provided the mediums are nonmagnetic. [CO-6] [L3] **8**
b) Solve Maxwell's equations to obtain electromagnetic wave equations for E and B in space. [CO-6] [L3] **8**

- c) Calculate the electric field amplitude and magnetic field amplitude due to a 60W bulb at distance of 1m from it. Assume the bulb to be a point source. [CO-6][L4] **4**

End Semester Examination, May 2023

B. Tech. – 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 Answer the following in brief:

- a) How traps affect the photoconductivity of semiconductors. [CO-2] [L2]
- b) In a LED the active material used is AlGaIn with a band gap of 4.5 eV. Find out the wavelength of light emitted. [CO-2] [L3]
- c) Why is wave nature of particle not observed in our daily experience? [CO-1] [L2]
- d) Explain the importance of meta-stable states in laser. [CO-1] [L2]

- e) Sketch a labeled diagram of an optical fibre. [CO-1] [L2]
- f) Give two reasons of change in properties of a materials at nano scale. [CO-1] [L2]
- g) What is quantum dot and graphene? [CO-1] [L2]
- h) In the Hall effect, the electric field is in X-direction and the velocity is in Y-direction. What is the direction of the magnetic field? [CO-3] [L2]
- i) Recall four properties of X-rays. [CO-3] [L1]
- j) Write any two Maxwell's equations. [CO-4] [L1] **2×10**

PART-A

- Q.2 a) Distinguish between i) direct and indirect band gap semiconductors ii) organic and compound semiconductors. [CO-2] [L2] **10**
- b) Interpret and analyze the construction and working of *pn-junction photodiode*. [CO-2] [L3] **10**

- Q.3 a) Derive the expressions for Schrodinger time independent and time dependent wave equations. [CO-1] [L4] **12**
- b) State and explain Compton effect. [CO-1] [L3] **6**

06

- c) What is the energy of an electron having wavelength 1 \AA ? [CO-1] [L4] **2**

02

- Q.4 a) Explain with neat diagram the construction and working of semiconductor laser. [CO-1] [L3] **10**
- b) Classify optical fibres on the basis of modes of propagation and index profile. [CO-1] [L3] **10**

PART-B

- Q.5 a) Discuss the electrical, mechanical and vibrational properties of carbon nanotubes. [CO-1] [L2] **10**

b) Distinguish between single walled and multi-walled carbon nanotubes. Give six applications of nanomaterials. [CO-1] [L1] **10**

Q.6 a) Derive Bragg's law for X-ray diffraction. Also describe Bragg's spectrometer and explain how it is used to analyze the crystal structure? [CO-3] [L3] **12**

b) Write a short note on Rutherford back scattering spectroscopy. [CO-3] [L2] **8**

Q.7 a) Distinguish between divergence and curl of a vector field. Derive an expression for curl of electric field. [CO-4] [L3] **10**

b) Given a potential of the form: $V = \frac{A}{r} + B$, check whether the potential satisfies Laplace equation and find the electric field corresponding to it. [CO-4] [L4] **10**

End Semester Examination, May 2023

B. Tech. – First Semester

CHEMISTRY-I (BSC-CH-101/BCH-101)

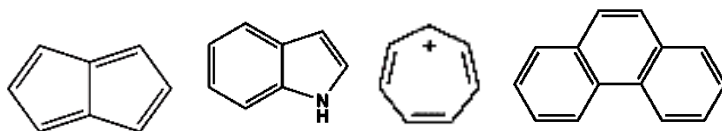
Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

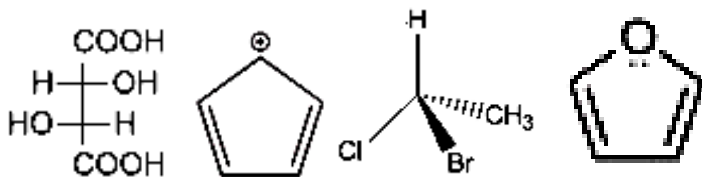
- Q.1
- a) Define triple point with an example. [CO-4] [L-1]
 - b) Compare SN_1 and SN_2 reactions with one example. [CO-6] [L-1]
 - c) Differentiate diastereomers and enantiomers with one example. [CO-3] [L-2]
 - d) Elaborate Markovnikov rule for addition reactions with an example. [CO-6] [L-2]
 - e) Calculate radial and angular nodes of in 4s and 5d orbital. [CO-1] [L-3]
 - f) Identify aromatic and anti-aromatic molecules in following: [CO-1] [L-3]



- g) What is Lambert-Beer law? Explain in detail. [CO-5] [L-1]
- h) Which of the following molecules are IR active? [CO-5] [L-1]
 $CHCl_3$, NH_3 , F_2 , Cl_2 ,
- i) Discuss the significance of Ellingham diagram. [CO-4] [L-2]
- j) Identify the hard base in following: F^- , Al^{3+} , Ag^+ , OH^- . [CO-2] [L-2] **2×10**

PART-A

- Q.2
- a) Compare the molecular orbital diagram of O_2 and N_2 molecules and calculate the magnetic moment of the molecules. [CO-1] [L-3] **10**
 - b) Derive an expression for the energy of the particle in a one dimensional box in terms of the particle's mass (m), the length of the box (l), and Planck's constant (h). [CO-1] [L-4] **10**
- Q.3
- a) Predict the periodic trends of electron affinity and ionization energy. Explain why II^{nd} ionization energy of sodium is around ten times greater than I^{st} ionization energy. [CO-2][L-4] **10**
 - b) Calculate Z_{eff} (effective nuclear charge) of valence electron of the following:
 - i) S
 - ii) Ca
 - iii) Na
 - iv) Zn[CO-2] [L-5] **10**
- Q.4
- a) Labeling of following stereo-centers with R or S configuration:



- b) Demonstrate the relative potential energy diagram for cyclohexane with various conformers. Which conformer is least stable in cyclohexane and why? [CO-3] [L-3] **10**

PART-B

- Q.5 a) Explain the mechanism of electrochemical corrosion with reactions and diagram. Discuss four factors affect the corrosion rates with brief description of any four. [CO-4] [L- 3] **10**
- b) Calculate the emf of the electrochemical cell:
 $\text{Fe} \mid \text{Fe}^{2+} (0.01\text{M}) \parallel \text{Cd}^{2+} (0.01\text{M}) \mid \text{Cd}$
The standard potential of Fe/Fe^{2+} half-cell is - 0.45 V and Cd/Cd^{2+} is – 0.40 V. [CO-4] [L-5] **10**
- Q.6 a) Describe the principle and various fundamental vibrations of infrared spectroscopy. Explain the applications of IR spectroscopy. [CO-5] [L-4] **10**
- b) Calculate No of vibration modes of following molecules: CCl_4 , BF_3 , H_2O , and $\text{C}_6\text{H}_5\text{CH}_3$. [CO-5] [L-5] **10**
- Q.7 a) Classify elimination reaction with examples. Explain the E1 and E2 mechanism of elimination. [CO-6] [L-4] **10**
- b) Differentiate between SN_1 and SN_2 reactions? Explain with suitable examples. [CO-6] [L-3] **10**

End Semester Examination, May 2023
B. Tech. – Fifth Semester
MATHEMATICS FOR BIO-TECHNOLOGY - II
(BSC-MA-203/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 in brief:

- a) Solve: $\frac{dy}{dx} + y = \sin x$. [CO-1][L-1]
- b) Solve: $(y \cos x + 1) dx + \sin y dy = 0$. [CO-1][L-2]
- c) Find complementary function for the differential equation: $y'' - a^2 y = 0$. [CO-1][L-2]
- d) Find particular integral for the differential equation: $(D^2 + 1)y = e^{2x} \cos 2x$. [CO1][L3]
- e) Solve: $zpq = p + q$. [CO-1][L-2]
- f) Solve $\sin xp + \sin yq = \sin z$. [CO-1][L-2]
- g) Evaluate: $\int_0^{\infty} t^2 e^{-2t} \sin t dt$. [CO-2][L-3]
- h) Find the inverse Laplace transform of $\frac{e^{-\pi s}}{s^2 + 1}$. [CO-2][L-3]
- i) In the fourier series expansion of $f(x) = |x|$ in $(-\pi, \pi)$, what is the value of b_n . [CO-2][L-2]
- j) A bag contains 2 red, 3 Green and 2 Blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is Blue? [CO-3][L-2] **2×10**

PART-A

Q.2 Solve the following differential equations:

- a) $(xy^3 + y)dx + 2(x^2 y^2 + x + y^4)dy = 0$ [CO-1][L-2] **10**
- b) $\frac{dy}{dx} + x^2 y = \log x$ [CO-1][L-2] **10**

Q.3 a) Solve $\frac{d^2 y}{dx^2} + a^2 y = \tan ax$. [CO-1][L-3] **10**

b) Solve $(D^4 - 4D + 4)y = 8x e^x \sin x$.

10 Marks CO-1, L-3

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

- Q.4 a) Solve the following differential equations:
 $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$ [CO-1][L-2] **10**
- b) If a string of length l is initially at rest in equilibrium position and each of the points is given the velocity.

$$\left(\frac{\partial y}{\partial t}\right)_{t=0} = b_0 \sin^3 \frac{\pi x}{l}. \text{ Find the displacement } y(x, t). \quad [\text{CO-1}][\text{L-3}] \text{ **10**}$$

PART-B

- Q.5 a) State and prove Convolution theorem for Laplace transform. [CO-2][L-2] **10**
 b) Solve the differential equation by using Laplace transform:
 $y'' + 4y' + 3y = e^{-t}$, when $y(0) = 1, y'(0) = -1$. [CO-2][L-3] **10**
- Q.6 a) Find the Fourier series expansion to represent e^{ax} in the interval $-\pi < x < \pi$ [CO-2][L-2] **15**
 b) Find the Fourier series expansion for $f(x) = \pi x$; $0 \leq x \leq 1$ [CO-2][L-3] **5**
- Q.7 a) In a bolt factory machines A, B and C manufacture respectively 25%, 35% and 40% of the total. Of this output 5, 4, 2 percent are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B and C? [CO-3][L-3] **15**
 b) Three unbiased coins are tossed. What is the probability of getting at most two heads? [CO-3][L-2] **5**

End Semester Examination, May 2023
B. Tech. – First / Second Semester
SEMICONDUCTOR PHYSICS (BSC-PH-104/BPH-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) What is the order of band gap in case of silicon semiconductor?
- b) What are excitons? How are they formed?
- c) What are majority charged carriers in p-type semiconductors?
- d) Where is the Fermi level located in p-type semiconductors at 0 K?
- e) What is stimulated emission of radiation?
- f) Write an expression for energy and momentum of a photon.
- g) Explain non-radiative recombination.
- h) Name two materials used for LED emitting wavelength in the infrared range.
- i) What is a photo detector? Is it forward biased p-n junction? Explain.
- j) Name one method which is used for measuring band gap experimentally. **2×10**

PART-A

- Q.2 a) Discuss the Kronig-Penny model in detail. How it explains the formation of energy bands separated by forbidden energy gap in solids. [CO-1][L-4] **15**
b) Outline the assumptions of free electron model of metals and write an expression for conductivity of metal. [CO-1][L-3] **5**
- Q.3 a) Derive an expression for the carrier concentration in an intrinsic semiconductor. What would be the position of Fermi level? [CO-2][L-4] **15**
b) Discuss Fermi-Dirac distribution function. [CO-2][L-4] **5**
- Q.4 a) Find the relation between Einstein's coefficients. [CO-3][L-3] **12**
b) Differentiate between spontaneous and stimulated emission of radiation. [CO-3][L-2] **8**

PART-B

- Q.5 a) Discuss the working of double hetero-junction LED and differentiate between homo-junction and hetero-junction LED. [CO-4][L-4] **15**
b) In a LED the active material used is GaAs with a band gap of 1.44 eV. Find out the wavelength of light emitted. [CO-4][L-4] **5**
- Q.6 a) Using a labelled diagram, discuss the working and construction an Avalanche photo detector in detail. [CO-5][L-4] **12**
b) Differentiate between PIN and Avalanche photo detectors. [CO-5][L-3] **8**
- Q.7 a) A uniform silver wire has a resistivity of 2.0×10^{-8} ohm-meter at room temperature. For an electric field along the wire of 6 volt-cm⁻¹, calculate drift velocity and mobility, assuming that there is 4.2×10^{28} m⁻³ conduction electrons. [CO-6] [L-3] **10**

- b) A silicon photo detector is radiated with radiation of wavelength 710nm, it generates a photocurrent of 35nA. What is the responsivity and quantum efficiency of photo detector at 710nm? Given input optical power ($P_0=0.152\mu\text{W}$). [CO-6] [L-3] **10**

End Semester Examination, May 2023

B. Tech - Third Semester

STRENGTH OF MATERIALS (C-306C)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

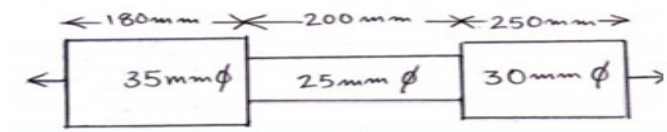
Q.1 Answer the following in brief:

- Differentiate between 'lateral and longitudinal strain'.
- Write the relationship between:
 - Elastic modulus and shear modulus.
 - Shear modulus and bulk modulus.
- Explain shear centre.
- Explain Mohr's circle.
- Draw the figure for bi-axial stress state.
- Write down the equation of torsion and explain each terms.
- What is the difference between concentric and eccentric loading.
- Show the variation of shear stress in I section and solid circular section.
- Explain plane stress condition.
- What do you understand by composite beam?

2×10

PART-A

- Q.2 a) Derive the expression for volumetric strain. [CO-1] [L-3] **5**
b) Figure given below shows a bar of three lengths. Find the stress in the three parts and the total extension of the bar for an axial pull of 40 kN. Take $E=2 \times 10^5$.



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

- Q.3 Determine the normal stress, tangential stress and the stress resultant on an oblique plane inclined at an angle of 30 with the x -axis for the following stresses:
(Tensile) $\sigma_x = 80$ MPa ,
(Tensile) $\sigma_y = 40$ MPa ,
 $\sigma_{xy} = 70$ MPa .
Also find the principal stresses. [CO-2] [L-5] **20**

- Q.4 A 250 mm x 250 mm rolled steel joist of I- section has flanges and web 15 mm thick. Find out the uniformly distributed load that this section can carry over a span of 5 m if the permissible skin stress is limited to 150 N/mm². [CO-3] [L-4] **20**

PART-B

- Q.5 The cross-section of a joist is a T-section, 150 mm X 300 mm X 15 mm, with 150 mm side horizontal. Find the maximum shear stress if it has to resist a shear force of 400 kN. Also sketch shear stress distribution. [CO-4] [L-3] **20**
- Q.6 A short column of rectangular section 350 mm x 450 mm carries a compressive load of 1000 kN. The load is applied at a point (50, 50) considering the centroid of the section as the origin. Find the stresses at the four corners of the section.

- Q.7 a) Write the assumptions made in deriving the equation of torsion.
 b) A solid shaft is required to transmit 150 kW power at 240 rpm. Find the suitable diameter of the shaft if the allowable shear stress is 105 N/mm². [CO6] [L-5] **20**

End Semester Examination, May 2023
B. Sc. (Interior Design) – Sixth Semester
PRACTICAL ASPECTS OF PROJECT MANAGEMENT (C-705B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

- Q.1 What is the role of Project Manager? Whom does it serve? Why do we require a project manager in interior and architecture field? **20**

PART-A

- Q.2 Explain the following terms in context to project management:
a) Agenda and minutes of meeting.
b) Cost control.
c) Material management.
d) Project close out. [CO-1] [L-1] **5×4**
- Q.3 What is the role of tender in interior and architecture? How it is connected with material management? Explain with the help of examples. [CO- 2] [L-2] **20**
- Q.4 How does a Project Manager controls the cost of a project. [CO-3] [L-3] **20**

PART-B

- Q.5 What is a contract document? Why it is necessary in Interior design field and how do we manage contract documents in a project? [CO-4] [L-4] **20**
- Q.6 Explain the time management techniques in detail. [CO-5] [L-5] **20**
- Q.7 How do we manage projects using MS Project? [CO-6] [L-6] **20**

End Semester Examination, May 2023

B. Tech. – First Semester

INDUSTRIAL CHEMISTRY (CH-101A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- What is dry corrosion?
- Define flash point and fire point.
- What is triple point in water system?
- Write two differences between dry cell and wet cell.
- What are the main constituents of composites?
- Write the name of gels formed in sol-gel process.
- What are biodegradable polymers?
- Why is alkaline water not suitable for boilers?
- Define cloud and pour points of lubricants.
- What is top-down approach of synthesis of nanomaterials?

2×10

PART-A

Q.2 a) Explain reverse osmosis method with the help of diagram.

10

- b) 50 ml of water sample required 12 ml of $\frac{N}{50} H_2SO_4$ for neutralization of phenolphthalein end point. Some water sample required 8 ml more of same acid on adding methylorange as an indicator. Calculate each type of alkalinity and its extent.
- c) Explain electrodialysis.

5

5

Q.3 a) Explain electrochemical theory of corrosion with the example and diagram.

10

b) Explain with reactions and diagrams the following:

- Galvanic corrosion.
- Sacrificial anodic protections.

5×2

Q.4 a) What is triple point? Explain with the help of phase diagram of water.

5

b) Explain the following terms:

- Congruent melting point.
- Degree of freedom.

2½×2

c) Explain phase diagram of Pb-Ag system.

10

PART-B

Q.5 a) Compare thick film and thin film lubrication theory with examples and diagram.

10

b) Write short notes on the following in relation to lubricant:

- Flash and Fire point.
- Aniline point.

5×2

Q.6 a) Discuss the uses and hazards of batteries.

5

b) Write any four applications of smart batteries.

5

c) What are conducting polymers? How are they classified? Explain briefly.

10

Q.7 a) Explain electro-deposition technique in brief.

5

b) What do you mean by the term: Nano? Discuss the significance of nanoscience and nanotechnology in engineering field.

5

c) Explain sol-gel process for the synthesis of nanomaterial. Explain it with block diagram.

10

End Semester Examination, May 2023
COMMON FOR ALL BRANCHES – Second Semester
ENVIRONMENTAL STUDIES (CH-202B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- a) When is the World environment day celebrated? What was the theme of environment day 2022? [CO1 L1]
- b) What are food webs? Support your answer with the help of examples. [CO2 L1]
- c) How are people affected by mining? [CO2 L1]
- d) Name 2 endangered and 2 endemic species of India. [CO2 L1]
- e) What are the 5 R's of waste management? [CO3 L1]
- f) Name any 4 biogeographic zones of India. [CO4 L1]
- g) Illustrate the causes of landslides in an area. [CO5 L2]
- h) What is man-wildlife conflict? Give examples. [CO5 L1]
- i) What is disaster management plan? [CO5 L1]
- j) What is population explosion? [CO6 L2] **2×10**

PART-A

- Q.2 a) Discuss the multidisciplinary nature of environmental studies. [CO1 L2] **10**
b) What is sustainable development? What are the three pillars of sustainable development? [CO1 L3] **10**
- Q.3 a) What is an ecosystem? Discuss the components and any one model of energy flow in an ecosystem with the help of well labelled diagrams. [CO2 L2] **10**
b) Classify the different renewable and non-renewable resources and discuss any two in detail. [CO2 L3] **10**
- Q.4 a) What do you understand by values of biodiversity in terms of consumptive use value, productive use value, social value, ethical value and option values. [CO2 L3] **10**
b) What is meant by in-situ and ex-situ conservation of biodiversity? Give examples. [CO2 L2] **10**

PART-B

- Q.5 a) Elaborate the sources, effects and control of any one type of pollution. [CO3 L2] **10**
b) Explain in detail the water (prevention and control of pollution) act and montreal protocol. [CO3 L3] **10**
- Q.6 a) Why do we refer Environment Protection Act, 1986 as an umbrella act? Discuss the major environment protection rules. [CO4 L3] **10**
b) How is Chipko movement related to Bishnoi community of Rajasthan? Explain in detail about the significance of these movements. [CO5 L2] **10**
- Q.7 a) Discuss in brief about the chemical weapons and their use. Also mention the role of Chemical weapon convention in prohibiting these toxic weapons. [CO6 L3] **10**
b) Write a short note on ozone layer depletion and climate change. [CO4 L2] **10**

End Semester Examination, May 2023
COMMON FOR ALL BRANCHES - Second Semester
ENVIRONMENTAL STUDIES (CH-202B)

Time: 3 hrs.

Max Marks: **100**

No. of Pages: 1

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

Q.1. Answer the following in brief:

(2x10=20)

- a) What are renewable and non-renewable resources? Give examples. [CO-1][L-1]
- b) Write two major causes of deforestation. [CO-2][L-1]
- c) Write down two scopes of environmental studies. [CO-1][L-2]
- d) Listed Biotic & A biotic components of the environment. [CO-1][L-1]
- e) What are the major implications of acid rain? [CO-3][L-2]
- f) The Silent valley project was supposed to be on: [CO-2][L-1]
 - i) Tropic Scrub forest ii) Evergreen Coniferous forest
 - iii) Tropical Rain forest iv) None of the above.
- g) Bhopal gas tragedy occurred due to: [CO-3][L-2]
 - i) DDT ii) MIC iii) Dioxin iv) SO₂
- h) In which year Forest Conservation Act was amended? [CO-3][L-2]
 - i) 1980 ii) 1982 iii) 1992 iv) 1995
- i) Chernobyl disaster is associated with: [CO-5][L-3]
 - i) Landslide ii) Nuclear accident iii) Earthquake iv) Acid rain
- j) Name any four hot spots of India. [CO-4][L-2] **2×10**

PART-A

- Q.2 a) Justify the statement "Environmental studies is a multidisciplinary subject" Support your answer with some facts. [CO-1][L-4] **10**
b) Define food chain and food web and discuss the structure and functions of an Ecosystem with an example of each. [CO-1][L-1] **10**
- Q.3 a) Illustrate any four alternate energy sources in detail. [CO-1][L-3,2] **10**
b) Classify the floods. Discuss the consequences and measures to prevent it. [CO-1][L-4,3] **10**
- Q.4 a) What do you mean by biodiversity? Explain Genetic, Species and Ecology biodiversity in detail. [CO-2][L-3] **10**
b) Compare In-Situ and Ex-situ conservation of biodiversity in detail. List out the four national parks and four wild life sanctuary. [CO-2][L-4] **10**

PART-B

- Q.5 a) Give a detailed account of water pollution, its causes and control measures in detail. [CO-3][L-3] **10**
b) Enumerate sources and various methods for control of air pollution. [CO-3][L-4] **10**
- Q.6 a) What are greenhouse gases and greenhouse effects? Evaluate the potential and contribution of different gases to global warming phenomenon. [CO-4][L-5] **10**
b) Describe the salient features of Air and Water Pollution Prevention and control acts. [CO-4][L-5] **10**

- Q.7 a) Analyze the duality of chemistry with its peaceful purpose and chemical weapon.
[CO-5][L-4] **10**
- b) Explain the following:
- i) CWC.
 - ii) Biological weapons.
- [CO-5][L-2] **5×2**

End Semester Examination, May 2023
B. Tech. – Sixth/Seventh Semester
ENTREPRENUERSHIP DEVELOPMENT (COM-0306)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Marks are indicated against each question.

- Q.1 Answer the following:
- a) What do you mean by term management? [CO2][L1]
 - b) Importance of manpower planning in any business entity. [CO3][L2]
 - c) Differentiate between 'inside and outside' collateral. [CO1][L4]
 - d) What do you mean by term management? [CO4][L1]
 - e) What do you understand by customer value proposition? [CO5][L1] **4×5**
- Q.2 Why it is necessary to scan the business environment? Explain the procedure to carry-out the scanning process. [CO-2,4] [L-2,3] **20**
- Q.3 What do you understand by Detail project report? What are the various key elements of project report? [CO-1,4,5] [L- 2,3] **20**
- Q.4 Discuss the various qualities of an entrepreneur's. [CO-1,2,3] [L-1,2] **20**
- Q.5 What do you understand by new product development? List the various consideration that taken into account while developing the new product. [CO-1,2] [L-1,2,4] **20**
- Q.6 What is the importance of financial sources to start any new venture? Explain in detail. [CO2,5][L-1,3] **20**

End Semester Examination, May 2023

B. Tech. – First Semester

INTRODUCTION TO OPEN SOURCE SOFTWARE AND OPEN STANDARDS (CS-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 any **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 Answer the following in brief:
- a) How copyleft is significant? [CO5] [L2]
 - b) What is open source software? [CO4] [L1]
 - c) Discuss Brook's law. [CO5] [L1]
 - d) Describe the role of ASF. [CO5] [L1]
 - e) How open source is beneficial to businesses. [CO4] [L2]
 - f) What is Linux's Open-Source License? [CO5] [L1]
 - g) Define 'degree of association'. [CO2] [L2]
 - h) What are the adoption barriers on open standards pathway? [CO3] [L2]
 - i) Describe any two types of kernel. [CO4] [L1]
 - j) Highlight the common challenges in open source projects. [CO4] [L1] **2×10**

PART-A

- Q.2 a) What are open standards? Explain its types. [CO1] [L1] **10**
b) Explain evolution of standards with its life cycle in detail. [CO1] [L2] **10**
- Q.3 a) Differentiate between de-jure and de-facto standard setters. [CO2] [L2] **10**
b) Explain SCOSTA and Web Standards adopted in the world. [CO2] [L2] **10**
- Q.4 a) Describe the various major principles of open standards. [CO3] [L1] **10**
b) Distinguish between transfer account procedure and open document format. [CO3] [L4] **10**

PART-B

- Q.5 a) Describe the strengths and advantages of open source software. [CO4] [L1] **10**
b) Explain any two GNU projects-Linux operating system, graphical user interface KDE/GNOME, apache web server. [CO4] [L2] **10**
- Q.6 a) How open source software is evolved? Also discuss history of UNIX. [CO5] [L1] **10**
b) Illustrate the software development process of OSS. [CO5] [L2] **10**
- Q.7 a) List the various challenges in open source projects. [CO6] [L4] **10**
b) Explain the various open source adoption methods and process in detail. [CO6] [L2] **10**

End Semester Examination, May 2023
B. Tech. – Second Semester
WEB PROGRAMMING THROUGH PHP AND HTML (CS-205)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 any three advantages of PHP. | [CO-1] [L-1] |
| b) State the use of ucwords() along with its syntax. | [CO-1] [L-2] |
| c) Describe the usage of "extends" keyword. | [CO-2] [L-2] |
| d) Explain the GROUP BY clause in SQL. | [CO-3] [L-2] |
| e) Differentiate between session and cookie. | [CO-4] [L-1] |
| f) What is the purpose of \$_PHP_SELF? | [CO-4] [L-2] |
| g) Explain the function of "foreach" construct in PHP. | [CO-5] [L-2] |
| h) Describe the DOM properties. | [CO-5] [L-2] |
| i) Differentiate between GET and POST methods. | [CO-6] [L-2] |
| j) State the use of "\$" symbol in PHP. | [CO- 6] [L-1] 2×10 |

PART-A

- | | | |
|-----|--|------------------------|
| Q.2 | a) Explain the different data types used in PHP. | [CO-1] [L-1] 10 |
| | b) Differentiate between client side and server-side JavaScript. | [CO-1] [L-1] 10 |
| Q.3 | a) Discuss the logical operators and bitwise operators in PHP. | [CO-2][L-1] 10 |
| | b) Write a program in PHP to calculate square of a number. | [CO-2] [L-1] 10 |
| Q.4 | a) Discuss the multidimensional array with its syntax. Also explain how can an array be converted to string. | [CO-3] [L-2] 10 |
| | b) Write a PHP script that inserts a new element at any position in an array. | [CO-3] [L-2] 10 |

PART-B

- | | | |
|-----|--|------------------------|
| Q.5 | a) Write a JavaScript program to calculate factorial of a number. | [CO-4] [L-2] 10 |
| | b) Write a PHP script to create class Shape and its subclasses-triangle, circle, square. Also create the function that calculates and displays the area of the selected shape. | [CO-4] [L-2] 10 |
| Q.6 | a) What are forms? Explain different form fields. | [CO-5] [L-2] 10 |
| | b) Explain how cookies are handled in PHP using suitable example? | [CO-5] [L-2] 10 |
| Q.7 | a) Explain the XML schema with an example. | [CO-6] [L-2] 10 |
| | b) Describe the steps to make database connection to MySQLi in PHP. | [CO-6] [L-2] 10 |

End Semester Examination, May 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) Prove that $A \cup B = B \cup A$. [CO1] [L3]

b) Determine the cardinality of the sets:

$$P = \{n^7 : n \text{ is a positive integer}\}$$

$$Q = \{l, l, m, m, m, n, n\}$$

[CO1][L4]

c) State De Morgan's Law. [CO2][L2]

d) Two dice are tossed once. Find the probability of getting an even number on first dice or a total of 8. [CO6][L3]

e) What are the steps to prove a formula using mathematical induction? [CO6][L1]

f) Find the particular solution of the difference equation:

$$2a_{r+1} - a_r = 12$$

[CO4][L4]

g) What do you understand by a recurrence relation? Give example. [CO4][L2]

h) Define a normal subgroup and give its example. [CO5][L1]

i) State Lagrange's theorem. [CO5][L1]

j) True or False "The spanning tree of a graph is unique". Justify your answer.

[CO2][L3] **2×10**

PART-A

Q.2 a) If $R = \{(1,2), (1,3), (2,3), (2,4), (3,1)\}$ and $S = \{(2,1), (3,1), (3,2), (4,2)\}$ are relations on $A = \{1,2,3,4\}$. Find $R \cup S$, $R \cap S$, SoR , R^{-1} . [CO1][L5] **10**

b) Determine whether the relation $R = \{(a,b) \in R, a-b \leq 1 \text{ on the set +ve Integers}\}$ is:

i) Reflexive

ii) Symmetric

iii) transitive

iv) Antisymmetric

v) a partial order relation.

[CO1] [L6] **10**

Q.3 a) Prove the following is a tautology $a \vee \sim(b \wedge c) \leftrightarrow (a \vee \sim b) \vee \sim c$ [CO3][L3] **10**

b) Construct the truth table for $(h \rightarrow i \wedge j) \rightarrow (h \rightarrow i)$ [CO3][L3] **10**

Q.4 a) Determine the value of n if:

i) ${}^{20}C_{n+2} = {}^{20}C_{2n-1}$

ii) $nC_{n-2} = 10$

[CO6] [L3] **10**

b) Prove by mathematical induction that the sum of the cubes of three consecutive integers is divisible by 9. [CO6] [L6] **10**

PART-B

Q.5 a) Solve the recurrence relation $a_{r+2} - 2a_{r+1} + a_r = 2^r$ by the method of generating functions with the initial conditions $a_0 = 2$ and $a_1 = 1$. [CO2][L5] **10**

b) Solve the difference equation by finding and combining the homogenous and particular solution for the following $ar - 4ar - 1 + 4ar - 2 = 3r + 2r$ [CO2][L5] **10**

Q.6 a) Let $(I, +)$ be a group, where I is the set of all Integers and $(+)$ is an addition operation. Determine whether the following subsets of G are subgroups of G .

a) The set G_1 of all odd integers.

b) The set G_2 of all even integers.

[CO5][L4] **10**

b) Define the following terms with an example:

a) Semigroup.

b) Abelian group.

c) Ring.

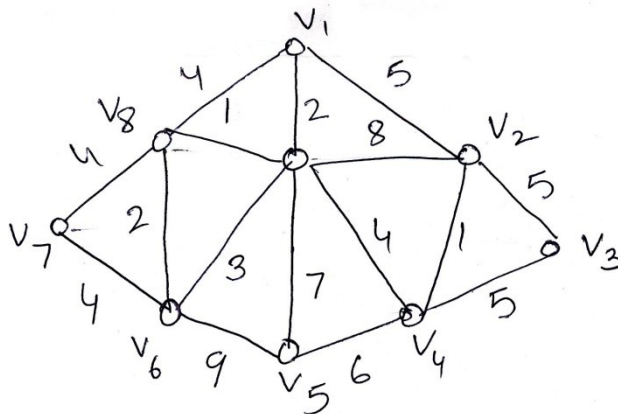
d) Integral domain.

e) Closure Property.

[CO5][L2] **10**

Q.7 a) Draw the minimum spanning tree of the following graph.

[CO4][L5] **10**



b) State and Prove Euler's formula for Planar Graphs.

[CO4][L-3] **10**

End Semester Examination, May 2023
B. Tech. – Third Semester
DATA STRUCTURES AND ALGORITHMS (CS-302)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following in brief:

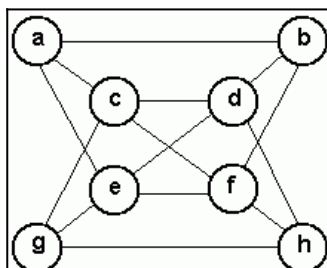
- | | |
|---|------------------------|
| a) What are the objectives of studying data structures? | [CO1] [L3] |
| b) Convert the infix expression $a + b * c - d / e$ into prefix expression. | [CO2] [L4] |
| c) Why are queues called as FIFO? How are they different from stack? | [CO3] [L3] |
| d) What is a node? Explain the various parts of it. | [CO3] [L2] |
| e) State the difference between iterative and recursive algorithms. | [CO3] [L2] |
| f) Analyze and explain selection sort techniques. | [CO3] [L5] |
| g) What are multigraphs? | [CO5] [L1] |
| h) How linked list is better than the array? | [CO5] [L4] |
| i) Define collision in hashing. | [CO6] [L6] |
| j) Why do we need hash table as a data structure? | [CO4] [L4] 2×10 |

PART-A

- Q.2 a) Which data structure is used to implement recursion? Write down an algorithm to implement sum of n element using recursion. [CO3] [L4] **10**
b) Convert the infix expression $A + (B * C - (D / E \wedge F) * G) * H$ into postfix form, showing stack status after every step. [CO3] [L4] **10**
- Q.3 a) Give a scenario, where queue data structure is applicable. Also write the steps to add and delete element in circular queue. [CO3] [L3] **10**
b) Write an algorithm to insert and delete a node in a singly linked list if the node is present at last. [CO3] [L3] **10**
- Q.4 a) Consider the binary search tree T shown in fig given below. Draw the tree T if each of the following operations is applied to the original tree T (operation are applied independently not successively).
i) Node 20 is added to T. iv) Node 25 is deleted from T.
ii) Node 88 is added to T. v) Node 75 is deleted from T.
iii) Node 22 is deleted from T. [CO3] [L6] **10**
b) What is balance factor in AVL tree? Describe them it. [CO3] [L6] **10**

PART-B

Q.5 a) For the following graph find the BFS spanning tree:



[CO5] [L5]

10

b) How the method of prim's algorithm is different from Kruskal's algorithm?

[CO5] [L4] **10**

- Q.6 a) What is merge sort? Write algorithm for merge sort and derive its run time complexity. [CO4] [L3] **10**
b) Write algorithm to perform insertion sort. [CO6] [L2] **10**
- Q.7 a) Given the input {4371, 1323, 6173, 4199, 4344, 9679, 1989} and a hash function of $h(x) = x \pmod{10}$, show the result: [CO2] [L6] **12**
i) Separate chaining hash table.
ii) Open addressing hash table using linear probing.
b) Distinguish between linear and binary search methods. [CO1] [L1] **8**

End Semester Examination, May 2023
B. Tech. - Third Semester
OBJECT ORIENTED PROGRAMMING SYSTEMS
(CS-304/CS-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 the following in brief:

2x10

- a) Explain static binding. How is it useful in OOPs? [CO-2][L-1]
- b) What do you mean by dynamic initialization of objects? Why it is required? [CO-2][L-1]
- c) Explain the role of seekg(), seekp(), tellg() and tellp() functions in the process of random access in a binary file. [CO-4][L-2]
- d) Discuss copy constructor with the help of an example? [CO-2][L-1]
- e) Differentiate between errors and exceptions with examples. [CO-5][L-2]
- f) Differentiate between function overloading and function overriding. [CO-2][L-2]
- g) When do we make a function inline and why? [CO-2][L-1]
- h) Differentiate between compile time and run time polymorphism. [CO-2][L-2]
- i) State generic programming. How is it implemented in C++? [CO-4][L-1]
- j) Demonstrate how a function can be defined friend to two classes? [CO-2][L-1] **2x10**

PART-A

- Q.2 a) Outline the advantages of object-oriented programming over procedure oriented programming. [CO-1][L-4] **10**
- b) Define the following terms:
- i) Data hiding.
 - ii) Encapsulation.
 - iii) Message passing. [CO-1][L-2] **10**
- Q.3 Develop an object oriented system using a class called ORGANIZATION that allows a university to manage data of their staff, faculty and students. Assume appropriate data, functions and constructors. Use new operator in constructors to allocate memory space required. [CO-6][L-6] **20**
- Q.4 a) How can we overload binary operator '-' using friend function? [CO-2][L-2] **10**
- b) List different types of polymorphism in detail. How can a function be overloaded? [CO-2][L-1] **10**

PART-B

- Q.5 How can we avoid duplication of inherited members that comes from multiple paths? Explain the concept of virtual base class with help of a program. [CO-3][L-2] **20**
- Q.6 a) Define a file. Write a program to read contents of a file and write them in another file. Explain all the file functions used for the purpose. [CO-4][L-1] **10**
- b) Write a program in C++ to read the contents of a file and display them on the screen. [CO-4][L-3] **10**
- Q.7 a) Distinguish between the terms class template and template class with the help of examples. [CO-4][L-5] **10**

- b) Create a class with suitable data and member functions to demonstrate the concept of re throwing an exception. [CO-5][L-6] **10**

End Semester Examination, May 2023

B. Tech. – Fourth Semester

ANALYSIS AND DESIGN OF ALGORITHMS (CS-402)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- Define and explain the term: 'time complexity'.
- State the difference between recursive and iterative algorithms.
- Calculate the π values for the following pattern : $P = aababcbababacaabababab$.
- What is minimum spanning tree?
- What is the longest common subsequence problem?
- State Master's theorem and solve $T(n) = 4T(n/2) + O(n)$.
- What do you understand by NP-Hard problem?
- What do you understand by spanning tree?
- Analyze the efficiency of heap sort.
- Differentiate between iterative and recursive algorithms.

2×10

PART-A

Q.2 a) Solve the following recurrence equation using recursion tree method:

$$T(n) = 3T\left(\frac{n}{4}\right) + O(n^2)$$

10

- b) What is an asymptotic notation? Write and explain different types asymptotic notations with graphs.

10

Q.3 a) Write and explain Knuth–Morris–String matching algorithm.

10

- b) What is Rabin Karp string matching? For working modulo $q = 11$, how many superiors hit does Rabin Karp matcher encounter in the text $T = 3141592653589793$ when looping for pattern $P = 26$?

10

Q.4 a) Write a recursive algorithm for Binary search and derive its time and space complexity.

8

- b) Write the merge sort algorithm. Explain it on the following input: $\{3, 1, 5, 9, 7, 8, 4, 2\}$. Also, find its time complexity.

12

PART-B

Q.5 a) What is fractional knapsack problem? Give the algorithm for it and solve the following problem:

$n = 5, m = 35, [p_1, p_2, p_3, p_4] = \{110, 25, 30, 74\}$ for weights $[w_1, w_2, w_3, w_4] = \{15, 7, 4, 8\}$.

10

- b) Pen-down the algorithm for Job-sequencing with deadline. State the solutions i.e. all feasible and optimal solution for the given jobs: $n = 4, [p_1, p_2, p_3, p_4] = \{70, 90, 85, 73\}$, $[d_1, d_2, d_3, d_4] = \{3, 1, 2, 3\}$.

10

Q.6 a) Construct a longest common subsequence (LCS) from:

$X = \langle A, B, C, B, D, A, B \rangle$ and $Y = \langle B, D, C, A, B, A \rangle$ using dynamic programming.

10

- b) Write and explain Dynamic approach to find matrix chain multiplication.

10

Q.7 a) Define 'backtracking'. State the sum of subsets problem. Write an algorithm to find the sum of subsets using backtracking technique. Solve the following and create its

tree: $m = 7, w = \langle 2, 3, 4, 5 \rangle$

10

b) What are NP problems? Explain P-class, NP-Hard and NP-complete problems properly. **10**

End Semester Examination, May 2023
B. Tech. – Fourth Semester
THEORY OF AUTOMATA AND COMPUTATION (CS-404A)

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:

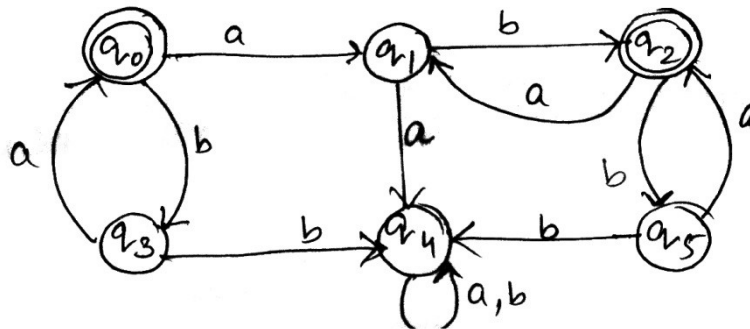
- Differentiate between Mealy and Moore machines.
- Design a finite automaton M over (0, 1) to accept all string ending with 11.
- Define 'push down automata'.
- What is halting problem of a Turing machine?

e) If G is a grammar having production as $S \rightarrow as \mid bs \mid a \mid b$. Find $L(G)$

4×5

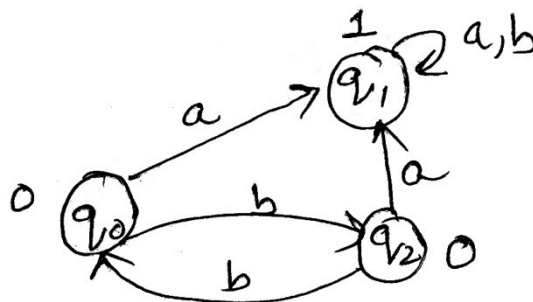
PART-A

Q.2 a) Construct a minimum automata equivalent to the DFA given in below figure.



10

b) Convert the given Moore machine into Melay machine for the given figure:



10

Q.3 a) Construct a grammar G, generating the language $L = \{a^n b^n c^n \mid n \geq 1\}$

5

b) What is type 0, type 1, type 2, and type 3 grammar? Distinguish between them by giving an example.

10

c) Find the language generated by the grammar:

$$G: S \rightarrow 0S1 \mid 0A1, A \rightarrow 1A \mid 1$$

5

Q.4 a) Write regular expression for language L over (0, 1) such that every string in L end with 00.

6

b) Prove that $\{a^p \mid p \text{ is a prime}\}$ is not regular using Pumping Lemma.

7

c) Construct a Transition System corresponding to the R.E $(ab + c^*)^* b$

7

PART-B

- Q.5 a) Reduce the following grammar to Chomsky Normal Form (CNF):
 $S \rightarrow abSb \mid a \mid aAb,$
 $A \rightarrow bS \mid aAAb$ **5**
- b) Convert the Grammar $G: S \rightarrow AB, A \rightarrow BS \mid b, B \rightarrow SA \mid a$ into Greibach Normal form (GNF). **10**
- c) Reduce the following Grammar:
 $S \rightarrow XY, X \rightarrow a, Y \rightarrow z \mid b, Z \rightarrow P, P \rightarrow d$ **5**
- Q.6 a) Find a Push Down Automata for the given Context Free Grammar (CFG):
 $S \rightarrow ab \mid aSb$ **5**
- b) Convert a PDA accepting the language:
 $L(G) = 0^m 1^m 2^n \mid m, n \geq 1$ **7**
- c) Construct a CFG which accepts null store N (A) where:
 $A = (\mid q_0 q_1 \mid, \mid a, b \mid, \mid z_0, z_1 \mid, \delta, q_0, z_0, \phi)$
Where δ is given by:
 $S(q_0, bz_0) = \{(q_0, zz_0)\} \quad \delta(q_0, \Lambda, z_0) = \{(q_0, \Lambda)\}$ **8**
- Q.7 a) Explain Turing machine and undecidability. **5**
- b) Prove that union of two recursive enumerable language is a recursive enumerable. **7**
- c) Construct a Turing machine for the language:
 $0^n 1^n \mid n \geq 1$ **8**

End Semester Examination, May 2023
B. Tech. – Fourth Semester
INTRODUCTION TO VIRTUALIZATION AND CLOUD COMPUTING
(CS-421)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

- Q.1 Answer the following in brief:
- a) What is the primary purpose of Hypervisor?
 - b) Explain few short comings of physical infrastructure.
 - c) Define virtualization along with its need.
 - d) Differentiate between 'emulation' and 'simulation'.
 - e) Differentiate between 'CAPEX and OPEX'.
 - f) What is a private cloud? Give an example.
 - g) Define the term 'cloud bursting'.
 - h) What are the benefits of cloud?
 - i) Define 'utility computing'.
 - j) What are the protocols used in establishing a virtual private network? **2×10**

PART-A

- Q.2 a) How virtualization can be classified based on the technology or area that is being virtualized? [CO-4][L-4] **10**
b) Compare traditional IT infrastructure with virtualized infrastructure. [CO-3][L-3] **10**
- Q.3 a) What do you understand by desktop virtualization? Discuss the various constraints in it. [CO-2][L-2] **10**
b) Illustrate storage virtualization and its types. [CO-4][L-4] **10**
- Q.4 a) How VPN is beneficial in cloud computing. Illustrate the working of VPN. [CO-4][L-4] **14**
b) What do you understand by network based storage virtualization? [CO-2][L-2] **6**

PART-B

- Q.5 a) Analyze the various steps that are required for preparation of virtualization. [CO-6][L-6] **10**
b) Explain different types of cloud workloads. Also, specify on which cloud it should be hosted. [CO-6][L-6] **10**
- Q.6 a) Create the factor matrix of public and private cloud. [CO-2][L-2] **10**
b) Analyze the advantages and disadvantages of public, private and hybrid cloud. [CO-4][L-4] **10**
- Q.7 a) Explain the various triggers of virtualization. [CO-2][L-2] **10**
b) In your opinion, what are the preparations needed for moving to virtualization? [CO-4][L-4] **10**

End Semester Examination, May 2023

B. Tech. – Fifth Semester

SOFTWARE ENGINEERING AND DEVELOPMENT PROCESSES (CS-522)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- a) Explain the need of association in modeling. [CO-5] [L-4]
- b) Define term: SPM. [CO-2] [L-1]
- c) Discuss various use case relationships in detail. [CO-1] [L-3]
- d) What is the need of a SRS document in modeling? [CO-3] [L-4]
- e) Differentiate between 'include' and 'extend' relationships. [CO-6] [L-6]
- f) What are the various advantages of using UML? [CO-4] [L-2]
- g) Explain the importance of decision points in software development process. [CO-4] [L-6]
- h) How UML things work in unified modeling? [CO-3] [L-6]
- i) What is consistency checking? [CO-5] [L-5]
- j) Explain the coding and testing scenario of an iteration process. [CO-2] [L-4] **2×10**

PART-A

- Q.2 a) Explain the working of modified waterfall lifecycle model. [CO-2] [L-2] **10**
b) Explain the conceptual model of UML in detail. [CO-3] [L-1] **10**
- Q.3 a) Draw a use case diagram for functioning of an ATM machine. [CO-5][L-6] **10**
b) Consider the process of ordering an item online. Draw an activity diagram representing each step of the process from ordering an item to deliver the item. [CO-6][L-3] **10**
- Q.4 a) Differentiate between 'class and package' with suitable diagram. [CO-2][L-4] **10**
b) Draw a class diagram of a cellular system. [CO-6][L-5] **10**

PART-B

- Q.5 a) Explain the need for interaction diagram. [CO-5][L-3] **10**
b) Draw the sequence diagram for a student course registration system a where student can make choice to enroll for the new course. Also draw its collaboration diagram. [CO-6] [L-5] **10**
- Q.6 a) Explain 4+1 architecture in detail. [CO-3] [L-5] **10**
b) Differentiate between 'scenario walk-through' and 'documentation review' with suitable example. [CO-2] [L-4] **10**
- Q.7 a) Write a short note on iteration planning process. [CO-5] [L-3] **10**
b) What is the need of design classes, user interface, and inheritance? Explain with suitable example. [CO-4] [L-5] **10**

End Semester Examination, May 2023

B. Tech. – Sixth Semester BUSINESS PROCESSES (CS-610)

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 (**any five**):

- a) What information is there on status of SAP?
- b) How many sessions can be opened at a time on a SAP system?
- c) List standard Menus on SAP screen.
- d) What is a transactional code?
- e) List at least 4 different T codes for common transactions.
- f) What is SAP HCM?

[L1]L2][CO12,3,4] **2×5**

PART A

Q.2 Describe the layout of the SAP easy access screen. [L1]L2][CO2] **10**

Q.3 State the purpose of an organizational element in SAP system. Explain the organizational structure with the help of diagram. [L1]L2][CO1] **10**

Q.4 Explain in detail SAP ERP system and the various solutions it incorporates. Also discuss evolution of SAP ERP. [L2]L3][CO3] **10**

PART B

Q.5 Explain in detail with suitable diagram, the role of SAP ERP HCM recruitment process. [L2]L3][CO4] **10**

Q.6 Differentiate between OLTP and OLAP. [L3]L4][CO6] **10**

Q.7 Explain how SAP supports reporting, analytics and strategic planning? [L4][CO6] **10**

End Semester Examination, May 2023

B. Tech. – Sixth / Seventh Semester

SYSTEM PROGRAMMING AND SYSTEM ADMINISTRATION (CS-703)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- a) Discuss the various types of drivers.
- b) Define Overlays.
- c) What is demand paging?
- d) What is standard O/P?
- e) What are macros?
- f) What are viruses?
- g) How can you compare two files in UNIX?
- h) What do you mean by booting? What are the steps of booting?
- i) What is the significance of PID and PPID?
- j) Define a macro processor.

2×10

PART-A

- Q.2 a) What is system software? Explain why do we need it? Explain machine architecture for system software. **10**
b) What are Macros? How a macro can be called within another Macro? Explain with an example. **10**
- Q.3 a) What are the data structures required for a two-pass assembler? Also, explain the design of a two-pass assembler. **12**
b) Explain different functions of a loader. How can a direct linking loader overcome the limitations of a relocating loaders? **8**
- Q.4 a) Explain UNIX architecture with its features. **8**
b) Write short notes on swapping and demand paging. **7**
c) Name the three modes of Vi and how you can switch from one mode to another. **5**

PART-B

- Q.5 a) What is shell? Discuss the various shell programming constructs with examples. **10**
b) What are wildcards? Explain the use of wild cards with help of examples. **10**
- Q.6 a) What is the role of system administrator? What are the commands used for backup and restoration of files in UNIX? **10**
b) Explain any five filter commands with example. **5**
c) Explain the mechanism of process creation. **5**
- Q.7 a) How a virus can be monitored and controlled in UNIX? **6**
b) Explain in brief the maintenance process of an operating system. **8**
c) Write a short note on 'I/O devices and drivers'. **6**

End Semester Examination, May 2023
B. Tech. – Eighth Semester
IT BUSINESS CONTINUITY AND DISASTER RECOVERY PLANNING
(CS-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) How is an alternate site different from fully mirrored and reciprocal site?
- b) Analyze the process of gathering data for the BIA.
- c) Cost of planning vs cost of failure. Explain.
- d) Explain the term "Risk Assessment".
- e) Differentiate between 'cost of planning versus the cost of failure'.
- f) Determine the elements of Project Success.
- g) Define impact criticality.
- h) Explain event logs in brief.
- i) Explain fully mirrored site.
- j) Explain the role of backup in risk mitigation.

2×10

PART-A

- Q.2 a) Examine various types of disasters? Explain in detail basics of business continuity and disaster recovery planning. **10**
- b) Define and explain each phase of BCM life cycle. **10**

8

- Q.3 a) Describe project, discuss the elements of a project success. **10**
- b) Analyze and explain the fundamentals of designing a project life cycle. **10**

- Q.4 a) Explain risk mitigation process. Develop your risk mitigation strategy and discuss in detail. **10**
- b) How MTBF is calculated? How it effect business continuity? **10**

PART-B

- Q.5 a) What is crisis communication? What are three simple rules for crisis communication? **10**
- b) Define BC/DR teams and describe the role of key personnel. **10**

- Q.6 a) Why communication plans are considered are included in BCM and DRP? **10**
b) How emergency management is carried out? Explain with respect to business continuity plan. **10**
- Q.7 Explain the following terms:
- a) Project closeout. **6**
 - b) Disaster recovery. **6**
 - c) Communication plans. **8**

End Semester Examination, May 2023
B. Tech. – Fifth Semester
BUSINESS INTELLIGENCE (CS-741)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 'data warehouse'. [CO-3][L-1]
- b) List any two benefits of BI. [CO-1][L-1]
- c) How BI can be deployed using cloud computing techniques in an organization? [CO-1][L-4]
- d) Distinguish between 'dashboard' and 'scorecard'. [CO-2][L-4]
- e) What do you mean by SDK? [CO-4][L-2]
- f) Explain different types of data analytics. [CO-5][L-2]
- g) Define 'report'. [CO-3][L-1]
- h) Compare star schema and snowflake schema. [CO-3][L-2]
- i) Define 'OLTP'. [CO-5][L-1]
- j) What do you understand by fact based decision making? [CO-5][L-2] **2×10**

PART-A

- Q.2 a) What is BI? List the applications of BI? Justify the fitting of BI into existing infrastructure. [CO-1][L-1] **12**
b) Explain BI components and its architecture in detail. [CO-1][L-2] **8**
- Q.3 a) Discuss different types of OLAP operations in detail. [CO-5][L-2] **10**
b) Demonstrate various types of schemas of data warehouse with the help of example. [CO-3][L-3] **10**
- Q.4 a) Describe automated tasks and events in detail. [CO-4][L-2] **10**
b) Explain Mobile BI along with its types. [CO-4] [L-2] **10**

PART-B

- Q.5 a) Identify the common project risks. Explain how these risks are assessed. [CO-4][L-1] **10**
b) Explain project planning activities with the help of a diagram. [CO-3][L-2] **10**
- Q.6 a) Describe reports and its types. Explain the steps of creating a report specification. [CO-3][L-2] **12**
b) Define drill-up and drill down capabilities in reports. [CO-6][L-1] **8**
- Q.7 a) Explain single sign-on in detail. [CO-4][L-2] **10**
b) Justify the role of EPM in BI. [CO-6][L-5] **10**

End Semester Examination, May 2023

B. Tech. – Eighth Semester NEURAL NETWORKS (CS-743)

Time: 3 hrs.

Max Marks:

100

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 how artificial neurons are inspired by biological neurons?
- b) State how NN is efficient as compared to conventional programming model?
- c) Define term: learning factors. [CO-1] [L-3]
- d) Differentiate hebbian and delta learning rule. [CO-3] [L-4] **5×4**

PART-A

- Q.2 a) Explain the concept of McCulloch-Pitts neural network. Draw a simple model for AND gate. [CO-6] [L-3] **10**
- b) Explain the need of Learning Rules in Neural Networks. [CO-6] [L-3] **10**
- Q.3 a) Design a perceptron to implement NAND gate using bipolar inputs and target. [CO-3] [L-6] **10**
- b) Elaborate the concept of single layer continuous perception neural network for linearly separable classification. [CO-3] [L-6] **10**
- Q.4 a) Define terms: back propagation, single layer feedback networks. [CO-2] [L-4] **10**
- b) Explain discrete perception algorithm in detail. [CO-6] [L-5] **10**

PART-B

- Q.5 a) Differentiate between 'continuous and discrete' time Hopfield neural network. [CO-2][L-4] **10**
- b) Differentiate various types of trainings with suitable example. [CO-2][L-4] **10**
- Q.6 a) Discuss the basic principle of association encoding and association decoding. **10**
- b) Explain the working of bidirectional associative memory and its architecture. [CO-6] [L-6] **10**
- Q.7 a) Select the measure used in the competitive network to identify the winning neuron. [CO-6][L-5] **10**
- b) What are the guidelines should be followed during recall mode and initialization of weights? [CO-6][L-5] **10**

End Semester Examination, May 2023

B. Tech. - Seventh Semester SECURITY IN CLOUD (CS-765)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 'port scanning'. [CO-5] [L-1]
- b) What is trap door? [CO-5] [L-2]
- c) What is virtualization? [CO-3] [L-1]
- d) Explain 'partitioning'. [CO-3] [L-2]
- e) What is TRIM command? [CO-4] [L-2]

- f) Define risk based authentication. [CO-3] [L-2]
- g) What is hash function? [CO-6] [L-1]
- h) Illustrate the importance of digital certificates. [CO-6] [L-3]
- i) Define 'passphrase'. [CO-5] [L-2]
- j) Give the example of bulk encryption algorithm. [CO-5][L-2] **2×10**

PART-A

- Q.2 a) What are program threats and system threats? Explain in detail. [CO-5][L-2] **10**
b) Explain computer security classifications. [CO-5][L-2] **10**
- Q.3 a) Explain security risks in cloud. What are the various security benefits of cloud computing? [CO-5] [L-2] **10**
b) What are architectural components and vulnerabilities unveiled by a given cloud setup. [CO-1] [L-3] **10**
- Q.4 a) Network traffic should be constantly monitored by the cloud provider like any other internet-connection organization. Analyze the statement and give techniques how cloud can be monitored. [CO-2] [L-4] **10**
b) Summarize the role of AAA (authentication, authorization and auditing) in cloud infrastructure. [CO-3] [L-5] **10**

PART-B

- Q.5 a) Determine the functions of:
i) Cylinders, heads and sectors.
ii) Logical block addressing and physical block addressing. [CO-4] [L-3] **10**
b) What is identity management? Explain various types of identity management in detail. [CO-4] [L-2] **10**
- Q.6 a) Explain RSA algorithm in detail with the help of an example. [CO-6] [L-5] **10**
b) Encrypt "This is the final exam" with play fair cipher using key "guidance". Explain the steps involved. [CO-6] [L-5] **10**
- Q.7 a) Explain the working of SSL (Secure Sockets Layer)? Who uses SSL? Determine various SSL transactions. [CO-2] [L-3] **20**

End Semester Examination, May 2023

B. Tech. – Sixth Semester

ARTIFICIAL INTELLIGENCE (CS-801)

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:

- What are the various methods of statistical reasoning?
- State the characteristics of AI problems.
- How over estimation is handled in A* algorithm?
- What is Commutative production system?
- Given that $P(A)=0.2$, $P(B)=0.4$, $P(B|A)=0.5$. Find $P(A|B)$.
- Explain the utility of certainty factor.
- Differentiate between 'knowledge domain' and 'problem domain'.
- List various properties of knowledge representation.
- Differentiate between 'convention systems' and 'expert systems'.
- Explain the characteristics of abduction reasoning.

2×10

PART-A

- Q.2 a) Discuss the importance of programming language in Artificial Intelligence. Show the programming structure of a Prolog Program using an example. [CO-1] [L-4] **10**
b) Define State Space Representation approach for solving any 8-queens problem. [CO-1] [L-6] **10**
- Q.3 Differentiate between simple and Steepest-Ascent Hill Climbing technique. Apply Hill Climbing technique to solve the following 8-puzzle problem by defining a suitable heuristic function. Write the sequence of steps and the intermediate states.

2	8	3
1	6	4
7		5



1	2	3
8		4
7	6	5

[CO-2] [L-6] **20**

Q.4 Consider the below mentioned cryptarithmic problem:

CROSS
+ ROAD

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-2] [L-6] **20**

PART-B

- Q.5 a) Translate these sentences into formulas in predicate logic:
- i) John likes all kinds of food.
 - ii) Apples are food.
 - iii) Chicken is food.
 - iv) Anything anyone eats and isn't killed by is food.
 - v) Bill eats peanuts and is still alive.
 - vi) Sue eats everything Bill eats. [CO-3] [L-3] **10**
- b) Create a family tree keeping in consideration of a family data and relationship.
- i) Declare male and female of the family.
 - ii) Declare parent relationship in the family.
- Question: Based on these relationships write down rules for the following:
Father(X,Y), Mother(X,Y), Sister(X,Y), Brother(X,Y), Grand_father(X,Y)[CO-3][L6]
10
- Q.6 a) Differentiate between 'Monotonic' and 'Non-Monotonic' reasoning systems. [CO-3] [L-3] **10**
- b) Consider an Incandescent bulb manufacturing unit. Here machines M1, M2 and M3 make 20%, 40% and 40% of the total bulbs. Of their output, let's assume that 2%, 3%, and 4% are defective. A bulb is drawn at random and is found defective. Find the probability that is made by machines M1 or M2 or M3? [CO-3] [L-6] **10**
- Q.7 a) Diagrammatically explain the structure of an expert system. What are the various advantages in keeping the knowledge base separate from the control module in knowledge based systems? [CO-3] [L-3] **10**
- b) Explain the concept of utility-based agent with an example. [CO-4] [L-4] **10**

End Semester Examination, May 2023

B. Tech. – Eighth Semester

SIMULATION AND MODELING (CS-805)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 concept of pseudo random numbers, with reference to a arrival of customers in a shopping mall.
- b) Enlist any four components of a system.
- c) Explain covariance or correlation, its importance and method.
- d) Explain one of the following continuous distributions and application area.
 - i) Uniform distribution.
 - ii) Exponential distribution.
- e) What is the difference between fixed-time steps based and event to event based simulation models? Illustrate with one example for each.
- f) Explain mid-square method for random number generation.
- g) Explain the main features of GPSS.
- h) Explain discrete frequency distributions.
- i) Differentiate between verification and validation.
- j) Write a short note on 'erlang distribution' and its significance. **2×10**

PART-A

- Q.2 a) Apply the queuing theory to a railway ticket booking counter where the customers are waiting in three queues for booking of their tickets. **10**
b) Explain the steps involved in simulation and modelling with the help of an appropriate diagram. **10**
- Q.3 a) Explain at least two methods of generating random numbers in details. **10**
b) Explain the box mullar transformation, its importance and application with the help of an example. **10**
- Q.4 Explain the procedure to generate the samples from:
a) Normal distribution.
b) Exponential distribution.
Explain their application areas. **20**

PART-B

- Q.5 a) Explain three step approaches to validation by Naylor and finger. **10**
b) How it can be decided that a particular distribution is applicable to input data? **10**
- Q.6 a) Explain the difference between terminating and non-terminating simulation with the help of suitable examples. **10**
b) Identify the various terms/ processes used in the simulation of a reservoir system. And simulate the various processes. **10**
- Q.7 Explain various terms/processes used in simulation of a servo system with the help of an example. **20**

End Semester Examination, May 2023
B. Tech. – Eighth Semester
MACHINE LEARNING TECHNIQUES (CS-808)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Define 'probability densities'.
- b) Compare classification and regression.
- c) Explain the term: reward, value function.
- d) How does neural n/w reduce the dimensionality? Explain.
- e) What do you understand by semi-supervised learning?
- f) Write a short note on the 'bellman equation'.
- g) Compare PCA and ICA.
- h) What are random variables? List features of discrete variable?
- i) Discuss three application areas of machine learning.
- j) Draw single layer perception model.

2×10

PART-A

- Q.2 a) Define probability, conditional probability, random variable, expectation with suitable examples. **10**
b) Explain the Bayes theorem in detail. **10**

- Q.3 a) What is regression? Discuss various types of regression model? **10**
b) Explain dimensionality reduction? Discuss the steps of PCA algorithm. **6**

c)

Object	X(Weight)	Y(pH)
A	1	1
B	2	1
C	4	3
D	5	4

Apply k-means clustering to group the objects in 2 clusters.

4

- Q.4 a) Summarize k-means algorithm and group the points (1,1,1), (1,1,0), (0,1,0) and (1,1,1) using K-Mcans. **10**
b) List features of factors analysis. Mention the application of factors analysis in machine learning. **10**

PART-B

- Q.5 a) Discuss Q-Learning concept in detail. **10**
b) Explain the reinforcement learning. Discuss the Linear quadratic regulation (LQR). **10**

- Q.6 a) Explain feed forward neural network with back propagation learning with suitable example. **10**
b) Discuss artificial neural network with suitable example. **10**

- Q.7 a) Define 'inductive learning'. Why is inductive learning an ill-posed problem? Explain. **8**
b) Write short notes on:
i) Generative methods ii) Support vector machine. **6×2**

End Semester Examination, May 2023
B. Tech. – Eighth Semester
NATURAL LANGUAGE PROCESSING (CS-824)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following questions:

- a) Explain the term NLP. [CO1][L-2]
- b) Discuss the part of speech tagging. Explain with the help of an example. [CO1][L-2]
- c) Explain Ambiguous grammars with help of example. [CO2][L-2]
- d) Search the ambiguity in the given example "The man saw the girl with the telescope" discuss in brief. [CO2][L-2]
- e) Define 'computation linguistics'. [CO3][L-1]
- f) Discuss the use of semantic networks. [CO3][L-2]
- g) List any two advantages of graph model. [CO4][L-1]
- h) Explain the term machine translation. [CO4][L-2]
- i) Discuss any one direct machine translation system. [CO5][L-2]
- j) Describe any one commercial use of NLP. [CO6][L-2] **2×10**

PART-A

- Q.2 a) Explain different phases of NLP in detail. [CO1][L-2] **10**
- b) Describe the role of grammar in language processing? Explain the basics of lexicography. [CO1][L-2] **10**
- Q.3 a) Discuss the different types of ambiguity in detail, with help of suitable examples. [CO2][L-2] **10**
- b) Solve the following problem using Bigram method "I read a book about the history of India". [CO2][L-3] **10**
- Q.4 a) Solve the following problem with CKY algorithm "she read a book in library". [CO2][L-4] **10**
- b) Write Top-Down and Bottom-up parse tree structure for the sentence "Ram went to the Vanvas" using the following rules. Assume terminals as per the given sentences.

S -> NP VP

NP -> N

NP -> DET N

VP -> V PP

PP -> PREP NP

[CO3][L-3] **10**

PART-B

- Q.5 a) Discuss the semantics-knowledge representation method in detail, with help of example. Explain the advantages of semantics-knowledge representation. [CO4][L-2] **10**

- b) Compare logic and inference pragmatics approaches and conclude which one of the approach gives better result. [CO4][L-2] **10**
- Q.6 a) Describe the machine translation approaches in detail. [CO5][L-2] **10**
b) Differentiate direct machine translation and Rule-Based machine translation. [CO5][L-2] **10**
- Q.7 a) Explain the Intelligent work processors. Discuss the uses of tutoring System. [CO6][L-2] **10**
b) Write short notes on:
i) Translator.
ii) Authoring systems. [CO6][L-2] **5×2**

End Semester Examination, May 2023
B. Tech. – Seventh Semester
DISTRIBUTED OPERATING SYSTEM (CS-825 / 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) How is distributed operating system better than network operating model?
- b) Compare open and closed group communication.
- c) How Bully algorithm works? Explain.
- d) What is mean by consistency? Compare sequential and causal consistency.
- e) Differentiate between MIMD and SIMD.

4×5

PART-A

Q.2 a) Enumerate the pros and cons of distributed systems? Also discuss the design issues of a hardware and software design. [CO-1][L-2] **10**

b) Differentiate between multiprocessing and multi-computing with examples.

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

Q.3 a) Give the technical difference between logical and physical clocks. [CO-2][L-2] **8**

b) How mutual exclusion algorithms in distributed system are handled? Explain the implementation also. [CO-2][L-5] **12**

Q.4 a) Discuss the threads and their design issues. How the threads are used in distributed systems? [CO-3][L-2] **10**

b) What are the different models which are used to organize different processors in a distributed system? [CO-3][L-1] **10**

PART-B

Q.5 a) Describe file system in distributed system. How can we implement transparency of file sharing in distributed file system? [CO-4][L-5] **10**

b) Summarize how the client cache consistency is being handled in distributed file system? [CO-4][L-4] **10**

Q.6 a) Explain the concept of distributed shared memory and its various models.

[CO-5][L-3] **10**

b) Discuss the following issues in context of page-based distributed shared memory:

i) Granularity.

ii) Achieving sequential consistency.

[CO-5][L-3] **5×2**

Q.7 a) Interpret how process management is achieved in MACH? Also state the various primitives used by the process management. [CO-6][L-3] **15**

b) Explain emulation in Mach.

[CO-6][L-1] **5**

End Semester Examination, May 2023

B. Tech. - Eighth Semester

BIG DATA ANALYTICS (CS-828A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 big data approach with traditional approach. [CO-1] [L-5]
- b) What are different big data sources? [CO-1] [L-1]
- c) Explain the role of job tracker in map reduce programming. [CO-4] [L-2]
- d) List the risks associated with big data analytics. [CO-1] [L-1]
- e) Differentiate between parallel and distributed systems. [CO-1] [L-2]
- f) Define exabytes. [CO-1] [L-1]
- g) Explain namenode and datanode in hadoop cluster. [CO-3] [L-2]
- h) Illustrate the STORE operator in Pig. [CO-5] [L-3]
- i) List the features of HIVE language. [CO-5] [L-1]
- j) What is machine learning? [CO-6] [L-1] **2x10**

PART-A

- Q.2 a) Discuss the risks associated with big data with the help of suitable examples in support of your answer. [CO-1] [L-2] **10**
b) Explain with suitable diagram big data analytics cycle. [CO-1] [L-2] **10**
- Q.3 a) What is regression? Illustrate the technique of linear regression along with the different performance measures that are used for evaluating the model. [CO-2] [L-4] **10**
b) Demonstrate the K-means algorithm using the suitable example. [CO-2] [L-3] **10**
- Q.4 a) Demonstrate workflow engine in hadoop. [CO-3] [L-3] **5**
b) Formulate the steps to setup hadoop cluster. [CO-3] [L-6] **7**
c) Explain the architecture of HDFS? Compare and contrast HDFS and RDBMS. [CO-3] [L-5] **8**

PART-B

- Q.5 a) Discuss the shuffling and sorting phase in Map Reduce programming. [CO-4] [L-2] **10**
b) Formulate different steps for loading the data into HDFS. [CO-4] [L-6] **10**
- Q.6 a) What is the need of query language? Discuss the features with suitable examples for any one query language. [CO-5] [L-2] **10**
b) Illustrate big data technologies for reporting and analysis. [CO-5] [L-4] **10**
- Q.7 a) Compare and contrast supervised and unsupervised machine learning techniques. [CO-6] [L-5] **10**
b) Summarize the features of spark and azure tools for machine learning. [CO-6] [L-5] **10**

End Semester Examination, May 2023

B. Tech. - Seventh Semester BIG DATA ANALYTICS (CS-828B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following questions:

- a) What are the major technological challenges in managing the data? [CO-1][L-1]
- b) Compare Hadoop with traditional file system. [CO-2][L-2]
- c) Define daemon and mention the various Hadoop daemons with their roles in a Hadoop cluster? [CO-2][L-2]
- d) Differentiate between 'eager loading and lazy loading' in JAQL. [CO-2][L-2]
- e) Differentiate between 'pigLatin and hiveQL'. [CO-4][L-2]
- f) Explain storage mechanism in HBase. [CO-4][L-2]
- g) Discuss the need for parallel processing for big data. [CO-1][L-2]
- h) Define 'features of apache flume'. [CO-4][L-1]
- i) What is zookeeper? List the benefits and limitations of it. [CO-2][L-1]
- j) Differentiate between structured, unstructured and semi-structured data using proper examples. [CO-1][L-1] **2×10**

PART-A

- Q.2 a) Discuss on big data technologies and tools. [CO-1][L-2] **10**
b) Explain the big data adoption architecture. Mention the benefits and barriers faced in adopting big data? [CO-1][L-2] **10**
- Q.3 a) What is map reduce? Summarize the working of various phases of map reduce with word count example. [CO-2][L-2] **7**
b) Illustrate Hadoop architecture with its features. [CO-2][L-4] **5**
c) Define 'oozie'. Illustrate with suitable example workflow using oozie. [CO-2][L-1] **3**
d) Demonstrate the commands used to perform data transfer between local file system and HDFS. [CO-4][L-3] **5**
- Q.4 a) Explain join, sort, expand operators in JAQL using suitable examples. [CO-2][L-2] **5**
b) Explain working of Hive with proper steps and diagram. [CO-2][L-4] **5**
c) Compare row oriented and column oriented database structures. [CO-4][L-5] **5**
d) Compare pig and hive. [CO-4][L-5] **5**

PART-B

- Q.5 a) Illustrate different approaches to big data reporting and analysis. [CO-4][L-3] **10**
b) Is R an interpretive or compiled language? List the limitations of open source R in HDFS and how big overcomes the same? [CO-4][L-1] **10**
- Q.6 a) The IBM infosphere stream processing language (SPL) is a declarative language for continuous data streams. Summarize five SPL primitive operators. [CO-6][L-5] **10**
b) Illustrate five domains where streams are suitable for building solutions. [CO-6][L-4] **10**
- Q.7 a) What is toolkit in any stream processing language? How to use it? Outline how the toolkits are versioned? [CO-6][L-4] **10**
b) Illustrate aggregate operator, pair operator, barrier operator and delay operator. [CO-6][L-4] **10**

End Semester Examination, May 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 Answer the following in brief:

- a) Give various applications of digital signal. [CO-1] [L-1]
- b) State demorgan's theorem. [CO-1,2] [L-1]
- c) Draw the truth table of T flip flop. [CO-2] [L-3]
- d) Draw XOR gate by using only four NAND gates. [CO-2] [L-2]
- e) Differentiate between encoder and decoder. [CO-2] [L-2]
- f) Design half adder circuit using PLA. [CO-2] [L-6]
- g) Differentiate between Latch and flip-flop. [CO-3] [L-2]
- h) What is FANIN and FAN OUT? [CO-5] [L-1]
- i) Convert the following into min terms: [CO-2] [L-4]
 - i) $A'B+CD$
 - ii) $ABC+C'D+AB'C$
- j) How many states are present in decade counter? [CO-3] [L-3] **2×10**

PART-A

- Q.2 a) Minimize the following function using K-map & QM method:
 $F(A,B,C,D) = \pi M(0,1,3,7,8,9,11) + d(2,5,7,14)$ [CO-2] [L-4] **10**
- b) Design full subtractor using
 - i) ROM
 - ii) PAL
 - iii) PLA[CO-2] [L-6] **10**
- Q.3 a) Design the following using 8:1 Multiplexer:
 $F(A,B,C,D) = \sum m(0,1,5,7,8,12,13,14)$ [CO-2] [L-6] **6**
- b) Design BCD-7 segment decoder using gates. Also mention its applications? [CO-2] [L-6] **14**
- Q.4 a) Discuss in detail various error detection methods. [CO-2] [L-6] **10**
- b) Subtract the following decimal numbers using 1's & 2's complement:
 - i) 22 from 29
 - ii) 42 from 20[CO-2] [L-3] **10**

PART-B

- Q.5 a) Design the following Asynchronous counter:
 - i) MOD-8
 - ii) MOD-3[CO-3] [L-6] **6**
- b) Draw and explain the working of Ring counter with its timing diagram. [CO3] [L2] **14**
- Q.6 a) Mention different specifications of D/A converter. [CO-4] [L-2] **10**
- b) Design 4-bit weighted resistor type digital to analog converter. [CO-4] [L-6] **10**
- Q.7 a) Draw and explain the working of JK flip flop in detail. [CO-4] [L-6] **10**
- b) Do the following conversions:
 - i) SR to T
 - ii) D to JK[CO-5] [L-6] **10**

End Semester Examination, May 2023
B. Tech. – Fourth Semester
MICROPROCESSORS AND INTERFACING (EC-401B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

Q.1 Answer the following in brief:

- a) What is the use of bidirectional buffer in 8085? [CO-1][L-2]
- b) Define the function of parity flag in 8085. [CO-1][L-1]
- c) Write instruction which rotate accumulator left with carry. [CO-2][L-1]
- d) What is the value of SP after execution of PUSH D instruction? (SP=3000, DE=8050). [CO-5][L-1]
- e) What are the predefined interrupts in 8086? [CO-2][L-1]
- f) How single stepping can be done in 8086? [CO-2][L-3]
- g) What is the difference between fixed priority and rotating priority modes of 8259? [CO-5][L-2]
- h) Distinguish between the 'memories mapped I/O and peripheral I/O'. [CO-3][L-2]
- i) Write the control word for 8255 IC for BSR mode to reset bits PC2 and PC4. [CO-4][L-2]
- j) How 8253/8254 can be operated as a square waveform generator? [CO5][L3] **2×10**

PART-A

- Q.2
- a) Explain the requirement of a program counter, stack pointer and status flags in the architecture of 8085 microprocessor. [CO-1] [L-2] **10**
 - b) Explain the following instructions of 8085 microprocessor with suitable example and addressing mode:
 - i) LDAX
 - ii) SHLD
 - iii) ANI
 - iv) DAA[CO-1][L-2] **10**
- Q.3
- a) Describe the functional units present and their functions in BIU and EU of 8086. [CO-2][L-2] **10**
 - b) What is the concept of memory banking? Explain utility of BHE signal in conjunction with A0. [CO-2][L-2] **10**
- Q.4
- a) If BX =0158H, DI =10A5H, DISPLACEMENT =1B57H DS = 2100H and DS is used as the segment register. Compute the physical address using direct, register, register indirect, register relative, based indexed and relative based indexed addressing modes. [CO-5, 6][L-3] **10**
 - b) Explain the functions of the following instructions:
 - i) SHL AX, CL
 - ii) ROL AL, 1
 - iii) CLD
 - iv) MOVSW
 - v) LOOPE[CO-5, 6][L-2] **10**

PART-B

- Q.5 a) Draw memory system and show memory map for the microprocessor system such that it should contain 2 kbyte of EPROM and 2 kbyte of RAM with starting addresses 0000H and 6000H. [CO-3, 6][L-6] **10**
b) Compare memory mapped I/O and I/O mapped I/O. [CO-3][L-5] **10**
- Q.6 a) Write a program to initialize 8255 in the configuration given below: Port A as simple input, Port B as simple output, Port CL as output and Port CU as input. Assume address of the control word register of 8255 as 83H. [CO4, 6][L6] **10**
b) Explain the following terms:
i) Programmed I/O.
ii) Interrupt driven I/O.
iii) Burst mode.
iv) Cycle stealing mode. [CO-4][L-2] **10**
- Q.7 a) Draw and explain the functional block diagram of interrupt controller IC 8259. [CO-5][L-2] **10**
b) How the control word registers and various counters are selected in 8253 IC? State the various modes of operation in 8253 and explain any two modes using timing diagram. [CO-5][L-3] **10**

End Semester Examination, May 2023
B. Tech. – Fifth Semester
MICROCONTROLLER AND INTERFACING (EC-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**. Each question carries equal marks.

Q.1 Answer the following in brief:

- How many external hardware interrupts are available in 8051 microcontroller? How are they activated?
- When an interrupt is activated, what is the first step taken by 8051 microcontroller?
- To which register does the SMOD bit belong? State its role in the rate of data transfer.
- What is the role of SBUF register in serial data transmission and reception?
- What is the difference in the timer lengths in modes 0, 1 and 2?
- What is the difference between the operation of a timer and a counter?
- Find the contents of register A after the execution of the following code:
CLR A
ORL A, #99H
CPL A
- Write a program to save the contents of accumulator in R7 register of bank 2.
- How external crystal oscillator can be connected to 8051 microcontroller?
- Which bits of PSW register are used for the CY and AC flag bits, respectively? **2×10**

PART-A

- Q.2
- Explain the following 8051 instructions with examples:
ACALL, POP, JBC, INC, SJMP. **10**
 - Write a program to copy value F0H into RAM locations 50H to 6FH. **5**
 - Briefly explain assembler directives of 8051 microcontroller. **5**
- Q.3
- Explain the function of following 8051 pins:
TXD, T1, (INT1)⁻, (PSEN)⁻, (RD)⁻ **10**
 - Write an 8051 program to toggle all the bits of P0 and P2 continuously with a 250 ms delay. **6**
 - Explain the organization of 128 bytes of on chip RAM in 8051 microcontroller. **4**
- Q.4
- Explain TCON register in detail. **6**
 - Refer to Figure 1, Write an assembly program to generate a pulse with ON time (Ton) = 4 ms and OFF time (Toff) = 10 ms using 8051 timers.

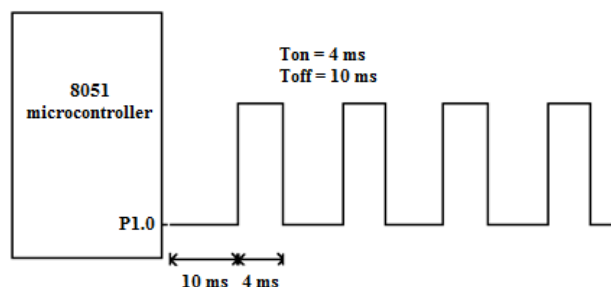


Figure 1: Waveform generation with different ON and OFF time values

- c) What is the function of TMOD register? **4**

PART-B

- Q.5 a) What is an interrupt? Explain different sources of interrupt in 8051 microcontroller. **10**
b) Write a program to generate a square wave of frequency 20 KHz using 8051 timer interrupts. **10**
- Q.6 a) Explain SCON register in detail. What value should be loaded in SCON to initialize serial communication in mode 1 with data reception enabled? **10**
b) Write a program to control the LEDs connected to port 2 of 8051 microcontroller that is clocked with 11.0592 MHz crystal oscillator as per the information given below:
If 'A' is received serially then LEDs should be switched to ON state.
If 'B' is received serially then LEDs should be switched to OFF state. **10**
- Q.7 a) Explain interfacing of LM35 temperature sensor with 8051 microcontroller using ADC0808 IC. **10**
b) Describe the interfacing of 8255 IC with 8051 microcontroller. **10**

End Semester Examination, May 2023

B. Tech. – Fifth Semester

COMMUNICATION SYSTEMS-I (EC-522)

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 'noise'. Where is it most likely to affect the signal? [CO-4][L-1]
 - b) Give some applications of communication systems. [CO-1][L-1]
 - c) An AM signal with a carrier of 1 KW power has 200 watt in each sideband.
Find the percentage modulation. [CO-2][L-3]
 - d) A 400 watts carrier is modulated to a depth of 75 percent. Find the total power in AM wave. Assume that the modulating signal is sinusoidal. [CO-2][L-3]
 - e) A FM signal is given by:
 $v(t) = 10 \cos(2\pi \times 108 t + 20 \cos(2\pi \times 103 t))$. Find its bandwidth. [CO-2][L-3]
 - f) Given an angle-modulated signal:
 $10 \cos[(108\pi t + 5 \sin 2\pi(103)t)]$. Determine the maximum frequency deviation. [CO-2][L-3]
 - g) An amplifier is operating at 170 C with a bandwidth of 15 kHz. Find thermal noise power in watts and rms noise voltage for a 60 ohm internal resistance and a 60Ω load resistance. [CO-3][L-3]
 - h) Define 'transit time noise'. Where do you experience this type of noise? [CO-3][L-1]
 - i) What is intermediate frequency and what is its significance? [CO-3][L-2]
 - j) Differentiate between low level and high level modulation. [CO-4][L-2] **2×10**

PART-A

- Q.2
- a) What is modulation? Why is it needed? [CO-1][L-2] **10**
 - b) Define 'communication'. List the advantages of digital communication system over analog communication system. [CO-1][L-2] **10**
- Q.3
- a) A carrier wave with amplitude 12 V and frequency 10 MHz is amplitude modulated to 50% level with a modulated frequency of 1 KHz. Write down the equation for the above wave and sketch the modulated signal in frequency domain. [CO-2][L-4] **7**
 - b) Draw and explain square-law modulator along with related equations. [CO-2][L-3] **7**
 - c) The antenna current of an AM broadcast transmitter modulated to a depth of 40% by an audio sine wave is 11 A. It increases to 12 A as a result of sinusoidal modulation by another audio sine wave. Calculate the modulation index due to second wave. [CO-2][L-3] **6**
- Q.4
- a) A carrier is frequency modulated with a sinusoidal signal of 2 kHz resulting in a maximum frequency deviation of 5 kHz. Find the bandwidth of modulated signal. The amplitude of modulating sinusoid is increased by a factor of 3 and its

P. T. O.

frequency is lowered to 1 kHz. Evaluate the maximum frequency deviation and bandwidth of the new modulated signal. [CO-2][L-5] **7**

- b) Discuss with suitable block diagram Armstrong method for FM generation. Why it is also called indirect method? [CO-2][L-2] **8**
- c) Derive the relation between phase modulation and frequency modulation. Explain how a FM wave can be generated using phase modulator. [CO-2][L-6] **5**

PART-B

- Q.5 a) Draw the block diagram of a super-heterodyne receiver and briefly explain each block. [CO-3][L-2] **8**
- b) What is intermediate frequency? What is the criterion for selecting intermediate frequency? [CO-3][L-2] **6**
- c) What is AGC? How AGC is obtained in a practical diode detector? Illustrate with a neat diagram. [CO-3][L-4] **6**
- Q.6 a) Differentiate between 'external' and 'internal' noise. Elaborate in detail different types of internal noise. [CO-4][L-2] **10**
- b) Define the following and obtain the relation between them:
i) Noise figure. ii) Noise temperature. [CO-4][L-2] **5**
- c) Two port devices are connected in cascade. For the first stage, the noise figure and available power gain are 5 dB and 12 dB respectively. For the second stage the noise figure and available power gain are 15 dB and 10 dB respectively. Determine overall noise figure. Also, find equivalent noise temperature. [CO-4][L-3] **5**
- Q.7 a) Derive an expression for signal to noise for coherent reception of DSB-SC. [CO-5][L-6] **10**
- b) What is the necessity of de-emphasis in FM receivers? [CO-5][L-2] **10**

End Semester Examination, May 2023
B. Tech. – Sixth Semester
MICROWAVE DEVICES AND CIRCUITS (EC-621)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- a) CFA stands for_____.
- b) Name the technique for measurement of high microwave power.
- c) Define pulse repetition frequency with reference to a radar.
- d) A cylindrical waveguide has a radius of 4 cm. find the cut off wavelength for the guide operation in T Mol mode.
- e) Define quality factor of a cavity resonator.
- f) What are passive microwave devices? Give two examples.
- g) What are the dominant modes in a rectangular waveguide?
- h) Mention two properties of a scattering matrix.
- i) Define 'velocity modulation'.
- j) Give two points of difference between TED's and microwave transistors. **2×10**

PART-A

- Q.2 a) What are the advantages and disadvantages of microwaves? **10**
b) Explain in detail the various applications of microwave. **10**
- Q.3 a) Show that a waveguide acts as a high pass filter. **10**
b) A rectangular waveguide has dimensions 2.5 x 5 cm. Determine:
i) Guide wavelength, ii) Phase velocity, iii) Phase constant,
iv) Characteristic wave impedance at a wavelength of 4.5 cm for the dominant mode. **2½×4**
- Q.4 a) Derive the scattering matrix of magic tee. **10**
b) Explain in detail the working of a circulator with its applications. **6**
c) Calculate the resonate frequency of a rectangular resonator of dimensions a = 3cm, b = 2 cm and d = 4 cm when the mode of operation is TE₁₀₁. **4**

PART-B

- Q.5 a) Explain the construction and working of a reflex klystron. **10**
b) Explain the following terms with reference to a magnetron:
i) Strapping ii) Frequency pushing iii) Frequency pulling iv) Phase focusing effect. **2½×4**
- Q.6 a) Write short notes on **(any two)**:
i) GUNN diode
ii) TRAPATT diode
iii) Tunnel diode. **10×2**
- Q.7 a) Explain any one technique for measurement of impedance. **5**
b) Double Minimum method is used to determine the VSWR value on a waveguide. If the separation between two adjacent nulls is 3.5 cm and that between twice minimum power points is 2.5 mm determine the value of VSWR. **5**
c) Derive the simple form of radar range equation. **10**

End Semester Examination, May 2023
B. Tech.—Sixth Semester
VLSI TECHNOLOGY AND CIRCUITS (EC-623)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 Moore's law and its significance with reference to IC industry.
- b) Explain Fick's law governing diffusion process.
- c) Implement the following output expression using CMOS: $Y = AB + BC$
- d) What is Electronic Grade Silicon (EGS)?
- e) What is Lithography? List its various types.
- f) Explain Etching and why is it used in IC fabrication process?
- g) Differentiate between depletion and enhancement MOSFETs.
- h) What is body effect?
- i) Draw stick diagram of a CMOS inverter circuit.
- j) Briefly explain 1T1R1C1 DRAM cell.

2×10

PART-A

- Q.2
- a) Discuss various advantages of FETs over BJT. **7**
 - b) Discuss small signal equivalent circuit of a MOSFET transistor. **5**
 - c) Explain VLSI design flow. **8**
- Q.3
- a) Explain with a suitable diagram the process of Ion implantation. What are the advantages and challenges that are associated with Ion implantation process in comparison to diffusion process? **7**
 - b) What is crystal? How crystal is grown? **3**
 - c) Why annealing process is required after Ion implantation? **10**
- Q.4
- a) Explain the epitaxial growth process in IC fabrication. How is it done? Why is it needed? **10**
 - b) Explain in detail negative and positive photoresists with examples. **10**

PART-B

- Q.5
- a) Discuss MOS device design equations. **10**
 - b) What do you understand by the term: transistor scaling? Differentiate between constant voltage and constant field scaling. **10**
- Q.6
- a) Explain MOSFET based 6T SRAM cell in detail. How is read operation performed in a 6 T SRAM cell? **10**
 - b) Implement full adder circuit using CMOS. **10**
- Q.7 Write notes on the following:
- a) Metallization applications and choices for IC fabrication.
 - b) Etching Mechanisms. **10×2**

End Semester Examination, May 2023
B. Tech. – Seventh Semester
DATA COMMUNICATION AND NETWORKING (EC-725)

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) List the types of stations in SDLC. [CO-2] [L-1]
 - b) The transport layer creates a communication between the source and destination. What are the three events involved in a connection? [CO-3] [L-1]
 - c) For n devices in a network, what is the number of cable links required for a mesh and ring topology? [CO-1] [L-1]
 - d) Discuss the concept of redundancy in error detection. [CO-4] [L-2]
 - e) What is the meaning of 10BASE2? [CO-3] [L-1]
 - f) State in which layer of the TCP/IP reference model the following protocols are present.
 - i) TCP.
 - ii) DNS. [CO-3] [L-2]
 - g) List any two functions which a bridge cannot perform. [CO-2] [L-1]
 - h) Identify the five components of a data communications system. [CO-1] [L-2]
 - i) Cite the advantage of mesh topology. [CO-1] [L-2]
 - j) Design the control format for supervisory frame in HDLC. [CO-3] [L-6] **2×10**

PART-A

- Q.2
- a) Discuss various types of network topologies in computer network. Also outline various advantages and disadvantages of each topology. [CO-1] [L-2] **8**
 - b) What is TCP/IP model? Discuss its function, protocols of each layer? How this model is different from OSI? [CO-3] [L-2] **12**
- Q.3
- a) Design a selective reject ARQ mechanism for flow control. How the inefficiency of Stop and Wait protocol is overcome in sliding window protocol? [CO-4] [L-6] **12**
 - b) What do you understand by Error Control? Determine the error for the given data 10 10001 using Hamming method. [CO-4] [L-3] **5**
 - c) How bit stuffing is used in HDLC? [CO-3] [L-3] **3**
- Q.4
- a) Elaborate in detail the structure of SONET. How it is different from SDH? [CO-3] [L-4] **8**
 - b) Design the Frame format for MAC. List various functions of MAC layer. [CO-2] [L-6] **5**
 - c) Classify different standards for project 802. [CO-2] [L-4] **7**

PART-B

- Q.5
- a) Define line coding? Apply unipolar NRZ, bipolar RZ, NRZ-I, Manchester, Bipolar AMI encoding for the information sequence 1110100. [CO-5] [L-3] **10**
 - b) Design the structure of AT and T FDM hierarchy. [CO-5] [L-6] **6**
 - c) How many voice band channels are required for the formation of group in FDM hierarchy? Design the structure for the formation of group in FDM hierarchy? [CO-5] [L-6] **4**

- Q.6 a) How ICMP and IGMP differ from each other? In which OSI layer do these protocols work? [CO-3] [L-3] **6**
- b) Find the class of each address:
- i) 2.22.148.90
 - ii) 130.15.18.20
 - iii) 200.15.18.44
 - iv) 244.67.45.38 [CO-3] [L-5] **4**
- c) Compare and contrast the differences between IPV4 and IPV6. [CO-3] [L-2] **10**
- Q.7 a) Discuss the http protocol. How to classify various types of documents in web? [CO-3] [L-2] **8**
- b) What is Firewall? Mention its various types. [CO-3] [L-2] **7**
- c) List various protocols used in file transfer. [CO-2] [L-1] **5**

End Semester Examination, May 2023

B. Tech. – First / Second Semester

PROFESSIONAL COMMUNICATION – I / PROFESSIONAL COMMUNICATION –II (HM-104/HM-204)

Time: 2 hrs.

Max Marks: **50**

No. of pages: 2

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

PART-A

Q.1 Multiple choice questions:

- a) Correct body language comes under the following stage of presentations:
 - i) Planning ii) Preparation iii) Delivery iv) None of the above
- b) The non-verbal communication displayed by bodily distance is called:
 - i) Haptics ii) Chronemics iii) Vocalics iv) Proxemics
- c) Which of the following statements are true with respect to "Communication"?
 - i) It forms the foundation for planning
 - ii) Controlling is not possible without written and oral communication
 - iii) Both (i) and (ii) above
 - iv) None of the above
- d) For emails to have a desired effect on the reader, they should always include:
 - i) Polite and simple language ii) Polite, even if you are complaining
 - iii) Short and to the point iv) All of the above
- e) "S" in SMART goals refers to:
 - i) Short ii) Specific iii) Simple iv) Special
- f) While making a slide the number of words should be limited to a maximum of ____ per slide.
 - i) Seven ii) Nine iii) Eight iv) ten
- g) Oral communication ensures ____ and ____.
 - i) fluency; speed
 - ii) adequate attention; immediate response
 - iii) speedy interaction; immediate response
 - iv) speed; attention
- h) At each stage in the process of communication, there is a possibility of interference which may hinder the process. Such interference is known as ____.
 - i) sender ii) receiver iii) barrier iv) none of the above
- i) As a means of communication, e-mails have features of the immediacy of both ____ and ____.
 - i) reading, receiving ii) writing, sending
 - iii) calling, receiving iv) receiving, sending
- j) The primary goal of communication is to ____.
 - i) to create barriers ii) to create noises
 - iii) to effect a change iv) none of these
- k) While writing a professional email, one should always ensure to mention someone's name in BCC?
 - i) TRUE ii) FALSE
- l) The most common goal of professional communication is ____
 - i) favorable relationship between sender and receiver
 - ii) organizational goodwill
 - iii) receiver response

- iv) receiver understanding
 - m) Upward communication flows from _____ to _____.
 - i) Upper to Lower
 - ii) Lower to Upper
 - iii) Diagonal
 - iv) Horizontal
 - n) The study of communication through touch is called_____
 - i) Haptics
 - ii) Proxemics
 - iii) Semantics
 - iv) Chronemics
 - o) CC in an email refers to someone who has to action on the email. TRUE or FALSE
Indent
 - i) True
 - ii) False
 - p) The fastest form of communication is verbal communication
 - i) True
 - ii) False
 - iii) Depends on Situation
 - q) Simplicity in writing essentially means_____
 - i) Use of simple sentences
 - ii) Use of simple words
 - iii) Use of simple tense
 - iv) plainness
 - r) While listening to a song, we do the "Empathetic" type of listening.
 - i) True
 - ii) False
 - s) The tone of our voice conveys our mood, interest, anger etc. to the audience.
 - i) True
 - ii) False
 - t) Only 7% of what we communicate is through body language
 - i) True
 - ii) False
- 2x10**

PART-B

- | | | |
|-----|---|---|
| Q.2 | What is verbal communication? | 6 |
| Q.3 | What are the objectives of communication? | 6 |
| Q.4 | A formal letter or e-mail should always start with a correct salutation. Explain. | 6 |
| Q.5 | What is the role of feedback in business communication? | 6 |
| Q.6 | What is facial expression? Give examples for facial expressions. | 6 |
| Q.7 | What is a cc in an formal Email? Explain its usage. | 6 |
| Q.8 | What is the purpose of E-mail in business communication? | 6 |
| Q.9 | Explain the process of communication? | 6 |

End Semester Examination, May 2023

B. Tech. — Fifth Semester

FRENCH-I (HM-506)

Time: 1½ hrs.

Max Marks: **50**

No. of pages: 3

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 suivantes.

(CO4) (L6)

(Read the passage and answer to the questions)

Bonjour! Je m'appelle Sonia. J'ai vingt ans. J'habite à Lyon. Je suis française. Je parle français. Je suis étudiante. Je suis petite. Mes cheveux sont noirs et mes yeux sont bleus. J'aime la danse. Je déteste le poulet. J'ai un frère qui s'appelle Rohan. Il a dix-huit ans. Il est beau.

A. Complétez avec un mot du texte. (Complete with a word from the text)

2

- i.) Caroline _____ le musique jazz.
ii.) Aneesh _____ dix- sept ans.

B. Dites vrai ou faux: (True or False)

4

- i.) Sonia est grande. _____
ii.) Le frère s'appelle Rohan. _____
iii.) Sonia a une sœur. _____
iv.) Sonia parle français. _____

Section-B

Expression Écrite

Q.2 Présentez – vous (Describe yourself)

ou

Décrivez votre ami | amie (Describe your friend)

(CO5) (L5, 6) **5**

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

Section-C
Grammaire

Q.3 Complétez avec les pronoms sujets.
(Complete with the subject pronouns)

(CO2) (L2,3) **5**

- a) Sara et Paul, _____ sont français.
- b) Sophie, _____ est indienne
- c) _____ sommes anglais.
- d) Louis, _____ est français.
- e) _____ êtes intelligent ?

Q.4 Quelle heure est-il ?
(What time is it?)

(CO2) (L1) **5**

- a) 5 : 45 _____
- b) 7 : 30 _____
- c) 8 : 25 _____
- d) 2 :10 _____
- e) 4 :05 _____

Q.5 Traduisez en français:
(Translate into french)

(CO2) (L4) **4**

- a) It's raining. _____.
- b) It's pleasant. _____.
- c) It is cold. _____.
- d) It's hot. _____.

Q.6 Complétez avec l'article défini – le,la,l',les.
(Complete with the definite articles)

(CO3) (L4) **2½**

- a) _____ stylo
- b) _____ école
- c) _____ mère
- d) _____ ballons
- e) _____ crayons

Q.7 Complétez avec l'article indéfini – un, une, des.
(Complete with the indefinite articles)

(CO3) (L4) **2½**

- a) _____ gomme
- b) _____ père
- c) _____ femme

- d) _____ sacs
- e) _____ trousse

Q.8 Complétez avec les verbes:
(Complete with the verbs)

(CO4) (L2) **5**

- a) Elles _____ belle. (Être)
- b) Ils _____ deux stylos. (Avoir)
- c) Je _____ au Canada. (Aller)
- d) Tu _____ bien. (Danser)
- e) Nous _____ le devoir. (Faire)

Q.9 Complétez avec les nombres ordinaux.
5

(CO2) (L 2,3)

(Complete with the ordinal number)

- a) Dimanche est le _____ jour de la semaine.
- b) Mai est le _____ mois de l'année.
- c) Mercredi est le _____ jour de la semaine.
- d) Août est le _____ mois de l'année.
- e) Décembre est le _____ mois de l'année.

Q.10 Complétez avec les nombres cardinaux:
(Complete with cardinal numbers.)

(CO2) (L 2,3) **5**

- a) 25 _____
- b) 30 _____
- c) 45 _____
- d) 60 _____
- e) 9 _____

Q.11 Remplissez les blancs.
(Fill in the blanks)

(CO6)(L1) **5**

- a) _____ est un fromage français.
- b) _____ est la monnaie unique européenne.
- c) _____ est la capitale de la France.
- d) _____ et _____ sont les monuments français.

End Semester Examination, May 2023

B. Tech. – Fifth Semester

GERMAN-I (HM-507)

Time: 1½ hrs.

Max Marks: **50**

No. of pages: 3

Note: All questions are **compulsory**. Marks are indicated against each question.

Q.1 **Schreiben Sie die Begrüßungen auf Deutsch.**
(Write the greetings in German.)

[CO3-5] [L1, 4] **5**

- | | | |
|-----------------|---|-------|
| a) Good night | - | _____ |
| b) Thank you | - | _____ |
| c) Hello | - | _____ |
| d) Good evening | - | _____ |
| e) Welcome | - | _____ |
| f) I am sorry | - | _____ |
| g) Really? | - | _____ |
| h) Good morning | - | _____ |
| i) I am fine | - | _____ |
| j) Bye | - | _____ |

Q.2 **Konjugieren Sie die Verben.**
(Conjugate the verbs.)

[CO3] [L3, 4] **10**

- | | |
|----------------------------------|------------|
| a) Ihr _____ Japanisch. | (sprechen) |
| b) Wie _____ Sie? | (heißen) |
| c) _____ du ins Theater? | (gehen) |
| d) Wir _____ den neuen Film. | (sehen) |
| e) Mein Bruder _____ ein Buch? | (lesen) |
| f) Ich _____ Maria. | (sein) |
| g) Wo _____ Sie, Frau Schiller? | (arbeiten) |
| h) Tom _____ in Delhi. | (wohnen) |
| i) Du _____ mit meiner Katze. | (spielen) |
| j) Ihr _____ am Montag um 7 Uhr. | (fliegen) |

Q.3 **Schreiben Sie die Nummer auf Deutsch!**
(Count and write the number names in German!)

[CO3] [L3, 4] **5**

(5)

- | | | |
|-------------------------|---|-------|
| a) dreizehn plus sieben | = | _____ |
| b) hundert minus zehn | = | _____ |

- c) einundneunzig plus neun = _____
 d) fünfzig minus vierzig = _____
 e) zwanzig minus null = _____

Q.4 **Schreiben Sie richtig.**
(Form the correct sentences.)

[CO3] [L3, 4] **5**

- a) kommen - **Woher** - Sie
 _____?
 b) **Ich** - trinke - Kaffee -
 _____.
 c) esst - **Ihr** - Pizza -
 _____.
 d) lernen - **Wir** - gern -
 _____.
 e) heißt - **Er** - Peter -
 _____.

Q.5 **Schreiben Sie 5 Sätze über dich.**
(Write 5 sentences about yourself.)

[CO5] [L3, 5] **5**

Q.6 **Ergänzen Sie!**
(Fill in the blanks!)

[CO3-5] [L1, 4] **5**

- a) Heute ist Samstag. Übermorgen ist _____. (Donnerstag, Montag, Freitag)
 b) John ist _____, Juliana ist Pilotin. (Lehrer, Pilot, Arzt)
 c) Eine Woche hat _____ Tage. (7, 8, 12)
 d) Mai ist _____. (im Sommer, im Winter, im Herbst, im Frühling)
 e) Erich ist Architekt. Eva ist _____. (Assistentin, Studentin, Architektin)

Q.7 **Schreiben Sie die Bedeutung von den folgenden Wörtern.**
(Write the meaning of the following words.)

[CO3-5] [L1, 4] **5**

The Apple, The Bed, The Table, The Lamp, The Sun ,The Garden, The Bag, The Coffee, The Sofa, The Park.

Deutsch	Englisch
der Apfel	
das Bett	

die Tasche	
der Garten	
das Fahrrad	
der Kaffee	
der Park	
die Lampe	
das Sofa	
die Sonne	

Q.8

Ergänzen Sie die Tabelle!
(Write the verb conjugations in the table!)

[CO3] [L3, 4] **10**

	spielen	kommen	wohnen
ich		komme	
er/sie/es	spielt		
wir			wohnen
ihr		kommt	
du	spielst		

End Semester Examination, May 2023

B. Tech. — 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 Escribe diez líneas sobre ti mismo y tu familia usando nombre/ adjetivo/ nacionalidad/ profesión/ edad etcétera. (Write 10 sentences about yourself and your family using name/ adjective/ nationality / profession/ age/ etc.)

(CO2)(L6) **10**[illegible]

Q.2 Lee el texto y elije verdad o falso
Read and choose true or false

(C06) (L2) **7**

iHola! Mi nombre es Ana. Tengo veinticinco años. Vivo en Miami, Florida con mi esposo y dos hijos. Tengo un hijo en kínder y una hija en primer grado. Mis hijos estudian en una escuela pública. Mi esposo es cantante y yo soy actriz.

- a) Ana vive en Miami T/F
- b) Ana tiene veinticuatro años T/F

- c) Sus hijos estudian en una escuela grande T/F
- d) Su esposo es doctor T/F
- e) Ana es actriz
- f) Ana vive con su madre T/F
- g) Ana tiene un hijo y una hija T/F

Q.3 Traduce las siguientes palabras del español a inglés.
Translate the following words from Spanish to English.

(CO2) (L3) **8**

- a) Madre _____
- b) Primo _____
- c) Abuelo _____
- d) Tío _____
- e) Padre _____
- f) Hermana _____
- g) Abuela _____
- h) Hijo _____

Q.4 Escribe en español.
Write numbers in Spanish.

(CO3)(L1) **5**

- a) 16-
- b) 27 -
- c) 38 -
- d) 15 -
- e) 98 -

Q.5 Completa las frases siguientes con la forma correcta del verbo ser.
Complete the following sentences with the correct form of the verb ser.

(CO2)(L3) **10**

- a) María y Ana _____ de Colombia.
- b) Él _____ profesor.
- c) Nosotras _____ amigas.
- d) Yo _____ un alumno serio.
- e) Tú y yo _____ de Arkansas.
- f) ¿Quién _____ la chica rubia?
- g) Tú _____ muy guapo.
- h) Ustedes _____ muy simpáticas.
- i) Usted _____ muy inteligente.
- j) Yo _____ de California.

Q.6 Convierte las siguientes frases en plural.

(CO4)(L3) **5**
 483
 2/3

Convert the following sentences into plural form.

- a) La chica _____
- b) La vaca _____
- c) El mono _____
- d) La goma _____
- e) El gato _____

**Q.7 Completa con el artículo indeterminado.
Complete with indefinite article.**

(CO4)(L4) **5**

- a) _____ lápices
- b) _____ esqueleto [skeleton]
- c) _____ mesa
- d) _____ sillas
- e) _____ exámenes
- f) _____ televisor
- g) _____ reloj
- h) _____ mapas
- i) _____ libros
- j) _____ teléfono

End Semester Examination, May 2023

B. Tech. — Sixth Semester

FRENCH-II (HM-606)

Time: 1½ hrs.

Max Marks: **50**

No. of pages: 6

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.**
(Read the passage and answer to the questions)

(CO2) (L3)

Cher Nicolas,

Je suis à Delhi avec ma famille pour les vacances. J'espère que tout va bien à Paris. C'est L'été en Inde et il fait très chaud ici. Demain, mes grands-parents viennent de Jaipur et nous partons à Nainital. C'est un très bel endroit. Je suis très excité. J'ai déjà 2 fois visitée le Nanital et j'adore aller là. Là bas, il ne fait pas chaud comme Delhi. Plutôt il fait très beau. Le Nanital est très célèbre pour ses sept beaux lacs. Il y a beaucoup d'autres endroits touristiques. Ces jours-la, il pleut aussi et c'est formidable. Nous nous amusons bien. Où est-ce-que tu vas en vacances? Chez vos grand-parents ou à la campagne? Dites-moi! Je te montre les photos après je rentre à l'école.

Réponds –moi vite!

Amicalement

Ayushman

Vocabulary

- | | |
|--------------------|-----------------------|
| 1. Endroit- place | 3. Là bas- over there |
| 2. Célèbre- famous | 4. Comme- like |

A. Dites Vrai ou Faux (Tell True or False)

3

- | | |
|--|-------|
| i.) Nicolas est un gar con indien. | _____ |
| ii.) Ayushman et Nicolas sont des frères. | _____ |
| iii.) Nicolas écrit cette lettre à Ayushman. | _____ |
| iv.) Il fait très chaud à Nanital. | _____ |
| v.) Les grand-parents d'Ayushman viennent de Jaipur. | _____ |
| vi.) En été, Il fait froid en Inde. | _____ |

B. Complétez avec un/des mots du texte.

2

- | | |
|---|--|
| i.) Tue es mor _____ ami. (grand/cher) | |
| ii.) Cet endroit est _____. (très célèbre / très excité) | |
| iii.) Il y a beaucoup de belles fleurs ;c'est _____. (mauvais/formidable) | |

iv.) Nous _____ demain . (habitons/partons)

C. Décrivez la ville de Nanital en 2-3 phrases.

1

Section-B
Expression Écrite

Q.2 Décrivez votre journée typique en 10-12 phrases.
(Describe your daily routine).

(CO3)(L5) 5

Q.3 Complétez les dialogues avec les mots donnés.
(Complete the dialogues with the given words)

(CO6)(L6) 5

Voulons	réserve	autre choses	un steak frites	une table
monsieur	voulez	crème brûlée	entrée	du vin blanc

Au Restaurant

Garçon: Bonjour a) _____!

Manuel: Bonjour!

Garçon: Est-ce que vous avez une b) _____?

Manuel: Non. Je veux c) _____ pour deux.

Garçon: Voilà monsieur! Qu'est-ce que vous d) _____ manger?

Manuel: Comme e) _____, je voudrais de la salade verte.

Sophie: Et pour moi, i) _____, s'il vous plaît!

Garçon: Et comme plat principal, monsieur?

Manuel: Comme plat principal, nous g) _____ du poisson aux pommes de terre.
 Aussi nous voulons h) _____, s'il vous plaît!
 Garçon: Et comme dessert?
 Sophie: Pour nous, de lai) _____.
 Garçon: Voilà monsieur! Voulez-vous j) _____?
 Manuel: Merci.

Section-C **Grammaire**

Q.4 Complétez avec les adjectifs possessifs. (Mon,ma,mes,ton,ta,tes etc.) (CO5) (L5) 3
(Complete with possessive adjectives)

- a) Nous rangeons _____ vêtements dans l'armoire.
- b) Vous parlez souvent à _____ enfants?
- c) Marie va au cinéma avec _____ sœur et _____ frère.
- d) Les enfants aiment _____ parents.
- e) J'aime _____ amie.

Q.5 Complétez avec l'article partitif (du, de la, de l', des) (CO5) (L4) 3
(Complete the sentences using partitif articles)

- a) Je prépare _____ viande.
- b) Elle prend _____ biscuits avec _____ lait chaud.
- c) À la soirée, l'homme boit _____ bière.
- d) Elle mange _____ pizza.
- e) Nous buvons _____ eau minérale.

Q.6 Mettez les phrases au féminin. (CO1) (L1) 4
(Turn the sentences in feminine)

- a) Le beau garçon est gentil.
 _____.
- b) Le grand-père est gros et vieux.
 _____.
- c) Il est bon mais triste.
 _____.

d) Le mécanicien est intelligent.

_____.

Q.7 Mettez les phrases au pluriel.
(Turn the sentences in plural)

(CO1) (L1) **4**

a) C'est un acteur italien.

_____.

b) Tu es français ?

_____.

c) Je chante la chanson.

_____.

d) L'homme a un cheval.

_____.

Q.8 Complétez avec les prépositions données.
(Complete with the given prepositions)

(CO4) (L2) **3**

a) Le cinéma_____ l'hôtel. (on the right of)

b) Je fais le devoir _____ matin. (since)

c) Nous partons _____ eux. (without)

d) Il y a une piscine _____ la maison. (behind)

e) J'habite _____ de l'école. (far from)

f) Le chat est _____ la table. (under)

Q.9 Conjuguez les verbs donnés.
(Conjugate the given verbs)

(CO3) (L6, 1) **5**

a) Nous _____ dans la salle de bains. (se laver)

b) Tu _____ son mère. (appeler)

c) Elles _____ leurs devoirs. (finir)

d) Le garçon _____ les journaux. (jeter)

e) Je _____ à la maison.(rester)

f) Vous _____ demain.(voyager)

- g) Ils _____ en vacances.(s'amuser)
- h) Nous _____ des œufs. (manger)
- i) La femme _____ anglais (parler)
- j) Ria et Reena _____ à l'école (travailler)

Q.10 **Qui est-ce?** (CO1) (L2) **2**
(Who is this? /who are these?)

- a) Elle enseigne les mathématiques aux étudiants.
 _____.
- b) Il joue au cinéma et au théâtre.
 _____.

Q.11 **Remplissez les blancs avec la forme correcte des couleurs.** (CO6) (L5) **3**
(Fill in the blanks with the correct form of colors)

- a) Le citron est _____. (yellow)
- b) La fleur est _____. (violet)
- c) Les chemises sont _____. (orange)
- d) La souris est _____. (grey)
- e) Les feuilles sont _____. (green)
- f) La maison est _____. (white)

Section-D **Culture and Civilisation**

Q.12 **Dites vrai ou Faux.** (CO5) (L2) **2**
(Say True or False)

- a) La suisse est un pays voisin de la France. _____
- b) Le Franc est la monnaie unique européenne. _____
- c) Lyon est une ville française. _____
- d) Givenchy est une voiture française. _____

Q.13 **Répondez aux questions suivantes.** (CO5) (L6) **2**
(Answer the given questions.)

- a) Quelles sont les couleurs du drapeau français ?
 _____.

b) Quel est l'emblème national de la France ?

_____.

Q.14 **Remplissez les blancs.**
(Fill in the blanks)

(CO5) (L2) **3**

a) _____ est la grande fête du printemps.

b) _____ et _____ sont les vins français.

c) _____. Cette fête s'appelle aussi le carnaval.

d) _____ et _____ sont les voitures françaises.

End Semester Examination, May 2023

B. Tech. — Sixth Semester GERMAN-II (HM-607)

Time: 1½ hrs.

Max Marks: **50**

No. of pages: 5

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

Q.1 **Lesen Sie den Text und antworten Sie!**
(Read the text and answer the following questions)

(CO2) (L3,4,2) **6**

Lebensmittel einkaufen

Oscar geht einkaufen in einen großen Supermarkt. Seine Einkaufs liste ist lang, er kauft für das ganze Wochenende ein. Außerdem kommen Gäste, für die er kochen wird. Beim Obst regal kauft er verschiedene Früchte: Äpfel, Bananen, Erdbeeren und Kirschen wird er für den Nachtsch verwenden, es gibt Obstsalat. Die Trauben verwendet er für die Vorspeise. Er möchte gerne kleine Spieße mit Käse und Trauben anbieten.

Mit dem Gemüse kocht er eine Suppe. Dafür braucht er ein Kilo Karotten, einige große Kartoffeln, ein halbes Kilo Zwiebeln und verschiedene Pilze. Er findet Champignons und getrocknete Steinpilze. Diese eignen sich sehr gut für eine Suppe. Außerdem nimmt er grünen Salat und Tomaten mit für die zweite Vorspeise.

Im ersten Kühlregal gibt es eine große Auswahl an Fleisch und Fisch. Oscar entscheidet sich für ein Huhn. Er kauft zusätzlich noch eine Packung Reis als Beilage zum Fleisch. Damit hat er bereits alles, was er für das Essen braucht. Er nimmt aber einiges mit, das ihm zu Hause fehlt: einen großen Laib Brot, ein halbes Kilo Salz, ein Kilo Mehl und zwei Kilo Zucker findet er neben dem Kühlregal. Dort nimmt er auch eine Flasche Milch mit. Was ihm jetzt noch fehlt: Käse und zehn Eier. Die findet er auch im Kühlregal um die Ecke.

- a) Wo geht Oscar einkaufen?
 - i.) Auf dem Markt.
 - ii.) Im Supermarkt.
 - iii.) In der Bäckerei.
 - iv.) In der Metzgerei.
- b) Was braucht er für die Suppe?
 - i.) Pilze und Petersilie
 - ii.) Kürbis und Sellerie
 - iii.) Sellerie und Karotten
 - iv.) Kartoffeln und Pilze
- c) Welche Früchte kauft Oscar?
 - i.) Trauben
 - ii.) Himbeeren
 - iii.) Birnen
 - iv.) Orangen
- d) Was findet Oscar neben dem Kühlregal?
 - i) Brot, Früchte und Gemüse
 - ii) Eier, Milch, Butter und Käse
 - iii) Brot, Salz, Mehl, Zucker
 - iv) Reis, Nudeln, Huhn und Fisch

- e) Was braucht er für die Vorspeise?
 - i.) Tomaten und Zwiebeln
 - ii.) Trauben und Käse
 - iii.) Bananen und Trauben
 - iv.) Salat und Tomaten
- f) Schreiben Sie die Gegenteil ' kurz'.
 - i) billig
 - ii) lang
 - iii) groß
 - iv) schlecht

Q.2 Verbinden Sie die Sätze.
[Form the sentences using modal verbs in conjugated form.]

(CO1) (L2) **5**

- a) ich/gut/kochen/können/
 _____.
- b) Keinen/Tee/möchten/er/trinken.
 _____.
- c) Du/sollen/Wasser/trinken.
 _____.
- d) Wollen/nach/Deutschland/Tina/fahren.
 _____.
- e) Tee/haben/Sie/möchten/oder/Kaffee?
 _____.

Q.3 Schreiben Sie den bestimmten Artikeln im Akkusativ.
[Write the definite articles in accusative.]

(CO1) (L1) **4**

- a) Anna braucht _____ Farbstift. (der/den/die)
- b) Vera sucht _____ rote Tisch. (die/den/der)
- c) Die Kinder spielen in _____ Garten. (der/die/den)
- d) _____ Buch finde ich sehr interessant. (das/die/der)
- e) Ich trinke nicht _____ Tee. (der/die/das)
- f) Wir möchten _____ Hamburger essen. (den/der/die)
- g) Kannst du mir _____ Heft geben? (die/das/der)
- h) Gehen Sie im _____ Supermarkt? (den/die/das)

Q.4 Ergänzen Sie die konjugierte Verben.
[Fill in the blanks with conjugated verbs.]
 (spielen, haben, machen, kaufen, sagen)

(CO1) (L2) **5**

- a) Wir _____ Fußball im Park
- b) Er _____ jede Woche Bonbons
- c) Am Montag _____ ich Erdkunde
- d) Was _____ ihr heute Abend?

e) Was _____ du?

Q.5 **Schreiben Sie die Wörter auf Deutsch und auf Englisch.**
[Translate the words in the respective language.]

(CO2-4) (L1,5,6) **5**

it's windy, spring, winter, autumn, grau, Wolken, Birne, gelb, Erdbeeren

- a) Pear _____
- b) Es ist Windig _____
- c) Cloudy _____
- d) Strawberry _____
- e) Frühling _____

Q.6 **Ergänzen Sie.**
[Fill in the blanks with]

(CO3-4) (L1,2,3) **8**

- a) Suchst du _____ Tasche?
 - i.) ihre
 - ii.) deine
- b) Wir besuchen _____ Eltern heute Abend.
 - i.) euer
 - ii.) unsere
- c) Das ist _____ Uhr.
 - i.) dein
 - ii.) meine
- d) _____ Montag habe ich eine Prüfung.
 - i.) am
 - ii.) um
- e) _____ 9 Uhr gehen wir zur Apotheke.
 - i.) um
 - ii.) im
- f) Maria _____ im Supermarkt.
 - i.) hatte
 - ii.) war
- g) Gestern _____ Ich keine Zeit.
 - i.) hatte
 - ii.) war
- h) Das Konzert _____ toll?
 - i.) hatte

- ii.) war
- i) Bilden Sie die Frage:
 - i.) Ich lerne Deutsch und Englisch.
 - ii.) Ich bin Lehrerin von Beruf
 - iii.) Er kocht eine Pizza.
 - iv.) Wir möchten eine Tasse Tee.
- j) Translate :
 - i) Er steht um 8 Uhr auf.
 - ii) kannst du eine CD und ein Heft mitbringen?
 - iii) Ich komme aus Indien und woher kommen Sie?
 - iv) Meine Mutter kauft zwei Kilos Orangen und Pflaume ein.

Q.7 Setzen Sie die Trennbare Verben in den richtigen Form ein!
[Fill the separable verbs in the correct form.]

(CO5) (L3) **4**

- | | |
|---------------------------------------|--------------|
| a) _____ du eine Flasche _____? | [mitbringen] |
| b) Wir _____ neues Haus _____. | [einkaufen] |
| c) Ana _____ ihre Freundin _____. | [anrufen] |
| d) Das Konzert _____ um 23 Uhr _____. | [anfangen] |

Q.8 Ergänzen Sie.
(Fill in the blank with the appropriate information about Germany):

(CO2) (L6) **5**

- a) Which is the smallest City of Germany?- change
 - i.) Arnis
 - ii.) Berlin
- b) Favorite food of people in Germany?
 - i.) Wurst
 - ii.) Hähnchen
- c) What do we call Christmas in German?
 - i.) Weihnachten
 - ii.) Silvester
- d) Famous Castle of Germany?
 - i.) Neuschwanstein Castle
 - ii.) Hohenzollern Castle
- e) Famous Library of Germany?
 - i.) Stadtbibliothek
 - ii.) Bavarian state library

Q.9 **Beschreiben Sie ihr Haus oder ihr Zimmer.**

(C05) (L3, 5) **8**

End Semester Examination, May 2023

B. Tech. — Sixth Semester

SPANISH-II (HM-608)

Time: 1½ hrs.

Max Marks: **50**

No. of pages: 6

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

Q.1 **lee el texto y responde las preguntas.**

(CO5) (L2) **8**

Read the text and answer to the questions.

¡Hola! Me llamo Antonia. Yo soy mexicana y tengo 35 años. Soy alta, delgada, y morena. Mi cabello (neck) es largo y negro. Mis ojos son pequeños, café y bonitos. Soy amable, generosa y inteligente.

Yo vivo en California con mi familia. Tengo 4 hermanos y una hermana. Mis padres son Elena y Juan. Ellos trabajan en el supermercado. Mi hermana es dentista y trabaja en el hospital. Yo soy médica y trabajo en la ambulancia. Mi hermana es enfermera y revisa a los enfermos. Mi hermano es policía y trabaja en la estación de policía.

Mi ciudad es muy pequeña pero bonita. El cine está entre (between) el gimnasio y el restaurante italiano. La escuela está enfrente (infront) de mi casa. Mi lugar favorito es el parque.

a) ¿Cuántos años tengo?

_____.

b) Descríbeme físicamente

_____.

c) ¿Dónde vivo?

_____.

d) ¿Cuántos hermanos tengo?

_____.

e) ¿Cuál es la ocupación de mis hermanos?

_____.

f) ¿Dónde trabaja mi hermana?

_____.

g) ¿Dónde está la escuela?

_____.

h) ¿Cuál es mi lugar favorito?

_____.

Q.2 **Escribe seis líneas sobre tu rutina diaria con el tiempo.**

(CO7)(L3) **6**

Write six lines about your daily routine with time.

e.g. Me despierto a las siete por la mañana.

Q.3 **Observa cada uno de los dibujos y describe cómo son en español. Habla del pelo, el color de ojos y la piel (skin)**

(CO1) (L1) **6**

Observe each picture and describe any two people in Spanish. Talk about their hair, eye and skin color, etc.



1.



2.



3.

Q.4 **Mira el dibujo y describe usando estar+gerundio.**
Look at the picture and describe using present continuous tense.

(CO5) (L5) 4



e.g. El chico está mirando la televisión.

- a) _____.
- b) _____.
- c) _____.
- d) _____.

Q.5 **Lee la siguiente descripción y contesta tus gustos.**
Read the following statements and write what you like to do in the following situations.

(CO5)(L6) 4

a) Me gusta ver la televisión y salir con los amigos en fin de semana.

b) En mi universidad me gustan las cafeterías y bibliotecas.

c) En mis vacaciones me gusta ir a la casa de mis abuelos y comer mucho.

_____.

d) En mi cumpleaños, me gusta comprar ropas nuevas.

_____.

Q.6 Completa las siguientes oraciones de acuerdo con gustar.
Complete the following sentences with the verb gustar.

(CO5)(L2) **6**

a) Ella _____ chocolates.

b) Yo _____ la comida italiana o indiana.

c) Nosotros _____ jugar al fútbol.

d) ¿Él _____ las flores?

e) Yo _____ cocinar la comida

f) Ustedes _____ los colores.

Q.7 Convierte las siguientes frases en plural.
Convert the following phrases into plural.

(CO5)(L1) **4**

e.g. Esta puerta es roja en color.

Estas puertas son rojas en color.

a) Este lápiz es blanco.

_____.

b) El pez es pequeño.

_____.

c) La clase es grande.

_____.

d) Esta novela es interesante.

_____.

Q.8 Elige la opción correcta.
Choose the correct option.

(CO2)(L2) **8**

a) Ellos _____ de India. (Nacionalidad)

i.) son

ii.) están

iii.) sois

b) Nosotros _____ cansados. (Emoción)

i) son

ii) estamos

iii) sois

c) Yo _____ estudiante. (Profesión)

i) estoy

- ii) soy
- iii) es

- d) Mi clase _____ grande. (Descripción)
 - i) estoy
 - ii) soy
 - iii) es
- e) Vosotros _____ nerviosos. (Emoción)
 - i) estáis
 - ii) sois
 - iii) están
- f) Usted _____ en la casa. (Locación)
 - i) es
 - ii) está
 - iii) estás
- g) Él _____ inteligente. (Descripción)
 - i) está
 - ii) es
 - iii) eres
- h) Yo _____ en la escuela. (Locación)
 - i) estoy
 - ii) está
 - iii) es.
- i) Él (estudiar) _____ en mi clase.
 - i) estudia
 - ii) estudias
 - iii) estudie
- j) Vosotros (escribir) _____ el poema.
 - i) escribéis
 - ii) escribís
 - iii) escribáis
- k) Nosotras (beber) _____ el zumo.
 - i) bebemos
 - ii) bebimos
 - iii) bebe
- l) Ella (leer) _____ el libro
 - i) lee
 - ii) le
 - iii) lea
- m) Tú (trabajar) _____ en la universidad.
 - i) trabajáis
 - ii) trabajas
 - iii) trabaje
- n) Yo (vivo) _____ en Delhi.
 - i) vivo

- ii) Vive
- iii) vives
- o) Ustedes _____ pizza.
 - i) comen
 - ii) trabajan
 - iii) hablan
- p) Vosotros _____ inglés.
 - i) aprende
 - ii) aprenden
 - iii) aprendéis

Q.9 **Escribe el tiempo en español.**
Write time in Spanish.

(CO3)(L1) **4**

- a) 1:50am-
- b) 2:30pm-
- c) 12:40am-
- d) 1:15pm-

End Semester Examination, May 2023
B. Tech. – Eighth Semester
HUMAN RESOURCE MANAGEMENT (HM-822)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer (**any four**) from the following:

- a) Recall the essential competencies of HR managers. [CO-1] [L-1]
- b) List the objectives of HRP. [CO-2] [L-1]
- c) List the benefits of induction. [CO-5] [L-1]
- d) Discuss the importance of career planning and management. [CO-5] [L-5]
- e) How incentive plans can be used for better organizational outcomes? [CO-5] [L-3]
- f) Assess the need of outplacement. [CO-5] [L-4] **5×4**

PART-A

- Q.2 Define 'HRM'. Analyze the strategic importance of human resource management. [CO-5] [L-1, 4] **20**
- Q.3 Illustrate various forecasting techniques of human resource with suitable examples. [CO-2] [L-4] **20**
- Q.4 Recall the process of recruitment. [CO-3,4] [L-1] **20**

PART-B

- Q.5 How would you design and administer a training programme? [CO-6] [L-6] **20**
- Q.6 State 'compensation'. How would you design and determine a compensation structure? [CO-5,6] [L-1,6] **20**
- Q.7
 - a) Assess the role of HR in virtual organization. [CO-1] [L-4] **10**
 - b) Discuss the role of HR in mergers and acquisitions. [CO-1] [L-2] **10**

End Semester Examination, May 2023
B. Tech. – Fourth Semester
DATA COMMUNICATION AND COMPUTER NETWORKS (IT-401A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following questions:

- a) What is the purpose of presentation layer in OSI model?
- b) State the difference between half and full duplex communication.
- c) Define 'mesh topology'.
- d) What is the purpose of hamming code in computer networks?
- e) State the major difference between UDP and TCP.
- f) Define 'polling'.
- g) What is the significance of DNS in networking?
- h) State the difference between classful and classless addressing.
- i) Define 'cryptography'.
- j) What is multicast routing.

2×10

PART-A

- Q.2 a) Define a Network. Explain types of Networks with their applications. [CO- 1] [L-2] **10**
b) List four major differences between analog and digital signals. Explain amplitude and phase of a signal. What is the freq. of a signal in kilohertz, if period of the signal is 400ms? [CO-2] [L-2] **10**
- Q.3 a) Explain Nyquist theorem. How many signal levels are required, if we need to send 265 kbps over a noiseless channel with a bandwidth of 40 khz? [CO-2] [L-2] **10**
b) State and explain Transmission Impairments in detail. [CO-2] [L-1] **10**
- Q.4 Write short notes on **(any two)** of the following:
a) Topology and its types.
b) Transmission media.
c) Secret and public key cryptography.
d) Data compression.

10×2

PART-B

- Q.5 a) Explain protocol stack used in TCP/IP model in various layers. [CO-4] [L-3] **10**
b) Explain diagrammatically aloha and slotted aloha. Also show how they differ in throughput? [CO-5] [L-3] **10**
- Q.6 a) Define routing and list two differences between static and dynamic routing [CO-6] [L-2] **4**
b) Explain asynchronous transfer mode in detail. [CO-6] [L-2] **16**
- Q.7 Write short notes on **(any two)** of the following:
a) Performance management.
b) Quality and class of service.
c) VLAN.
d) Distributed queue dual bus.

10×2

End Semester Examination, May 2023

B. Tech. – Fourth Semester

JAVA PROGRAMMING (IT-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 any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- Difference between Java and C++.
- Explain throw, throws and finally keyword in java.
- What is meaning of Byte code in Java?
- Can a java program be executed without Main method? Give a brief explanation of your answer.
- What is the importance of setting environment variables such as path and class path?
- What will happen if the following line is present in a program?
Interface X extends interface Y { }
- Does java support multiple inheritance? If yes, then how?
- Explain run method of threads.
- How to run a JAR file through command prompt?
- Explain Graphics2D class.

2×10

PART-A

- Q.2
- What is the difference between method overloading and method overriding? Explain with the help of an example. **10**
 - Create a program in java which performs the following operations Add, Sub, Mul, Div and take the class variables accordingly. **10**
- Q.3
- What is an Applet? Explain the life cycle of an applet with a suitable program. **10**
 - Write a program to implement Arithmetic Exception and File Not Found Exception. **10**
- Q.4
- Write a program to make a login form in java using AWT. **10**
 - Create a list of vegetables. If you click on one of the items of the list, the item should be displayed in a text box. **10**

PART-B

- Q.5
- What is remote method invocation? Write steps to set up remote method invocation. **10**
 - Write short notes on following:
 - CORBA.
 - SOAP.

5×2

b) Write a program to concatenate two files.

10

Q.7 a) Explain the architecture of JDBC? List the four drivers associated with it.

10

b) Write a program to access the contents of a table using JDBC.

10

End Semester Examination, May 2023
B. Tech. - Seventh semester
NETWORK PROGRAMMING AND ADMINISTRATION (IT-701)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q1 is compulsory**. 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 UDP and TCP protocol. [CO-3][L-2]
 - b) Differentiate between broadcasting and multicasting. [CO-3][L-2]
 - c) Define 'NAT'. [CO-4][L-1]
 - d) List the limitations of classful addressing in IPv4. [CO-3][L-1]
 - e) Illustrate the need of remote administration. [CO-4][L-4]
 - f) Discuss the requirement of socket programming. [CO-2][L-2]
 - g) Write and explain the syntax to create a socket. [CO-1][L-2]
 - h) State the purpose of UDP. [CO-3][L-1]
 - i) Explain the operation of ping program. [CO-6][L-2]
 - j) Explain gethostname function. [CO-2][L-2] **2×10**

PART-A

- Q.2 a) Explain the working of ARP and RARP using suitable diagram for each. [CO-3][L2] **10**
 b) Discuss any three network monitoring tools. [CO-3][L-2] **10**
- Q.3 a) Illustrate each of the following socket functions:
 i) Listen ii) Close and related iii) Connect iv) Bind [CO-2][L-4] **8**
 b) Formulate the procedure to implement an Echo server and an Echo client. [CO-2][L-6] **12**
- Q.4 a) Demonstrate in detail about working of concurrent server. [CO-3][L-3] **10**
 b) Discuss various design issues and algorithms related to iterative connection less servers (UDP). [CO-3][L-2] **10**

PART-B

- Q.5 a) What is RPC? Discuss RPC model and its need in networking. [CO-3][L-3] **10**
 b) Explain dynamic port mapping with suitable example. [CO-3][L-2] **10**
- Q.6 a) Differentiate between 'static and dynamic routing'. [CO-4][L-2] **4**
 b) Illustrate the working of RADIUS. [CO-4][L-2] **8**
 c) Demonstrate the steps to configure a DNS Server. [CO-4][L-3] **8**
- Q.7 a) Summarize different techniques to secure passwords. [CO-3][L-5] **10**
 b) Illustrate how firewalls are used in controlling access and in monitoring the network. [CO-4][L-4] **10**

End Semester Examination, May 2023

B. Tech. – First Semester

APPLIED MATHEMATICS-I (MA-101A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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

- Q.1 a) Test the series: $1 - \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} - \frac{1}{\sqrt{4}} + \dots \infty$ for absolute convergence [CO-1] [L-2]
- b) Check the convergence of the series $\frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \frac{4}{5} + \dots \infty$. [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 $f(x) = \cos(ax+b)$ [CO-2] [L-4]
- e) State Maclaurin'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: $\Gamma\left(\frac{7}{2}\right)$ [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 Wronskian for the differential equation $(D^2 + 2D + 1)y = 5e^x$. [CO-6] [L-2] **2×10**

PART-A

- Q.2 a) Discuss the convergence of the series: $\sum_{n=2}^{\infty} \frac{n^{1/2}}{n^2 + 1}$ [CO-1] [L-2] **10**
- b) Discuss the convergence of the series: $\sum \frac{x^n}{(n+1)^n}$ [CO-1] [L-2] **10**
- Q.3 a) Calculate the approximate values of $\sqrt{26}$ 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 $\sin x$ 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

$$\int_0^{4a} \int_{x^2/4a}^{2\sqrt{ax}} dy dx$$

- Q.5 a) Change the order of integration in the integral and evaluate $\int_0^{4a} \int_{x^2/4a}^{2\sqrt{ax}} dy dx$. [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 divergence. [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 $\frac{d^2 y}{dx^2} - 2 \frac{dy}{dx} + y = \cos x$ [CO-6] [L-4] **10**
 b) Using method of variation of parameters, solve:
 $\frac{d^2 y}{dx^2} + 16y = \tan 4x$ [CO-6] [L-5] **10**

End Semester Examination, May 2023

B. Tech. — Second Semester

APPLIED MATHEMATICS—II (MA-201A)

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 is the half range sine series for $f(x)=T$ in $(0, l)$ [CO:2][L-1]

b) Find $L^{-1}\left(\frac{1}{s(s-1)}\right)$ [CO:2][L-2]

c) Find $L\{\sin kt \sinh kt\}$ [CO:3][L-2]

d) State convolution theorem of fourier transform. [CO:2][L-2]

e) Prove that $i^n = e^{-i(4n+1)\frac{\pi}{2}}$. [CO:6][L-5]

f) Evaluate $\int_C \frac{3z^3 + z}{z^2 - 2} dz$, where $C: |z|=1$. [CO:3][L-3]

g) Determine a, b, c, d so that the function $f(z) = (x^2 + axy + by^2) + i(cx^2 + dxy + y^2)$ is analytic. [CO:5][L-4]

h) What is the half range cosine series for $f(x)=1$ in $(0, l)$. [CO:4][L-3]

i) Find the sum and product of the eigen values of $\begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$. [CO:1][L-1]

j) Find the rank of the identity matrix of order 4. [CO:1][L-1] **2×10**

PART-A

Q.2 a) Investigate the value of λ and μ so that the equations:

$$x + y + z = 6; x + 2y + 3z = 10; x + 2y + \lambda z = \mu \text{ have}$$

i) No solution, ii) unique solution and iii) an infinite number of solutions.

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

b) Find the Eigen values and Eigen vectors of the matrix: $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ [CO:1][L-4] **10**

Q.3 a) Expand $f(x) = \pi x$ from $x = -c$ to $x = c$ as a fourier series. [CO:2][L-2] **10**

b) Find the Fourier sine series for $f(x) = x^2, 0 < x < l$ [CO:2][L-3] **10**

Q.4 a) Solve: $p^2 - q^2 = x - y$ [CO:3][L-2] **10**

b) Solve: $x^2(y - z)p + y^2(z - x)q = z^2(x - y)$ [CO:3][L-4] **10**

PART-B

Q.5 a) Determine analytic function $f(z)$ whose real part is $x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$.

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

b) Evaluate $\oint_C \frac{e^z}{(z-1)(z-2)^2} dz$, where C is the circle $|z| = 3$. [CO:4][L-3] **10**

Q.6 a) Find the Fourier sine transform of $e^{-|x|}$ hence evaluate $\int_0^\infty \frac{x \sin mx}{1+x^2} dx$. [CO:5][L-4] **10**

b) Solve the integral equation $\int_0^\infty f(x) \cos px \, dx = \begin{cases} 1-p & 0 \leq p \leq 1 \\ 0 & p > 1 \end{cases}$. [CO:5][L-2] **10**

Q.7 a) Solve the following equation by Laplace transform method:

$$x'' + 9x = \cos 2t, x(0) = 1, x\left(\frac{\pi}{2}\right) = -1$$

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

b) State and prove convolution theorem of laplace transform. [CO:6][L-4] **10**

End Semester Examination, May 2023
B. Tech. – Third Semester
QUANTITATIVE APTITUDE (MA-301/MA-301A)

Time: 2 hrs.

Max Marks: **50**

No. of pages: 5

Note: The paper consists of **FIFTY** multiple choice questions. Each question has **FOUR** options with **ONE** correct answer. Select the correct answer. Attempt all questions. All questions are of **ONE** mark each. There is no negative marking. Fill the right option in the answer table given below. Options field in the answer table given below will only be considered.

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 In a class, 18 boys are over 160 cm tall. If these constitute three-fourths of the boys and the total number of boys is two-thirds of the total number of students in the class, what is the number of girls in the class?
- a) 12 b) 10
c) 14 d) 18

Directions for questions 2 to 6:-
In the following questions, select the set of conclusions which logically follows from the given statements.

- Q.2 **Statements:** All that is blood is red. Fluid is blood.
Conclusions:
I. Fluid is red
II. Fluid is not red
III. All that is red is blood.
a) Only conclusions I and II follow
b) Only conclusions II and III follow
c) Only conclusion I follow
d) All conclusions are followed
- Q.3. **Statements:** All testers are samples. Some samples are glossy.
Conclusions:
I. All testers are glossy.
II. Some glossy are testers.
III. Some glossy are samples.
IV. All samples are testers.
a) Only I follow
b) Only I, II and III follow

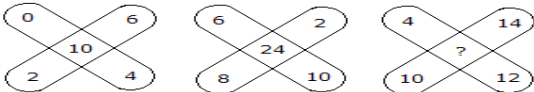
- c) Only III follows
d) Only II and III follow

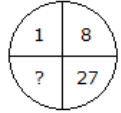
- Q.4 **Statements:** Some bugs are pigs. No pig is a pot.
Conclusions:
I. No bug is a pot.
II. Some bugs are not pots.
III. Some pigs are bugs.
IV. No pig is a bug.
a) Only either I or IV follows.
b) Only II and III follow.
c) Only I and III follow.
d) All follows.
- Q.5 **Statements:** Some thieves are jeepers. Some jeepers are bosses.
Conclusions:
I. No thieves are bosses.
II. All jeepers are bosses.
III. Some bosses are thieves.
IV. No jeepers are thieves.
a) Either conclusions I or IV follow.
b) Either conclusions I or II follow.
c) Either conclusions I or III follow.
d) No conclusion is correct
- Q.6 **Statements:** No ferry is truck. All trucks are stars.
Conclusions:
I. No star is ferry.
II. No truck is ferry.
III. Some stars are trucks.
IV. Some stars are ferry.

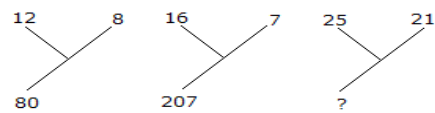
- a) Only II and III follow.
 b) Only either I or IV and II and III follows.
 c) Only either I or III follow.
 d) Only I or III follows.

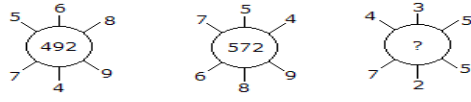
- Q.7 Find the least number which leaves a remainder of 3 when divided by 5, 6, 7 and 8, but leaves no remainder when divided by 9?
 a) 1683 b) 1692
 c) 1598 d) 1458

Directions for questions 8 to 12:
 Which one will replace the question mark in the following figures?

- Q.8 
 a) 28 b) 38
 c) 48 d) 58

- Q.9 
 a) 64 b) 74
 c) 84 d) 58

- Q.10 
 a) 184 b) 149
 c) 166 d) 130

- Q.11 
 a) 115 b) 130
 c) 135 d) 140

- Q.12

A ₂	C ₄	E ₆
G ₃	I ₅	?
M ₅	O ₉	Q ₁₄

 a) L₁₀ b) K₁₅
 c) I₁₅ d) K₈

- Q.13 A certain number of camels and an equal number of men are going somewhere. Half of the owners are on their camels' back while the

remaining ones are walking along leading their camels. If the number of legs walking on the ground is 80, how many camels are there?
 a) 16 b) 14
 c) 10 d) 40

Directions for questions 14 to 18:- Study the following information carefully and answer the questions given below: Eight persons Amy, Bon, Cal, Don, Elf, Fog, Gia and Harry are sitting around a rectangular table in such a way that two persons sit on each of the four sides of the table facing the centre. Persons sitting on opposite sides are exactly opposite to each other. Don faces north and sits exactly opposite to Harry. Elf is to the immediate left of Harry. Amy and Gia sit on the same side. Gia is exactly opposite of Bon who is to the immediate right of Cal. Amy is next to the left of Don.

- Q.14 Who is sitting opposite to Amy?
 a) Gia b) Don
 c) Elf d) Cal
- Q.15 Who is next to Elf in clockwise direction?
 a) Gia b) Bon
 c) Fog d) Amy or Fog
- Q.16 Which of the following pairs of persons has both the persons sitting on the same side with first person sitting to the right of second person?
 a) Don-Fog b) Cal-Bon
 c) Elf-Harry d) Amy-Gia
- Q.17 Who is sitting opposite to Elf?
 a) Don b) Amy
 c) Fog d) Amy or Don
- Q.18 Which of the following statements is definitely true?
 a) Amy is facing North.
 b) Elf is sitting opposite of Fog.
 c) Fog is to the left of Gia.
 d) Cal is to the left of Amy.

- Q.19 In a caravan, in addition to 50 hens, there are 45 goats and 8 camels with some keepers. If the total number of feet be 224 more than the number of heads in the caravan, the number of keepers is:
- a) 10 b) 5
c) 15 d) 8

Directions for questions 20 to 22:- Study the following information carefully and answer the questions given below: A, B, C, D, E, F and G are seven persons wearing a different color shirt - White, red, black, green, yellow, blue and violet and a different color trousers - blue, red, white, Black, cream, yellow and indigo. The persons, color of the shirt, and color of the trousers above are not necessarily in the same order. No person is wearing shirt and trousers of same color. F is wearing red color shirt and is not wearing cream or yellow color trousers. D is wearing green color shirt and indigo color trousers. Color of G's shirt and B's trousers is same. Color of C's shirt and E's trousers is same. A is wearing blue shirt and C is wearing blue trousers. B is not wearing any yellow dress. G is not wearing a white shirt. Red and blue combination is not worn by any person.

- Q.20 Who wears violet color shirt?
- a) B
b) E
c) B or E
d) Data inadequate
- Q.21 What is the color of A's trousers?
- a) Cream b) Blue
c) White d) None of these
- Q.22 What is the color of G's trousers?
- a) Indigo b) White
c) Cream d) Red
- Q.23 Which of the following given equations will be satisfied, if it is given $A > B$ & $N > B$ are definitely true?

- a) $M > A > R > B < N$
b) $A > M > R > B > N$
c) $A < R < M > B > N$
d) $M < A = R > B < N$

Directions for questions 24 to 25:

- A) Only conclusion I follows.
B) If only conclusion II follows.
C) If either conclusion I or conclusion II follows.
D) If neither conclusion I nor conclusion II follows.
E) If both conclusions I and II follow.

Q.24 **Statements:**

$P < Q \leq S = T, R = Q < U, V > U$

Conclusions:

I. $P > U$ II. $V > T$

Q.25 **Statements:**

$A \geq P = S > T, V < B = T \geq X$

Conclusions:

I. $A > X$

II. $P < B$

Q.26 A man walks 5 km towards south and then turns to the right. After walking 3 km he turns to the left and walks 5 km. Now in which direction is he from the starting place?

- a) West b) South
c) North East d) South West

Q.27 i) In a family of six persons A, B, C, D, E and F, there are two married couples.

ii) D is grandmother of A and mother of B.

iii) C is wife of B and mother of F.

iv) F is the granddaughter of E.

What is C to A?

- a) Daughter b) Grandmother
c) Mother d) None of these

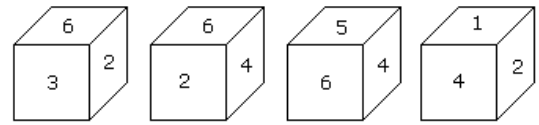
Q.28 Daya has a brother Anil, Daya is the son of Chandra. Bimal is Chandra's father. In term of relationship, what is Anil of Bimal?

- a) Son b) Grandson
c) Brother d) Grandfather

- Q.29 One evening before sunset Rekha and Hema were talking to each other face to face. If Hema's shadow was exactly to the right of Hema, which direction was Rekha facing?
- North
 - South
 - East
 - Data is inadequate
- Q.30 I am facing south. I turn right and walk 20 m. Then I turn right again and walk 10m. Then I turn left and walk 10m and then turning right walk 20m. Then I turn right again and walk 60m. In which direction am I from the starting point?
- North
 - North East
 - North West
 - West
- Q.31 Identify the next word in the letter series: - JAK, KBL, LCM, MDN, _____
- OEP
 - NEO
 - MEN
 - PFQ
- Q.32 Identify the next word in the letter series: - QN, RP, TS, WW, _____, FH
- AC
 - XB
 - AB
 - YC
- Q.33 If A is to the south of B and C is to the east of B, in what direction is A with respect to C?
- North East
 - North West
 - South East
 - South West
- Q.34 A, B, C and D playing cards .A and B are partners .D faces North. If A faces towards West, then who faces towards South?
- B
 - C
 - D
 - Data Inadequate
- Q.35 If $M \times N$ means M is the daughter of N; $M + N$ means M is the father of N; $M \% N$ means M is the mother of N and $M - N$ means M is the brother of N then $P \% Q + R - T \times K$ indicates which relation of P to K?

- Daughter in law.
- Sister in law.
- Aunt.
- Mother in law.

- Q.36 Which number is on the face opposite to 6?



- 4
- 2
- 1
- 3

- Q.37 Pointing to a man in a photograph, a woman said, "His brother's father is the only son of my grandfather." How is the woman related to the man in the photograph?

- Mother
- Aunt
- Sister
- Daughter

- Q.38 $A + B$ means A is the daughter of B ; $A - B$ means A is the husband of B ; $A \times B$ means A is the brother of B. If $P \times Q + R$, which of the following is true?

- P is the brother of R
- P is the uncle of R
- P is the son of R
- P is the father of R

- Q.39 Identify the next word in the letter series: DEF, DEF2, DE2F2, _____, D2E2F3.

- DEF3
- D3EF3
- D2E3F
- D2E2F2

Direction for the questions 40-44:-

All the opposite faces of a big cube are coloured with red, black and green colours. After that is cut into 64 small equal cubes.

- Q.40 How many small cubes are there where one face is green and other one is either black or red?

- 28
- 8
- 16
- 24

Q.41 How many small cubes are there whose no faces are coloured?

- a) 0 b) 4
c) 8 d) 16

Q.42 How many small cubes are there whose 3 faces are coloured?

- a) 4 b) 8
c) 16 d) 24

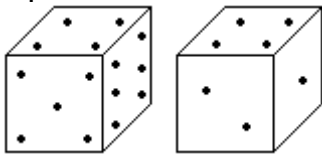
Q.43 How many small cubes are there whose only one face is coloured?

- a) 32 b) 8
c) 16 d) 24

Q.44 How many small cubes are there whose at the most two faces are coloured?

- a) 48 b) 56
c) 28 d) 24

Q.45 Here two positions of dice are shown. If there are two dots in the bottom, then how many dots will be on the top?



- a) 2 b) 3
c) 5 d) 6

Q.46 In alphabet series, some alphabets are missing which are given in that order as one of the alternatives below it. Choose the correct alternative.:
_ bc _ _ bb _ aabc

- a) acac b) babc
c) abab d) aacc

Q.47 In a class of 40 students, 12 enrolled for both English and German. 22 enrolled for German. If the students of the class enrolled for at least one of the two subjects, then how many students enrolled for only English and not German?

- a) 30 b) 10
c) 18 d) 28

Q.48 In alphabet series, some alphabets are missing which are given in that order as one of the alternatives below

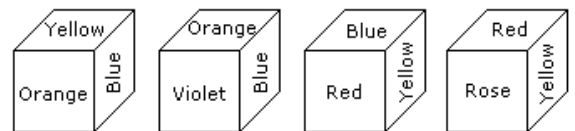
it. Choose the correct alternative.:mnopqopqrs _ _ _ _

- a) mnopq b) oqrst
c) pqrst d) qrstu

Q.49 There are 30 students in a class. Among them, 8 students are learning both English and French. A total of 18 students are learning English. If every student is learning at least one language, how many students are learning French in total?

- a) 20 b) 30
c) 25 d) 28

Q.50 From the four positions of a dice given below, find the color which is opposite to yellow?



- a) violet b) red
c)) rose d) blue

End Semester Examination, May 2023

B. Tech. – Fourth Semester

APPLIED MATHEMATICS-III (MA-302)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

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

Q.1 Answer the following in brief:

- a) If $z = x + iy$, find the real and imaginary part of $\sin z$. [L3]
- b) State the Cauchy Reimann Equation in Polar Form. [L1]
- c) Determine whether $\frac{1}{z}$ is analytic function or not? [L3]
- d) Expand $f(z) = \cos z$ about $z = \frac{\pi}{4}$ using Taylor's series. [L3]
- e) Write the formula for Fourier Integrals. [L2]
- f) Find the Fourier Sine Transform of $f(t) = \cos t$ [L3]
- g) What is the probability that a number is divisible by 2? [L1]
- h) What is the probability that a letter picked at random is a vowel? [L2]
- i) Define the Alternate Hypothesis. [L1]
- j) A bag contains defective article, the exact number of which is not known. A sample of 50 from the bag gives 5 defective articles. Check whether to accept or reject the null hypothesis. [L3] **2×10**

PART-A

- Q.2 a) If $f(z) = u + iv$ is an analytic function of z and $u = e^{-x}(x \cos y - y \sin y)$ then find $f(z)$. [L3] **10**
- b) Show that the function $f(z) = \sqrt{|xy|}$ is not regular at the origin. [L4] **10**
- Q.3 a) Expand the function in Laurent's Series $f(z) = \frac{1}{z^2 - 3z + 2}$, for $1 < |z| < 3$. [L3] **10**
- b) Evaluate : $\int_C \frac{3z^2}{z^2 - 1} dz$ where $C: |z-1|=1$. [L4] **10**
- Q.4 a) Find the Fourier Transform of e^{-ax^2} , where $a > 0$ [L3] **10**
- b) State and prove Convolution theorem for Fourier Transform [L2] **10**

PART-B

- Q.5 a) Find the probability that at most 5 defective fuses will be found in a box of 200 fuses, if experience shows that 2 percent of such fuses are defective. [L3] **10**
- b) Find the Binomial distribution whose mean is 4 and variance is 3. [L3] **10**

Q.6 a) A die is thrown 270 times and the results of these throws are given below:

No. appeared on the die	1	2	3	4	5	6
Frequency	40	32	29	59	57	59

Test the Hypothesis that coins are unbiased.

(Hint: *for $v = 5$, $\chi^2 = 11.070$ at 5% level of significance*)

[L3] **10 marks**

- b) The average mark in Mathematics of sample of 100 students was 51 with a S.D. of 5 marks. Could this have been a random sample from a population with average marks 40? (Hint: $|z_\alpha| = 1.966$ at 5% level of significance)

[L3] **10**

- Q.7 a) Find the Coefficient of Correlation from the following table:

Age of Husband	23	27	28	29	30	25
Age of Wife	18	22	23	24	25	22

[L2] **10**

- b) Fit a straight line to the following data:

x	12	15	21	25
y	15	7	10	12

[L3] **10**

End Semester Examination, May 2023
M. Tech. – Second Semester
ADVANCED PLANT BIOTECHNOLOGY (M-BT-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 Answer the following in brief:

- a) What are the limitations of usage of a stirred tank bioreactor for plant cell culture? [CO-1][L-1]
- b) Illustrate double fertilization in angiosperms. [CO-1][L-3]
- c) Enumerate the uses of androgenic haploids? [CO-2][L-1]
- d) How is callus different from embryo? [CO-2][L-5]
- e) How are somaclonal variations introduced in plant tissue cultures? [CO-3][L-3]
- f) Mention any one method of selection of transformed cells from the culture? [CO-4][L-2]
- g) How are secondary metabolites useful for plants? [CO-4][L-5]
- h) Name any two elicitors used in plant tissue culture to obtain secondary metabolites. [CO-5][L-1]
- i) Assess the significance of plant quarantine. [CO-6][L-4]
- j) Appraise the role of PGFRA in managing plant genetic resources. [CO-6][L-5] **2×10**

PART-A

- Q.2 a) Distinguish between zygotic embryo and somatic embryo. [CO-1][L-3] **10**
b) Describe the process of in-vitro somatic embryogenesis. [CO-1][L-4] **10**
- Q.3 Appraise the concept of cellular totipotency giving the descriptive account of micro propagation. [CO-2][L-5] **20**
- Q.4 Broadly classify alkaloids, giving their structures and functions. [CO-3][L-5] **20**

PART-B

- Q.5 Analyze the efficiency of biotransformation of plant cell cultures to obtain high value secondary metabolites giving examples. [CO-4][L-4] **20**
- Q.6 Demonstrate the sequence of events in Agrobacterium mediated gene transfer in plants. [CO-5][L-2] **20**
- Q.7 a) Identify various types of plant germplasms. [CO-6][L-3] **10**
b) Describe the ex-situ methods of Germplasm conservation. [CO-6][L-2] **10**

End Semester Examination, May 2023
M. Tech. – Second Semester
ADVANCED ENVIRONMENTAL BIOTECHNOLOGY (M-BT-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Comment on the current status of biotechnology in environment protection. [CO1][L1]
- b) Summarize the various toxic influences of metals on the microbial cell. [CO3][L2]
- c) Assess the use of trickling filter in waste water treatment. [CO2][L3]
- d) Define 'CBD'. [CO1][L1]
- e) What is the importance of paleoendemism? [CO5][L1]
- f) "India is one of the megadiversity nations", comment. [CO6][L1]
- g) What is the importance of reeds in lagoons? [CO3][L1]
- h) What are the characteristic effluents of textile industry? [CO2][L1]
- i) Are GMOs threatening to biodiversity? [CO1][L2]
- j) What do you mean by environmental site assessment? [CO4][L1] **2×10**

PART-A

- Q.2 a) Write a brief note on 'oilzapper technology'. [CO-5] [L-1] **10**
b) Discuss in detail the process of activated sludge treatment. How is trickling filter different from activated sludge treatment of waste water? [CO-2] [L-2] **10**
- Q.3 a) What is the significance of tertiary wastewater treatment? [CO-2] [L-1] **10**
b) Give a detailed account of cleaner technologies used for treatment of Tannery and dairy industry waste. [CO-5] [L-1] **10**
- Q.4 a) Explain how microbes interact and deal with metal stress? Illustrate various mechanisms focusing on metal resistance. [CO- 3] [L-2] **15**
b) Describe the potential advantages and disadvantages of bioremediation technologies. [CO-4] [L-1] **5**

PART-B

- Q.5 a) Summarize the differences between intrinsic and engineered bioremediation. [CO-4] [L-2] **8**
b) Phytoremediation could be an effective way for improving environmental condition. Justify and explain the different mechanisms of phytoremediation with suitable examples. [CO-3] [L-4] **12**
- Q.6 a) Why there is a need of sustainable development? [CO-6] [L-1] **5**
b) What does bio prospecting mean? How does bio piracy relate to the concept of ownership? [CO-5] [L-2] **15**
- Q.7 a) Evaluate the core obligations of the Nagoya protocol with respect to genetic resources? [CO-1] [L-3] **10**
b) Select and explain the strategy which can be used for ex situ conservation of biodiversity? [CO-1] [L-4] **10**

End Semester Examination, May 2023
M. Tech. – Second Semester
FOOD PACKAGING TECHNOLOGY (M-BT-221)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Emphasize the scope of packaging of food materials. [CO-1] [L-4]
- b) Set a comparative using suitable example between raw and processed food. [CO-3] [L-3]
- c) Mention any two parameters necessary for proper storage of beverages. [CO-6] [L-2]
- d) Name two ways of processing fruits and vegetables. [CO-4] [L-1]
- e) Explain shelf life stating an example. [CO-1] [L-2]
- f) How relevant is the recommended best before date mentioned on packaged food? [CO-5] [L-4]
- g) Bottling is distinct from canning. Justify. [CO-6] [L-4]
- h) Necessitate the relevance of labeling. [CO-6] [L-2]
- i) Enlist any two precautions in handling a meat product for supplying over long distance. [CO-2] [L-3]
- j) Discuss vacuum pack units. [CO-1] [L-3] **2×10**

PART-A

- Q.2 a) Elaborate the salient features of green packaging technology. [CO-1] [L-1] **10**
b) State and explain the varied forms of food packaging. [CO-1] [L-1] **10**
- Q.3 a) Elaborate the necessity of wholesale packaging. Justify with suitable examples wherever necessary. [CO-2] [L-2] **10**
b) Summarize the general requirements of packaging and labeling. [CO-2] [L-2] **10**
- Q.4 Outline the salient features of the following:
a) Prevention of deterioration of food stuff by packaging.
b) Interaction of food stuff with printed packaging material. [CO-3] [L-3] **10×2**

PART-B

- Q.5 a) Predict the schematics used to handle milk products considering their transportation over long distances. [CO-4] [L-6] **10**
b) Outline the process of selection of raw and processed food. [CO-4] [L-6] **10**
- Q.6 a) Elaborate the process of packaging of cereal grains. Justify with suitable examples wherever necessary. [CO-5] [L-5] **10**
b) Summarize the process of snack processing along with its preservation. [CO-5][L-5] **10**
- Q.7 Give a detailed account of the following:
a) Aseptic packaging system.
b) Disposal and recycling of packaging materials. [CO-6] [L-2] **10×2**

End Semester Examination, May 2023
M. Tech. – Second Semester
NUTRACEUTICALS AND FUNCTIONAL FOODS (M-BT-226)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory**. 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 'Nutraceutical and functional food'. [CO-1] [L-1]
- b) How Type I diabetes is different from Type II diabetes. [CO-1] [L-3]
- c) Illustrate some vegetables, fruits, grains and seed /nuts sources for phytoestrogens. [CO-2] [L-2]
- d) What are phytochemicals? Why phytochemicals are important nutraceutical? [CO-4] [L-4]
- e) Mention the function of EPA and DHA in the body. What foods have DHA and EPA? [CO-3] [L-3]
- f) Comments on nutraceuticals role in controlling the obesity. [CO-5] [L-2]
- g) Illustrate the sources for carotenoids and their significance. [CO-5] [L-3]
- h) How immunomodulatory property containing food significant as functional food? [CO-6] [L-2]
- i) Why inulin is considered as prebiotics? [CO-6] [L-4]
- j) Discuss about nutrigenomics that can add value to nutraceutical food. [CO-3] [L-3] **2×10**

PART-A

- Q.2 a) How are nutraceuticals classified? Give examples in each category. [CO-2] [L-4] **10**
b) Discuss the role of dietary fibres, sources and medical benefits. [CO-1] [L-2] **10**
- Q.3 a) Illustrate the significance, sources and mechanism of action of antioxidants. [CO-3] [L-3] **10**
b) Why phytoestrogens are important for our health? Evaluate how do phytoestrogen works? Mention their sources and benefits. [CO-4] [L-5] **10**
- Q.4 a) What are carotenoids? Determine the medicinal properties and applications in food and nutraceutical industries. [CO-4] [L-4] **10**
b) How sphingolipids are extracted and purified? [CO-4] [L-4] **10**

PART-B

- Q.5 Evaluate the difference between prebiotics and probiotics. Name the probiotic strains. Discuss various medical benefits of probiotics. [CO-5] [L-5] **20**
- Q.6 a) What is cardiovascular disease? Outline the diseases associated with cardiovascular system. Appraise the role of nutraceuticals in the cardiovascular disease. [CO-5] [L-5] **10**
b) Discuss about different types of liver disorders and write a note on the liver health nutraceuticals. [CO-5] [L-3] **10**
- Q.7 Discuss in detail about nutrigenomics and their applications. [CO-6] [L-3] **20**

End Semester Examination, May 2023
M. Tech. – Second Semester
NUMERICAL METHODS IN CIVIL ENGINEERING (MCE-201)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; Marks are indicated against each question.

Q.1 Solve the simultaneous linear equations using the elimination method:
 $(x/2) + (2y/3) = -1$ and $x - (y/3) = 3$ [CO-1] [L-2] **20**

Q.2 Solve the system of equations using both Jacobi and Gauss-Seidel method:
 $5x_1 - 2x_2 + 3x_3 = -1$
 $-3x_1 + 9x_2 + x_3 = 2$
 $2x_1 - x_2 - 7x_3 = 3$
Obtain the result correct to three decimal places. [CO-2] [L-3] **20**

Q.3 Solve the following linear system using the Gaussian elimination method:
 $4x - 5y = -6$
 $2x - 2y = 1$ [CO-2] [L-3] **20**

Q.4 A real root of the equation $f(x) = x^3 - 5x + 1 = 0$ lies in the interval (0, 1). Perform four iterations of the secant method. [CO-3] [L-3] **20**

Q.5 Find the polynomial $f(x)$ by using Lagrange's formula and hence find $f(3)$ for:

x	0	1	2	5
f(x)	2	3	12	147

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

Q.6 Evaluate $\int_0^2 e^{-x} dx$ by using Simpson's one third rule. [CO-4] [L-5] **20**

Q.7 Apply R.K. method of 2nd order to solve initial value problem $\frac{dy}{dx} = x + y, y(0) = 1$, Find y at $x = (0.2)$, Taking $h = 0.1$. [CO-5] [L-3] **20**

Q.8 Solve by dual simplex method:
Min $z = 5x_1 + 6x_2$
Subjected to,
 $x_1 + x_2 \geq 2$
 $4x_1 + x_2 \geq 4$
 $x_1, x_2 \geq 0$ [CO-5] [L-4] **20**

End Semester Examination, May 2023
M. Tech. – Second Semester
AIRPORT PLANNING AND DESIGN (MCE-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Classify the type of airports based on "aircraft designed to serve". [CO-1] [L-2]
- b) With the help of neat sketch, correlate "hangars" with airport planning. [CO-2] [L-3]
- c) Diagrammatically illustrate the concept of "cross – wind component". [CO-3] [L-3]
- d) Justify how "Air Traffic Capacity" affects in the orientation of new runways. [CO-4] [L-3]
- e) What do you understand by the term "declared distances"? [CO-5] [L-2]
- f) State the factors considered for applying correction to runway length. [CO-1] [L-2]
- g) Describe "taxiway curves". [CO-2] [L-2]
- h) Summarize the concept of "separation distances between taxiway and runway". [CO-3] [L-2]
- i) Validate the application of "Apron" at airport. [CO-4] [L-2]
- j) Correlate "environmental management plan (EMP)" with airport terminal planning. [CO-5] [L-3] **2×10**

PART-A

- Q.2 Illustrate the various obstacle limitation surfaces that are used for establishing for defining the limits to the objects into airspace. [CO-1] [L-3] **20**
- Q.3 Write a well – explanatory note on the various factors considered in locating old runways, with consideration to the existing runways at a typical airport. [CO-1] [L-3] **20**
- Q.4 With the help of neat sketch, illustrate the different elements of a typical runway. [CO-2] [L-3] **20**

PART-B

- Q.5 Elaborate the concept of "Planning of Taxiways" and "Taxiway on Aprons". [CO-3] [L-3] **20**
- Q.6 With suitable sketches, explain "Planning of Aprons". [CO-4] [L-3] **20**
- Q.7 Summarize the following:
- a) Impact of the construction of airports on environment.
 - b) Taxiway markings. [CO-5] [L-3] **10×2**

End Semester Examination, May 2023

M. Tech. – Fourth Semester

RETROFITTING AND REHABILITATION OF STRUCTURES (MCE-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 retrofitting and rehabilitation? [CO-1] [L-1]
- b) Enlist any five repair materials used in masonry structures. [CO-2] [L-1]
- c) What are the criteria for material selection required for different repairs? [CO-2] [L-2]
- d) Mention the special characteristics of quick setting compounds. [CO-2] [L-2]
- e) Explicit the inferences that can be drawn from visual inspection. [CO-4] [L-2]
- f) Signify substrate preparation. [CO-5] [L-2]
- g) What do you mean by autogenous healing? [CO-3] [L-1]
- h) Explicit the need for repair of dormant cracks. [CO-5] [L-2]
- i) Enlist the materials required for Jacketing. [CO-5] [L-1]
- j) Give reaction mechanism of corrosion. [CO-2] [L-2] **2×10**

PART-A

- Q.2 a) Describe the need for retrofitting and rehabilitation. [CO-1] [L-6] **10**
b) Discuss the importance of maintenance, routine and preventive maintenance. [CO-1] [L-3] **10**
- Q.3 Enlist special mortars and concretes used in retrofitting. Describe mechanical and durability characteristics of any two. [CO-2] [L-2] **20**
- Q.4 Why is grouting required? Explain the types of grouting materials with emphasis on epoxy bonding agents. [CO-3] [L-2] **20**

PART-B

- Q.5 a) Explain different methods of semi destructive testing. [CO-4] [L-2] **10**
b) Describe importance of ultra sonic pulse velocity, probe test, pull out test causes of deterioration in concrete structures. [CO-4] [L-4] **10**
- Q.6 Describe corrosion in reinforced concrete with respect to its typical locations, causes and types. [CO-5] [L-3] **20**
- Q.7 Write short notes on the following:
 - a) Steel jacketing.
 - b) FRP jacketing.
 - c) Beam shear strengthening.
 - d) Flexural strengthening. [CO-5] [L-3] **5×4**

End Semester Examination, May 2023
B. Tech. – Second Semester
RESOURCE MANAGEMENT AND CONTROL IN CONSTRUCTION
(MCE-CM-201)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

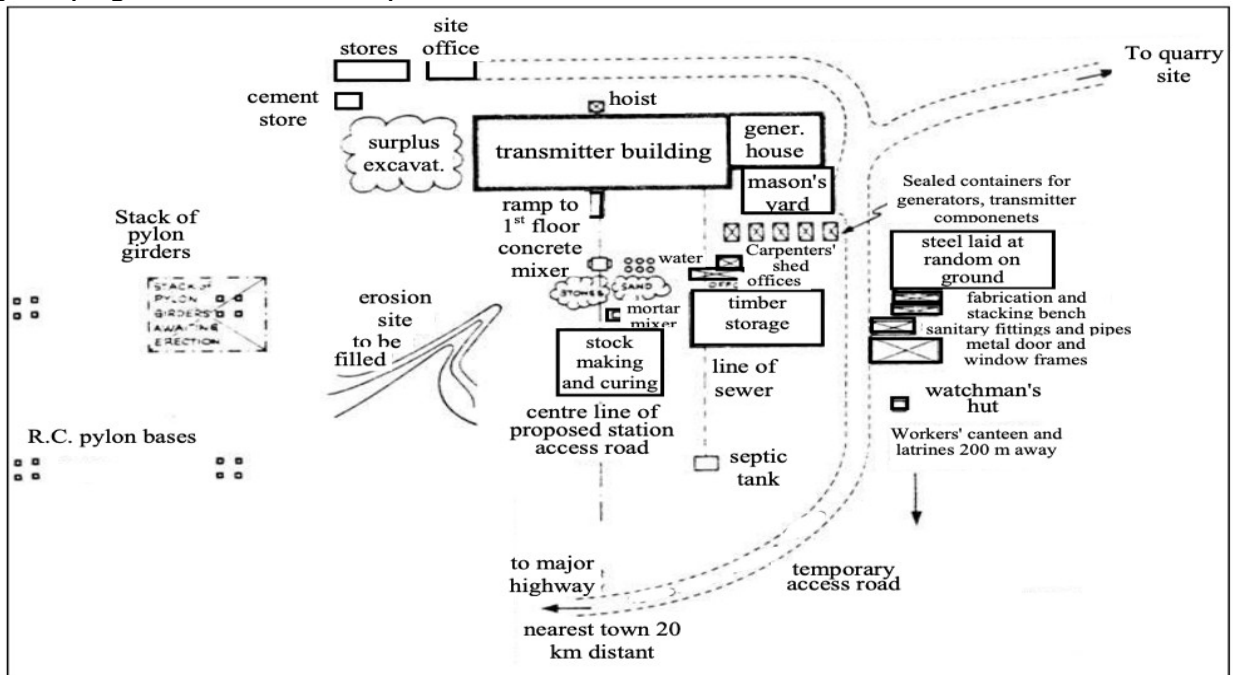
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following in brief:

- a) Define the term "organisational structures". Explain its importance. [CO-1] [L-1]
- b) Explain the importance of WBS (work breakdown structures) with clear identification of a construction life-cycle phases. [CO-1] [L-2]
- c) Write a short note on "production management" with regards to organisational goals. [CO-2] [L-1]
- d) Enunciate the sub-functions of material control department. [CO-2] [L-2]
- e) Explain the factors affecting employment of woman. [CO-3] [L-2]
- f) Define "manpower planning". [CO-3] [L-1]
- g) What do you understand by "control charts"? [CO-4] [L-1]
- h) List the various sampling techniques in relation to construction quality management. [CO-5] [L-1]
- i) Write a short note on occupational diseases with examples. [CO-5] [L-1]
- j) List the objectives of method study. [CO-4] [L-1] **2×10**

PART-A

Q.2 Figure below shows the construction site for the construction of a transmitter station on an open location. Criticize on the existing layout plan if any and suggest improvements justifying with a new site layout.



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

Q.3 "One of the main objectives of material management is to ensure purchasing and storage functions efficiently and with minimum cost". Justify the statement from the stand of a purchasing department highlighting its objectives, organisation and its functions. [CO-2] [L-3] **20**

Q.4 "Labour legislation/laws are placed to adapt to the economic and social challenges of the modern world of work". Justify and explain the labour laws prevailing in India. [CO-3] [L-4] **20**

PART-B

Q.5 Write a well detailed note on ISO 9000 with special relevance to its importance and quality management guidelines. [CO-4] [L-2] **20**

Q.6 "Although the construction industry is one of the largest sectors of employment in India, it is also the second most hazardous, with an average of around 38 fatal accidents a day (as per 2022 data)". How do you propose the remedy to issue? [CO-5] [L-5] **20**

Q.7 Write a well detailed note on Method Study including a basic procedure to obtain it. [CO-4] [L-2] **20**

End Semester Examination, May 2023
M. Tech. – Second Semester
CONSTRUCTION ECONOMICS AND FINANCE (MCE-CM-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- a) Give the objectives of construction accounting. [CO-1] [L-2]
- b) A company is planning to replace some construction equipments, going by the incremental rate of return, which alternative will you select? [CO-3] [L-3]
- c) How is depreciation related with income tax? [CO-3] [L-2]
- d) Give the objective of positive risk response strategy. [CO-5] [L-2]
- e) Differentiate between risk and uncertainty citing relevant examples. [CO-4] [L-2]
- f) Give one example of each direct and indirect cost. [CO-1] [L-3]
- g) Define the term "net working capital". [CO-5] [L-1]
- h) Write down any two goals of work breakdown structure. [CO-5] [L-2]
- i) How is time value of money useful for project planning team? [CO-4] [L-3]
- j) Draw the typical curve of AW and ESL briefly explain its? [CO-4] [L-3] **2×10**

PART-A

- Q.2 a) An investor plans to borrow Rs.4,00,000 from a funding agency to install a water softening unit. He opted to repay the principal amount including interest at a rate of 9% per year in 5 years. Identify the involved symbols and their values for the total amount owed after 5 years. Also draw the cash flow diagram. [CO-1] [L-3] **8**
- b) Explain the following:
- i) Corporate overhead costs.
 - ii) Factors affecting cash flow. [CO-1] [L-3] **12**
- Q.3 a) The initial cost of a road roller having a useful life of 12 years is Rs.49,00,000/-. The estimated salvage value at the end of its useful life is Rs. 4,95,000/-. Compute the annual depreciation and book value of the road roller using straight line method. [CO-2] [L-4] **10**
- b) A person has taken a loan of amount of Rs.10,000/- from a bank for a period of 5 years. Estimate the amount of money, the person will repay to the bank at the end of 5 years for the following cases:
- i) Considering simple interest rate of 8% per year.
 - ii) Considering compound interest rate of 8% per year. [CO-2] [L-4] **10**
- Q.4 a) A company wants to have enough money to purchase a new machine in 4 years. If the machine will cost Rs. 12,50,000/-, how much should the company set aside each year if the account earns 8% per year. [CO-3] [L-3] **10**
- b) Discuss in detail the concept of cost benefit analysis. [CO-3] [L-3] **10**

PART-B

- Q.5 Explain the concept of risk management and its benefits citing relevant examples. [CO-4] [L-3] **20**
- Q.6 Discuss in detail the concept of capital management and factors effecting same. **527**

- Q.7 Explain the deliverable oriented work breakdown structure and its advantages with the help of an example. [CO-4] [L-3] **20**

End Semester Examination, May 2023
M. Tech. – Second Semester
MANAGEMENT INFORMATION SYSTEMS FOR CONSTRUCTION
MANAGEMENT (MCE-CM-208)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 non-programmed decisions? [CO-4] [L-2]
- b) What is the role of computer in MIS? [CO-3] [L-2]
- c) Illustrate the evolution of MIS briefly. [CO-2] [L-1]
- d) What is concept behind information and system theory? [CO-3] [L-1]
- e) Define the management information system. [CO-1] [L-2]
- f) What do you understand by data analyzing. [CO-4] [L-2]
- g) What are the main factors for success of an organization through MIS? [CO-6] [L-6]
- h) What are the various characteristics of system for an organization? [CO-2] [L-3]
- i) Give some examples of application of MIS in service sector. [CO-5] [L-4]
- j) Write a short note on 'marketing management'. [CO-5] [L-5] **2×10**

PART-A

- Q.2 a) What is the role of MIS in an organization? [CO-1] [L-2] **10**
b) Describe the structure of MIS with the help of tree chart. [CO-1] [L-1] **10**
- Q.3 a) How MIS and decision making process plays an important role for an organization? [CO-2] [L-2] **10**
b) What are the various stages involved in decision making? Describe with the help of flow chart. [CO-3] [L-6] **10**
- Q.4 a) What are the various classification and types of DSS? [CO-3] [L-2] **10**
b) What is the importance of computer for an organization? [CO-3] [L-1] **10**

PART-B

- Q.5 What do you understand by data? Explain various characteristics of good data and methods used in data collection. [CO-4] [L-1] **20**
- Q.6 Explain in detail the various application of management information system in various sectors. [CO-5] [L-3] **20**
- Q.7 a) Which type of socio-technical approach should be followed for the implementation of a project for an organization? [CO-6] [L-1] **10**
b) Describe in detail that how quality assurance of MIS was done. [CO-6] [L-5] **10**

End Semester Examination, May 2023
M. Tech. – Second Semester
FEM IN STRUCTURAL ENGINEERING (MCE-SE-201)

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) State the differences between finite element method and classical methods of solving engineering problems. [CO-1] [L-2]
b) List the factors on which choice of the element depends in discretization process. [CO-3] [L-1]
c) Describe the concept of "shape function" in FEM. [CO-1] [L-1]
d) With the help of neat sketch, illustrate "plate elements". [CO-4] [L-3]
e) State the different types of "weighted residual method" in FEM. [CO-2] [L-2] **4×5**
- Q.2 a) Compare the property of "stiffness" and "flexibility". [CO-4] [L-4]
b) With the help of neat sketch, illustrate four noded Iso – parametric quadrilateral element. [CO-2] [L-1]
c) State the Jacobian matrix for a linear triangular element. [CO-5] [L-2]
d) Summarize the various characteristics of "Elements" used in FEM. [CO-3] [L-2]
e) Justify the significance of ETABS in FEM. [CO-5] [L-1] **4×5**
- Q.3 a) With the help of neat sketch, correlate "strain – displacement relation" in FEM. [CO-1] [L-3] **5**
b) A beam AB of span 'l' simply supported at ends and carrying a concentrated load 'W' at the centre C. evaluate the deflection at the mid – span by using Rayleigh – Ritz Method and compare with the exact solutions. [CO-1] [L-5] **15**
- Q.4 a) Plan a mechanism to determine expression for determining the shape function for a 4 – noded rectangular element. [CO-2] [L-5] **10**
b) Evaluate the following:
i) $\int L_1^2 L_2^1 L_4^2 dV$.
ii) $\int L_1^2 L_3^2 dA$.
iii) $\int L_2^3 L_2^1 L_4^2 dV$.
iv) $\int L_2^4 L_4^2 dA$. [CO-2] [L-4] **10**
- Q.5 Analyze a 2 – span continuous beam with each span of 6m. the first span contains 2 point loads at 1m and 2m from the left support. The magnitude of point loads is 40 kN and 80 kN respectively. The second span contains Udl of 70 kN/m. The beam is fixed at extreme ends. Determine the deflection matrix of the beam. [CO-3] [L-4] **20**
- Q.6 Write a well – explanatory note on the following:
a) Fast element stiffness computation.
b) Convergence criteria for ISO – parametric element. [CO-4] [L-5] **10×2**
- Q.7 a) Show that the condition that first variances of total potential energy is stationary, is equivalent to satisfying equilibrium equation and boundary condition in case of a simply supported beam subjected to Udl. [CO-4] [L-4] **15**
b) With suitable examples, write a well – detailed note on "nodes" in FEM. [CO5][L3] **5**

End Semester Examination, May 2023

M. Tech. – Second Semester

STRUCTURAL DYNAMICS (MCE-SE-202A)

Time: 3 hrs.

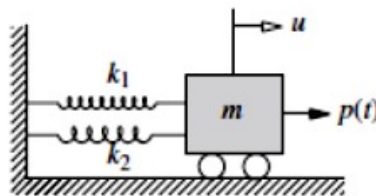
Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 initial condition for the free vibrations in MDOF? [CO-2] [L-2]
- b) Define 'degrees of freedom'. Give an example of a 2-degree freedom system. [CO-1] [L-1]
- c) What are the dynamic forces resisted by a typical suspension bridge? [CO-1] [L-2]
- d) Define 'frequency ratio'. Find the frequency ratio if forcing frequency is 209.4Hz and natural frequency is 178.9Hz. [CO-2] [L-2]
- e) When is the phenomenon of resonance occur in terms of frequency ratio. [CO-6] [L-2]
- f) Starting from the basic definition of stiffness, determine the effective combined stiffness of the springs and write the equation of motion for the undamped spring-mass systems shown below:



- g) What is the maximum base moment if the pseudo spectral acceleration is 0.4g and column height is 3.0m? [CO-3] [L-3]
- h) Compute the time period for SDOF system for a mass of 3000kg and column stiffness of 100kN/m. [CO-4] [L-4]
- i) Define 'deformation response factor'. [CO-] [L-4]
- j) List types of seismic base isolation system [CO-6] [L-2]
- [CO-2] [L-1] **2×10**

PART-A

- Q.2 a) Give a brief account of types of analysis followed in structural statics and dynamics. [CO-1] [L-2] **10**
- b) Develop expression for response of damped SDOF system to free vibration. [CO1][L4] **10**
- Q.3 A Machine of 1.5 tonnes weight is placed on a concrete plank of width 600mm and length 2m and thickness 150mm. Evaluate the static and dynamic deflection of the machine running at 2000 rpm. Use M20. [CO-4] [L-4] **20**
- Q.4 a) A water tank is set to vibrate freely. Amplitude of vibration reduces from 0.5m to 0.1m in 4 cycles in 8 seconds. Find the damped natural period and damping. [CO-4] [L-4] **10**
- b) Derive Duhamel's integral function. Give its significance. [CO-5] [L-4] **10**

PART-B

- Q.5 Explain central difference method for finding the response of a non-linear system subjected to Arbitrary dynamic loading. [CO-4] [L-3] **20**
- Q.6 a) Discuss tripartite plot. [CO-5] [L-3] **10**
- b) Derive the characteristic equation for a free undamped three degree of freedom system. [CO-4] [L-4] **10**
- Q.7 Perform Eigen value analysis-the Eigen values and Eigen vectors for a three storeyed building 3.0m X 3.0m plan area, floor to floor height as 3m, column dimension as

230mm X 230mm and thickness of slab as 100mm. Assume mass-less columns and no
infill walls. M25 Concrete has been used. [CO-4] [L-6] **20**

End Semester Examination, May 2023
M. Tech. – Second Semester
DESIGN OF ADVANCED CONCRETE STRUCTURES (MCE-SE-207)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

- Q.1 Answer the following in brief:
- a) Highlight the purpose of codes in structural design. [CO-1] [L-1]
 - b) Differentiate between IS Codes and SP. [CO-6] [L-3]
 - c) List the range of span provision for: [CO-1] [L-1]
 - i) Wall-supported slab system.
 - ii) Beam- supported slab systems.
 - d) Explain "frame-shear wall interactions". [CO-2] [L-2]
 - e) List the considerations wherein the minimum thickness of transfer girders is based on. [CO-2] [L-1]
 - f) Differentiate between 'corbels and cantilevers'. [CO-2] [L-3]
 - g) Explain any two types of shear walls. [CO-3] [L-2]
 - h) Define the term "Fatigue" in relation to structures. [CO-6] [L-1]
 - i) How is the influence of torsion addressed in the design? [CO-4] [L-3]
 - j) "The permissible stresses for steel tank plates as recommended in IS:800-2007 are multiplied by 0.8 for the inner faces". Justify. [CO-5] [L-3] **2×10**

PART-A

- Q.2 Write a well detailed notes on:
- a) "Structural Systems".
 - b) Determination of "Static Vs Dynamic action" of lateral loads. [CO-1] [L-2] **10×2**
- Q.3 Design a simply supported transfer girder of length 5.25m loaded from two columns, 1.75 m from each end with 3750 kN. The total depth of the beam is 4.2m and the width of the support is 520 mm. Assume grade 40 concrete and Fe415 steel. [CO-2] [L-6] **20**
- Q.4 Enunciate a procedural framework for design of shear walls. [CO-3] [L-4] **20**

PART-B

- Q.5 Design the rectangular beam section for torsion. The data is as follows:
- a) Bending Moment = 36 kNm.
 - b) Shear Force= 26 kN.
 - c) Torsional Moment= 17 kNm.
 - d) Permissible stresses of concrete and steel is 5 N/mm² and 140 N/mm² respectively.
 - e) Modular ratio=19. [CO-4] [L-6] **4×5**
- Q.6 Draft a step-by-step procedure for design of columns and footings in steel portal frames. [CO-5] [L-4] **20**
- Q.7 Write a well detailed note on the fatigue properties of the following component materials:
- a) Plain concrete.
 - b) Reinforcing bars. [CO-6] [L-2] **10×2**

End Semester Examination, May 2023

M. Tech. – Second Semester

GEOMETRIC DESIGN OF STREETS AND HIGHWAYS (MCE-TE-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 Answer the following in brief:

- a) What are objects of camber? [CO-1] [L-1]
- b) Why overtaking zones are provided. [CO-2] [L-2]
- c) What is the width of formation? [CO-2] [L-1]
- d) Mention various elements included in the road margins. [CO-3] [L-2]
- e) How the problem of road construction in water logged areas may be solved? [CO-5] [L-3]
- f) Write an expression for finding the stopping distance. [CO-3] [L-2]
- g) What are the advantages and limitations of channelized and unchannelized intersection? [CO-5] [L-2]
- h) What is the importance of highway drainage? [CO-3] [L-2]
- i) Enumerate various types of intersections. [CO-4] [L-1]
- j) Which is better: underpass or overpass? Justify your statement. [CO-5] [L-3] **2×10**

PART-A

- Q.2 a) Enumerate the factors governing the width of carriage way. State the IRC specifications for width of carriageway for various classes of roads. [CO-1] [L-2] **10**
- b) Explain total reaction time of driver and factors on which it depends. Explain PIEV theory and its importance. [CO-1] [L-3] **10**
- Q.3 a) State the factors on which overtaking sight distance depends. Explain briefly. [CO-2] [L-3] **10**
- b) The radius of a horizontal circular curve is 150m. The design speed is 80 Kmph and the design coefficient of lateral friction is 0.15. [CO-2] [L-3]
- i) Calculate the superelevation required if full friction is assumed to be develop
 - ii) Calculate the coefficient of friction needed if superelevation is not provided. [CO-3] [L-4] **10**
- Q.4 Define pavement surface characteristics for safe and comfortable driving. Discuss different aspects of the pavement surface. [CO-3] [L-2] **20**

PART-B

- Q.5 a) Explain the level of service concept while deciding the design capacity of a road. [CO-5] [L-2] **10**
- b) What are the effects of design speed on horizontal alignment design? What are the design speeds for different classes of roads specified by IRC? [CO-4] [L-2] **10**
- Q.6 a) What is a traffic rotatory? What are its advantages and limitation, in particular to traffic conditions in India. [CO-4] [L-2] **10**
- b) What are interchange ramps? With sketches show different types of interchanges and mention their advantages. What are its advantages and limitation, in particular to traffic conditions in Delhi. [CO-4] [L-2] **10**
- Q.7 Explain how surface water is collected and disposed off in i) rural roads ii) in urban roads? [CO-4] [L-3] **20**

End Semester Examination, May 2023
M. Tech. – Second Semester
INTELLIGENT TRANSPORTATION SYSTEM (MCE-TE-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- a) Explain advanced rural transportation system in brief. [CO-4, L-2]
- b) Mention various ITS data collection techniques. [CO-2, L-1]
- c) Vehicle to vehicle communication helps to avoid congestion. Elaborate the statement briefly. [CO-5, L-3]
- d) Explain the term: "ITS" and its importance. [CO-1, L-2]
- e) Write down the components of AVI system. [CO-5, L-1]
- f) Explain the functioning of Traffic Management Centers (TMC). [CO-1, L-2]
- g) Explain the term: dynamic road message sign and its importance. [CO-6, L-2]
- h) Discuss advantages and disadvantages of ITS. [CO-1, L-1]
- i) List down the name of technologies used in western countries to mitigate the traffic congestions. [CO-6, L-1]
- j) Explain information management and its importance in ITS. [CO-3, L-2] **2×10**

PART-A

- Q.2 Explain the benefits of road side communication in detail. [CO-3, L-1] **20**
- Q.3 Discuss the historical development of ITS in detail with some examples. [CO1]L-3] **20**
- Q.4 "Geography Information System (GIS) helps in regulating the traffic flow". Justify this statement. [CO-2, L-4] **20**

PART-B

- Q.5 Discuss the importance of advanced traffic management systems (ATMS) to reduce traffic accidents. [CO-5, L-3] **20**
- Q.6 "Various ITS technologies help to improve the efficiency of commercial vehicle operations". Justify this statement. [CO-4, L-4] **20**
- Q.7 Explain the ITS system of Japan in detail with the help of a case study. [CO-6, L-2] **20**

End Semester Examination, May 2023
M. Tech. – Second Semester
TRANSPORTATION SAFETY AND ENVIRONMENT (MCE-TE-209)

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 term "accident". Also explain the different causes of traffic accidents. [CO1][L2]
- b) Explain the role of road geometrics in road safety with one example. [CO2][L2]
- c) Explain various engineering application to prevent road accidents. [CO2][L2]
- d) Write down the full form of 3E's and their application in mitigation of road accidents. [CO3][L2]
- e) Draw a flowchart of stages in accident/incident investigation. [CO2][L2]
- f) Discuss various elements of accident cost analysis. [CO4][L1]
- g) Explain various objectives of traffic management measures. [CO6][L2]
- h) Discuss various safety measures related to education in brief. [CO6][L1]
- i) Explain the term "road safety audit". Why it is required? [CO2][L2]
- j) Explain various parameters considered during accident data collection analysis. [CO-1] [L-2] **2×10**

PART-A

- Q.2 a) The Motor vehicle fuel consumption in a city is 5.082 million liters, there were 3114 motor vehicle fatalities, 355,799 motor vehicle injuries, 6,721,049 motor vehicle registrations and an estimated population of 18,190,238. Kilometer of travel per liter of fuel is 12.42 km/liter. Calculate registration death rate, population death rate and accident rate per vehicle km. [CO-1] [L-3] **10**
- b) Explain the procedure and importance of accident investigation in reducing the accident rate at a particular location. [CO-2] [L-2] **10**
- Q.3 a) Explain various engineering practices used to prevent road accidents. Citing relevant case study of a city highlight the preventive measures adopted to mitigate road accidents. [CO-3] [L-2] **10**
- b) Justify the statement 'land use planning-a contribution to sustainable land management. [CO-3] [L-4] **10**
- Q.4 a) "Legislation and enforcement have brought in significant reductions in the accident rate". Justify this statement with some suitable examples. [CO-3] [L-4] **10**
- b) Discuss various short-term and long-term measures to provide road safety to the users as a driver and pedestrian. [CO-3] [L-2] **10**

PART-B

- Q.5 a) "Economic analysis is necessary to evaluate the different transport plans". Elaborate this statement with some examples. **10**
- b) A single lane road 50 km long is to be widened to two lanes at a cost of Rs. 8.0 lakhs per km, including all improvements. The cost of operation of vehicles on the

single lane road is Rs. 1.20 per vehicle km, whereas it is Rs. 1.00 per vehicle km on the improved facility. The average traffic may be assumed to 2500 vehicles per day over a design period of 20 years. The interest rate is 10 percent per annum. The cost of maintenance is Rs. 5,000 per km on the existing road and Rs. 10,000 per km on the improved road. Is the investment in the improvement scheme worthwhile?

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

Q.6 Discuss various traffic management measures and their influence in accident prevention. [CO-5] [L-2] **20**

Q.7 a) Explain the term "one-way streets. Also, mention its advantages and disadvantages. [CO-6] [L-2] **10**

b) Evaluate the effectiveness and benefits of different traffic management measures with the help of a relevant case study. [CO-6] [L-2] **10**

End Semester Examination, May 2023

M. Tech. – Second Semester

ADVANCE ALGORITHM (MCS-201)

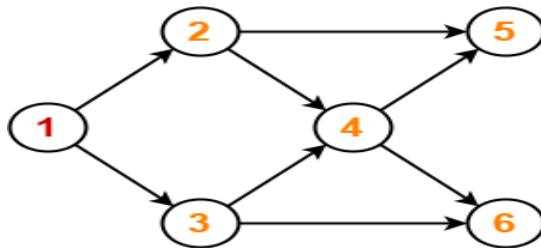
Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; Marks are indicated against each question.

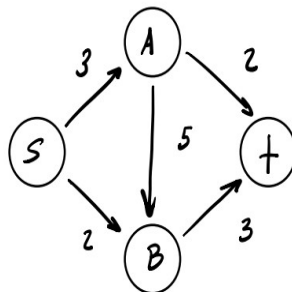
- Q.1 a) Explain quick sort algorithm and simulate it for the following data sequence:
<3 5 9 7 1 4 6 8 2> [CO-1] [L-2] **10**
b) Find the topological ordering for the following graph:



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

- Q.2 a) Discuss matching in a general graph using Edmond's Blossom algorithm. [CO2][L2] **10**
b) Write steps for creating a minimum spanning tree using kruskal's algorithm. [CO-2][L-2] **10**

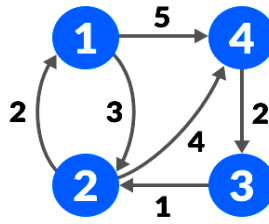
- Q.3 a) Explain the Strassen's Matrix Multiplication algorithm. Compare its efficiency to the simple matrix multiplication algorithm. [CO-4] [L-2] **10**
b) Apply Ford-Fulkerson algorithm to find maximum flow from source s to destination t.



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

- Q.4 a) Write the Chinese remainder theorem. Also find all the integers that leave remainders 1, 2, 3 when divided by 9, 8, 7, respectively using Chinese remainder theorem. [CO-4] [L-3] **10**
b) Explain Greedy paradigm and write algorithm to find maximal weighted independent set. [CO-2] [L-2] **10**
- Q.5 a) Illustrate Monte-Carlo and Las Vegas algorithm with suitable examples. [CO-5][L-3] **10**
b) Explain the terms, NP, NP complete and NP-hard, with the help of examples for each. [CO-1] [L-2] **10**
- Q.6 a) Explain the use of modulo arithmetic in conversion between base-representation and modulo-representation. [CO-2] [L-2] **10**
b) Illustrate the dynamic paradigm concept. [CO-4] [L-2] **10**

- Q.7 a) Consider the following graph to find all pair shortest path using Floyd Warshall algorithm.



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

- b) "Randomized algorithms is a way of life now a days". Comment. [CO-4] [L-2] **10**

- Q.8 a) Illustrate the Edmon Blossom's algorithms with the help of a suitable example.

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

- b) Explain the point value representation of a polynomial with the help of an example.

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

End Semester Examination, May 2023

M. Tech. – Second Semester SOFT COMPUTING (MCS-202)

Time: 3 hrs.

Max Marks: **100**

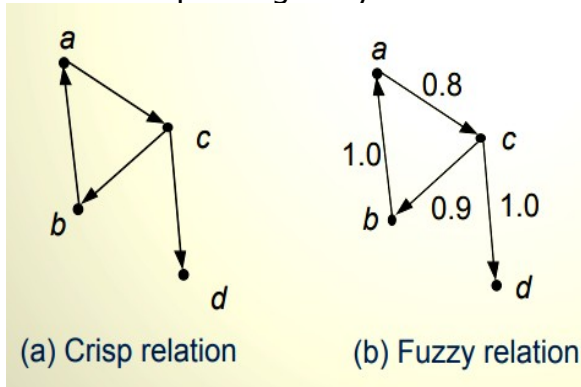
No. of pages: 2

Note: Attempt **FIVE** questions in all; Marks are indicated against each question.

Q.1 Answer briefly:

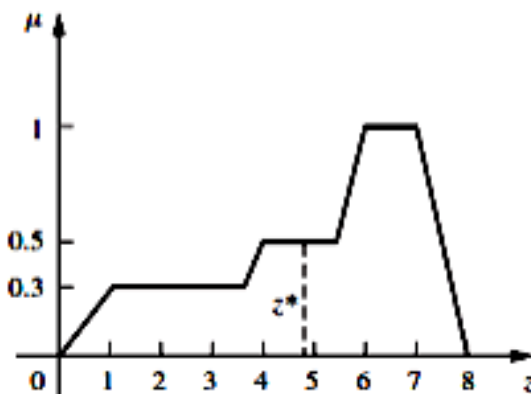
- Represent this relation R by a 2-D membership array, where R is a crisp relation among the two sets $X=\{\text{dollar, pound, franc, mark}\}$ and $Y=\{\text{United States, France, Canada, Britain, Germany}\}$, which associates a country with a currency as follows:
 $R(X,Y) = \{(\text{dollar, United States}), (\text{franc, France}), (\text{dollar, Canada}), (\text{pound, Britain}), (\text{mark, Germany})\}$
- Draw the basic structure for working of genetic algorithm.
- Mention the difference between supervised and unsupervised learning with a real life example. Classification and clustering come under which type of learning.
- What is the difference between hamming distance and Euclidean distance? Find the Hamming distance between (2173896, 2233796).
- Implement for one epoch a single layer perceptron (SLP) N/W to train 'OR' function with binary inputs and targets. {Assume initial weights = 0 and bias $b=0$ }. **4×5**

Q.2 a) Draw corresponding fuzzy matrix w.r.t the graph below:



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

- Define 'de-fuzzification'. Given the fuzzy output, solve it using the centroid de-fuzzification method.



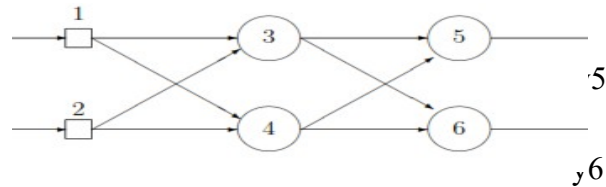
[CO-1] [L-2] **10**

Q.3 We have data from the primary survey and objective testing with two attributes (acid durability and strength) to classify whether a special paper tissue is good or not. The four training samples are as:

X1=(Acid Durability) (seconds)	X2 =(Strength) (Kg/sq meter)	Y= Classification
7	7	Bad
7	4	Bad
3	4	Good
1	4	Good

Now the factory produces a new paper tissue that passes lab test with X1=3, X2 =7. Can we guess the class (good or bad) of this new tissue without going through another survey? (Assume K=3) [CO-2] [L-6] **20**

Q.4 The following diagram represents a feed-forward neural with one hidden layer:



A weight on connection between nodes i and j is

denoted by w_{ij} , such as w_{13} is the weight on the connection between nodes 1 and 3. The following table lists all the weights in the network:

$w_{13} = -2$	$w_{35} = 1$
$w_{23} = 3$	$w_{45} = -1$
$w_{14} = 4$	$w_{36} = -1$
$w_{24} = -1$	$w_{46} = 1$

Each of the nodes 3, 4, 5 and 6 uses the following step function as an activation function:

$$\varphi(v) = \begin{cases} 1 & \text{if } v \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

Calculate the output of the network (y_5 and y_6) for each of the input patterns:

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

- Q.5 a) What is Clustering? Name any three clustering algorithms and explain the working of any one. [CO-4] [L-2] **10**
b) Consider the following data concerning credit default. Age and loan are two numerical cases. Use the training set to classify an unknown case (age=48 and loan=\$142,000) using Euclidean distance and K=1. [CO-4] [L-2] **10**

- Q.6 Consider the following fitness function:
 $f(\langle \text{bitstring} \rangle) = \text{number of 1's in the bitstring where both adjacent bits are 0's}$
For example, $f(010110100) = 2$, $f(100011011) = 0$, and $f(010101010) = 4$.
(Notice that 1's in the first or last position in the string is not counted in the fitness function, even if adjacent to a 0.)
a) Create an initial population containing 4 random 9-bit strings.
b) Discard the 2 least-fit ones (break ties randomly).
c) Do a cross-over using the 2 most fit. The 2 children that result and their parents constitute the next generation.
d) Randomly mutate 1 bit in 1 string in the population.
e) Go to step (b) [CO- 5] [L-4] **5×4**

- Q.7 a) What is the difference between AI, deep learning and machine learning? [CO-5] [L-2] **10**
b) Write six application areas of genetic algorithms and discuss any one. [CO-5] [L-2] **10**

- Q.8 a) Mention any five applications of soft computing in current industry. [CO-6] [L-2] **10**
b) State top five notable trends in deep learning and neural networks. [CO-6] [L-2] **10**

End Semester Examination, May 2023
M.Tech – Second Semester
DATA PREPARATION AND ANALYSIS (MCS-221A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; Marks are indicated against each question.

- Q.1 a) What are the differences between supervised and unsupervised learning? [CO-5] [L-2] **10**
b) How is logistic regression done? [CO-3] [L-3] **10**
- Q.2 a) Explain the steps in making a decision tree. [CO-2] [L-4] **10**
b) How can you avoid over fitting your model? [CO-1] [L-3] **10**
- Q.3 a) What is Z in hypothesis testing? [CO-4] [L-2] **10**
b) Jane has just begun her new job as on the sales force of a very competitive company. In a sample of 16 sales calls it was found that she closed the contract for an average value of 108 dollars with a standard deviation of 12 dollars. Test at 5% significance that population means is at least 100 dollars against the alternative that it is less than 100 dollars. Does company policy require that new members of the sales force must exceed an average? 100 per contract during the trial employment period. Can we conclude that jane has met this requirement at the significance level of 95%? [CO-1] [L-5] **10**
- Q.4 a) Differentiate between clustering and association. [CO-3] [L-3] **10**
b) Explain the significance of the KNN Algorithm. [CO-2] [L-2] **10**
- Q.5 a) What is the difference between the regression model, and the estimated regression equation? [CO-5] [L-2] **10**
b) What is the difference between the coefficient of determination, and coefficient of correlation? [CO-5] [L-2] **10**
- Q.6 a) How can learning curves help create a better model? [CO-5] [L-4] **10**
b) The goal in the predictive analysis is to use training data to learn a model that can make predictions on new data. Suppose we increased the size of the training set. Would this likely improve or deteriorate the performance of the model on new data? Why? [CO-5] [L-4] **10**
- Q.7 a) We generally will be more interested in association rules with high confidence. However, often we will not be interested in association rules that have the confidence of 100%. Why? Then specifically explain why association rules with 99% confidence may be interesting (i.e., what might they indicate)? [CO-4] [L-4] **10**
b) The algorithm that we used to do association rule mining is the Apriori algorithm. This algorithm is efficient because it relies on and exploits the Apriori property. What is the Apriori property? [CO-3] [L-4] **10**

Q.8 Consider learning a target function of form $f : \mathbb{R}^2 \rightarrow \{A, B, C\}$ that is, a function with 3 discrete values defined over the 2-dimensional plane. Consider the Decision trees learning algorithm:

That has been used to learn our target function f , though doing so might require a common extension (e.g., in the case of decision trees, we need to utilize the usual method for handling real-valued input attributes).

- a) Describe assumptions you are making about the Decision tree learning algorithm. [CO-6] [L-4] **10**
- b) Draw in the decision surface that would be learned given this training data (and describing any ambiguities in your decision surface) [CO-4] [L-5] **10**

End Semester Examination, May 2023

M. Tech. – Second Semester COMPUTER VISION (MCS-223)

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) Differentiate between 'computer vision' and 'image processing'. Discuss any three application areas of computer vision. [CO-1][L-4] **10**
b) Compare and contrast the human imaging system with the computer imaging system. [CO-1][L-4] **10**
- Q.2 a) List out any three edge detection methodologies. Write a program in python to detect the edges of an image using these methods. [CO-2][L-1] **10**
b) Discuss the purpose of the corner detection in an image. [CO-2][L-2] **10**
- Q.3 a) Write a program in python to perform the following operations:
i) Rotate the image.
ii) Scale the image.
iii) Add two images.
iv) Convert the color image to grayscale image.
v) Perform bit-wise operations. [CO-3][L-2] **2×5**
b) Discuss the significance of image segmentation. Write a program in python for image segmentation and also apply blur and smoothing operations to the image. [CO-3][L-2] **10**
- Q.4 a) Illustrate the significance of filters. Write a program in python to show the role of different filters. [CO-3][L-3] **10**
b) State and explain the convolution methodology. Explain each of its components. [CO-3][L-2] **10**
- Q.5 a) Demonstrate why data preprocessing and feature extraction are essential factors of image classification. [CO-4][L-3] **10**
b) Differentiate between 'supervised' and 'unsupervised' learning. List out any two algorithms of each and discuss their pros and cons. [CO-5][L-4] **10**
- Q.6 a) Demonstrate the principle of the bayes classifier with a suitable example. [CO-5][L-3] **10**
b) Illustrate the importance of k-means clustering in pattern analysis. [CO-5][L-3] **10**
- Q.7 a) Demonstrate how a face recognition system works? [CO-6][L-3] **10**
b) Show the effectiveness of computer vision technology in healthcare. [CO-6][L-2] **10**
- Q.8 Describe the following terms:
a) Image histograms.
b) Artificial neural network.
c) Principal component analysis.
d) Erosion and dilation. [CO-3,4,5][L-2] **5×4**

End Semester Examination, May 2023

M. Tech. – Second Semester ADHOC NETWORKS (MCS-227)

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) What is the significance of the amplitude of an electromagnetic wave? What does it signify in the photon picture? [CO-1] [L-2] **10**
b) What will happen if the multiple access technologies are not used in the communication system? [CO-1] [L-2] **10**
- Q.2 a) What makes the wireless channel unpredictable? Explain different characteristics of wireless channels. [CO-1] [L-2] **10**
b) Explain the different types of voice recognition system. What are the major challenges with voice recognition? Describe the uses of voice recognition software. [CO-1] [L-2] **10**
- Q.3 a) How does the frequency reuse enhance cellular network capacity? Explain cellular architecture using a neat and clean diagram. [CO-1] [L-3] **10**
b) What uses the Internet rather than traditional communication lines to connect two or more people via telephone? Also explain what do you understand by wireless network optimization? [CO-1] [L-3] **10**
- Q.4 a) What are the two broad categories of MAC protocols for adhoc networks? What are the issues in designing a MAC protocols for adhoc wireless networks?[CO-2] [L-2] **10**
b) What do you mean by contention-based protocols with scheduling mechanism? Explain the advantages of reservation based MAC protocols over contention-based MAC protocols? [CO-2] [L-3] **10**
- Q.5 a) What are the challenging issues in adhoc network maintenance? What characteristics do routing protocols consider when determining the best path? [CO-2] [L-3] **10**
b) What routing technique is applied in flooding and how it will affect the network performance? Which IP address is used for flooding? [CO-2] [L-3] **10**
- Q.6 a) Which is the major issue in designing multicast routing protocol? Which protocol is more bandwidth efficient Rtmac or macaPR? Justify your answer. [CO-3] [L-2] **10**
b) Explain reverse path forwarding. Illustrate the main problem faced in RPF. [CO-3] [L-2] **10**
- Q.7 a) Explain working of any one routing protocol in detail. [CO-3] [L-3] **10**
b) Why secure routing protocols are needed? What are the criteria for a secure routing protocol? What protocol is used for secure routing and switching? [CO-3] [L-3] **10**
- Q.8 Explain the following:
a) Energy efficient multicasting.
b) Multicasting with quality of service guarantee.
c) Application dependent multicast routing. [CO-2][L-3] **20**

End Semester Examination, May 2023
M. Tech. - Second Semester
ANTENNA AND RADIATING SYSTEMS (MEC-201)

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) If the electric field strength of a plane wave is 1V/m, evaluate the strength of magnetic field in space. [CO1] [L-3] **5**
b) An antenna has a field pattern given by $E(\theta) = \cos^2\theta$, for $0^\circ \leq \theta \leq 90^\circ$, evaluate Half Power Beam Width of the antenna. [CO3] [L-5] **5**
c) Differentiate between End-fired and Broad side array. [CO2][L-4] **5**
d) Explain challenges associated with design of the antenna. [CO2][L-3] **5**
- Q.2 a) Explain reflector antenna and its type. [CO3][L-2] **10**
b) Derive mathematical expression for radial component of electric field vector for Hertzian dipole. [CO1][L-4] **10**
- Q.3 a) A Fender image monopole car antenna forming a dipole 62 inch long ($L=1.575\text{m}$) and 1/8 inch in diameter ($a = 0.159\text{cm}$). Monopole antenna treated as dipole model for operating frequency of 1MHz the electrical length is 0.00525λ . Analyze its efficiency and give concluding remark in this case. [CO2][L-4] **10**
b) Derive mathematical expression for directivity of end-fire array. [CO3][L-3] **10**
- Q.4 a) Evaluate the nulls of the total field when $d=\lambda/4$ and $\beta = 0$ for two element array. [CO3][L-3] **10**
b) Design a three element Yagi-Uda antenna to operate at frequency of 172 MHz. [CO2][L-3] **10**
- Q.5 Explain various modeling techniques of Microstrip line patch antenna. [CO4] [L-3] **20**
- Q.6 a) Differentiate between various feeding techniques of Microstrip line patch antenna. [CO-3][L-4] **10**
b) Re-state Huygen's Field Equivalence principle. [CO3][L-3] **10**
- Q.7 a) Calculate the gain of antenna with a circular aperture of diameter 3 m at a frequency of 5 GHz. [CO4][L-3] **10**
b) Explain Friis Transmission equation. [CO1][L-3] **10**

End Semester Examination, May 2023
M. Tech. – Fourth Semester
ADVANCED DIGITAL SIGNAL PROCESSING (MEC-202)

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) State and prove periodicity property of DFT. [CO-1][L-2] **8**
b) Compute the DFT of the following sequence $x(n)$ using the decimation in time FFT algorithm.
$$x(n) = [1, -1, -1, -1, 1, 1, 1, -1].$$
 [CO-1][L-3] **12**
- Q.2 a) List out the conditions for the FIR filter to be linear phase. [CO-1][L-2] **8**
b) Design digital low pass filter using bilinear transformation, given that:
$$H_a(s) = \frac{1}{(s+1)(s+1.732s+1)}.$$

Assume sampling frequency of 100 rad/sec. [CO-1][L-2] **12**
- Q.3 a) Draw the direct form implementation of the FIR system having difference equation $y(n) = x(n) - 2x(n-1) + 3x(n-2) - 10x(n-6)$. [CO-1][L-2] **10**
b) What is the need for multi rate DSP? Explain the process of sampling rate conversion using the decimation and interpolation. [CO-2][L-2] **10**
- Q.4 Discuss how the desirable Kalman filter is different from Wiener filter in estimation? Explain the Kalman- filtering using signal flow graph. [CO-3][L-2] **20**
- Q.5 Draw the block diagram of an adaptive filter as a noise canceller and explain. Compare LMS algorithm with RLS adaptive algorithm. [CO-3][L-2] **20**
- Q.6 a) Discuss in detail the computational requirements of nonparametric methods of power spectrum estimation. [CO-4][L-2] **10**
b) Describe the MA and ARMA models for power spectrum estimation. [CO-4][L-2] **10**
- Q.7 a) Write short notes on:
i) Digital filter banks.
ii) Design of phase shifters. [CO-5][L-2] **5×2**
b) Discuss the application of DSP in speech processing. [CO-5][L-2] **10**

End Semester Examination, May 2023
M. Tech – Second Semester
SENSORS APPLICATIONS IN MANUFACTURING (MEEIR-201)

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) Classify different types of transducers and discuss the characteristics of transducer. [CO-1] [L-2] **10**
b) Explain the block diagram of DC signal conditioning system. [CO-1] [L-3] **10**
- Q.2 a) Recall the concept of an inductive transducer and discuss LVDT in detail. [CO-2] [L-3] **10**
b) Explicit the detection techniques used by photo sensors in the manufacturing industries. [CO-2] [L-4] **10**
- Q.3 a) Deliberate the features of bar code sensors and what are its benefits in manufacturing industries. [CO-1] [L-2] **10**
b) Enumerate the use of color sensors and describe the color sensing algorithms. [CO-1] [L-2] **10**
- Q.4 Enumerate the role of robots with machine vision deliberate the mechanism robots utilizing vision systems to recognize objects. [CO-3] [L-2] **20**
- Q.5 a) Discuss cryogenic manufacturing applications employed in industries. [CO-3][L-2] **10**
b) Discuss the operation of semiconductor absorption sensors employed in manufacturing industries. [CO-3] [L-2] **10**
- Q.6 a) Deliberate tracking the mean time between operations interventions, tracking the yield and mean process time. [CO-5] [L-2] **10**
b) Discuss the networking of sensors for detecting machinery faults. [CO-4] [L-2] **10**
- Q.7 a) Enumerate the usage of analog to digital and digital-to-analog converters in industries. [CO-1] [L-2] **10**
b) Explicit the fuzzy logic for optoelectronic color sensors in manufacturing. [CO-3] [L-2] **10**
- Q.8 Explain the terms:
a) RFID.
b) Microwave sensors. [CO-2] [L-5] **10×2**

End Semester Examination, May 2023
M. Tech. – Second Semester
ROBOTICS FOR INDUSTRIAL AUTOMATION (MEEIR-202A)

Time: 3 hrs.

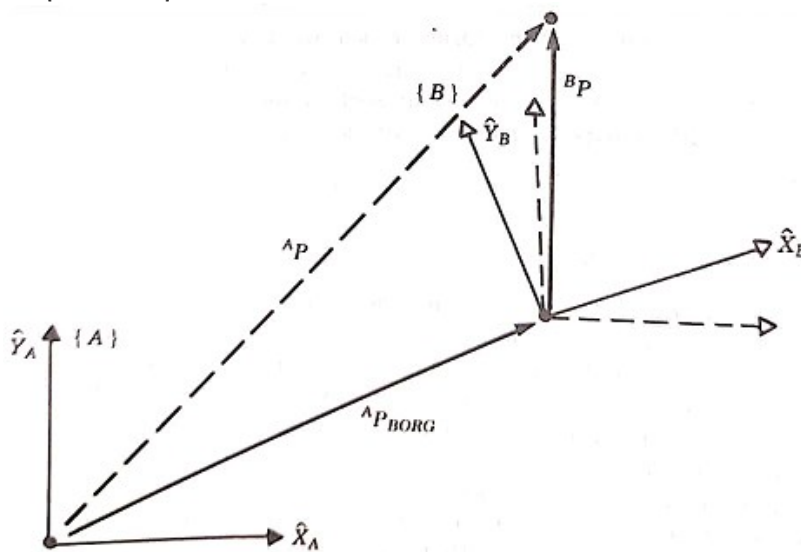
Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; Marks are indicated against each question.

- Q.1 a) What are the different classifications of robots? [CO-1] [L-2] **10**
b) What is a robot gripper? Explain the different grippers used in robot industry. [CO-1] [L-2] **10**

- Q.2 a) Compare different types of drive systems used in robot. [CO-1] [L-2] **10**
b) Figure shows a frame {B} which is rotated relative to frame {A} about \hat{Z} by 30 degrees and translated 10 units in \hat{X}_A and 5 units in \hat{Y}_A . Find ${}^B P$ where ${}^A P = [3 \ 7 \ 0]^T$



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

- Q.3 a) Explain the forward kinematics of a 3 D manipulator. [CO-2] [L-2] **10**
b) Explain D-H notation of link parameters. [CO-2] [L-2] **10**

- Q.4 a) What are the steps involved in trajectory planning? [CO-3] [L-2] **10**
b) Explain cubic polynomial method of path generation in robot. [CO-3] [L-3] **10**

- Q.5 a) What do you mean by tool configuration in robotics. [CO-2] [L-2] **10**
b) Differentiate between linear and rotational velocities of a rigid body. [CO-2] [L-2] **10**

- Q.6 a) Differentiate between on line and offline programming of a robot manipulator. [CO-4] [L-2] **10**
b) Explain the classification of programming languages based on level. [CO-4] [L-2] **10**

- Q.7 Explain any four applications of robots in manufacturing industry. [CO-4] [L-2] **20**

- Q.8 a) Explain some of the important instructions used for robot programming language VAL for motion control and hand control. [CO-4] [L-2] **10**
b) Compare cartesian space scheme and joint space schemes in trajectory planning. [CO-3] [L-3] **10**

End Semester Examination, May 2023
M. Tech. (Automation and Robotics) - Second Semester)
INTERNET OF THINGS (MEEIR-252)

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 in detail the various IoT communication models. [CO1] [L2] **10**
b) Discuss the application and usage of internet of things in
i) Home. ii) Agriculture. [CO1] [L1] **5×2**
- Q.2 a) List the differences between SDN and NFV for internet of things. [CO2] [L3] **10**
b) What role does NETCOZF, YANG-NETCONF play in IoT system management? [CO2] [L2] **10**
- Q.3 a) What are the various data types and functions in python programming? Explain both in detail. [CO3] [L1] **12**
b) Mention the various exception handling Python packages. Explain any one in brief. [CO3] [L3] **8**
- Q.4 a) Explain in detail any one raspberry PI interfaces. [CO4] [L2] **10**
b) Using Python program describe the interfacing of external gadgets with raspberry PI. [CO4] [L3] **10**
- Q.5 Describe in detail about the various cloud storage models. [CO5] [L1] **20**
- Q.6 Discuss in detail:
a) Cloud Computing.
b) Big Data Analytics. [CO1] [L2] **10×2**
- Q.7 a) Define a software defined network. Describe in detail network function virtualization. [CO3] [L2] **12**
b) Mention few important characteristics of internet of things. [CO1] [L1] **8**
- Q.8 Describe in detail the various levels of internet of things. [CO2] [L2] **20**

End Semester Examination, May 2023
M. Tech. – Second Semester
ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS IN AUTOMATION
(MEEIR-253)

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) What is artificial intelligence and how does it differ from traditional programming? [CO-1] [L-3] **6**
b) How do we ensure that AI systems are rational, and what are the challenges in achieving this goal? [CO-1] [L-3] **6**
c) How do intelligent agents perceive their environment and what are the different types of sensors used for this purpose? [CO-1] [L-2] **8**
- Q.2 a) What is iterative deepening search and how can it be used for problem-solving in artificial intelligence? [CO-2] [L-2] **10**
b) Explain A* search, in context with other search algorithms. [CO-2] [L-2] **10**
- Q.3 a) Enlist the common issues with search algorithms, such as local minima or over fitting and how can they be addressed in artificial intelligence. [CO-3] [L-2] **12**
b) What is local search, and how can it be used for optimization problems in artificial intelligence? [CO3,L2] **8**
- Q.4 a) How can machine learning and natural language processing be used to improve knowledge representation in artificial intelligence? [CO-4] [L-3] **10**
b) Explain semantics of Bayesian Networks. How Bayesian networks represent probabilistic relationships between variables? [CO-4] [L-3] **10**
- Q.5 Discuss approximate inference in Bayesian Networks by Markov chain simulation. [CO-4] [L-2] **20**
- Q.6 Which is the reason to use probabilistic reasoning in AI? Explain any expert system architecture. [CO-3] [L-2] **20**
- Q.7 Describe Markov decision processes and how do they use probabilistic reasoning to model decision-making? [CO5, L2] **20**
- Q.8 a) How can heuristics be used for natural language processing or image recognition in AI? What is the effect of heuristics accuracy? [CO-2] [L-2] **10**
b) Discuss Expert system architecture in detail. [CO-5] [L-2] **10**

End Semester Examination, May 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**. Each question carries equal marks.

Q.1 Answer the following (**any four**):

- | | |
|---|------------------------|
| a) Recall the roles and responsibilities of HR manager. | [CO-1][L-1] |
| b) Discuss the concept of job analysis. | [CO-1][L-2] |
| c) List the benefits of induction. | [CO-3,4][L-1] |
| d) Discuss the purposes of training. | [CO-1][L-2] |
| e) Outline the objectives of performance management system. | [CO-5][L-1] |
| f) Discuss retirement 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 process of retirement with its importance in the organization. | [CO-5][L-1] 20 |

PART-B

- | | |
|--|-------------------------|
| Q.5 Discuss the process of career planning and management. | [CO-5][L-2] 20 |
| Q.6 How would you design and determine a compensation structure? | [CO-6][L-6] 20 |
| Q.7 Discuss the following:
a) VRS.
b) Layoff. | [CO-5][L-2] 10×2 |

End Semester Examination, May 2023

M. Tech. – Fourth Semester

COMPOSITE MATERIALS (M-ID-005)

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 What do you understand by "Glass Fiber in Construction Materials"? Explain the Properties and Application of Glass Fiber. [CO-3][L-2] **20**
- Q.2 Explain the Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance. [CO-4][L-3] **20**
- Q.3 a) Explain Isostrain and Isostress conditions in detail with figure. [CO-4][L-3] **10**
b) What are the mechanical, physical and chemical properties of metal matrix composites and how do they compare to traditional engineering materials such as metals, polymers, and ceramics? [CO-3][L-3] **10**
- Q.4 Write short notes on:
a) Casting-solid state diffusion technique.
b) Cladding-Hot isostatic pressing.
c) Applications of whiskers.
d) Carbon fiber composites (CFCs). [CO-2][L-2] **5×4**
- Q.5 Describe the manufacturing process of ceramic matrix composite and metal matrix composite and also explain the main difference between the manufacturing process of both the composites. [CO-5][L-3] **20**
- Q.6 Write in detail the Classification, Characteristics and Application of Composite Materials. [CO-1][L-1] **20**
- Q.7 a) What is autoclave method for polymer matrix composite and how to use this method? [CO-5][L-3] **10**
b) What are the various types of reinforcement used in polymer matrix composites and how do they affect the properties of composite materials? [CO-4][L-3] **10**
- Q.8 a) What is the relation between Interacting failure criteria and hygrothermal failure criteria? Explain in detail about both the failure criteria. [CO-5][L-2] **10**
b) Explain the steps involved in the production of carbon composite and also write application of carbon composite. [CO-3][L-3] **10**

End Semester Examination, May 2023
M. Tech – Second Semester
ENGLISH FOR RESEARCH PAPER WRITING (M-MC-002)

Time: 2 hrs.

Max Marks: **50**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all; Marks are indicated against each question.

- Q.1 Answer **any two** of the following:
- a) Review of literature.
 - b) Abstract.
 - c) How to avoid ambiguity in a research paper.
 - d) Result writing.
- [CO-3][L-4] **5×2**
- Q.2 Define ways to structure a paragraph while writing a research paper. [CO-2][L-1] **10**
- Q.3 What is plagiarism? Define a few ways to avoid it. [CO-3][L-2] **10**
- Q.4 Describe about the way of planning and preparation for a dissertation. [CO-1][L-3] **10**
- Q.5 What is an abstract? Define the skills required to write it. [CO-4][L-2] **10**
- Q.6 Define the ways in which one can write a proper conclusion for a research paper. [CO-5][L-1] **10**
- Q.7 Write the introduction of any proposed research paper you might be writing. [CO-3][L-5] **10**

End Semester Examination, May 2023

M. Tech. – Second Semester

INVENTORY MANAGEMENT (MME-201)

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 Memorize and state the inventory decisions in the conditions of certainty, risk and uncertainty in brief. [CO-1,3][L-1] **20**
- Q.2 a) Distinguish between 'P and Q inventory management system'. [CO-3][L-4] **10**
b) List the types of inventories in a manufacturing industry. [CO-1][L-1] **10**
- Q.3 Appraise the cost and profit implications in holding inventory. Also state the costs associated with inventory in brief. [CO-2][L-5] **20**
- Q.4 a) Distinguish between carrying the inventory or not holding the adequate inventory. [CO-4][L-4] **10**
b) Recognize the importance of logistics as interface function of demand forecasting. [CO-2,5][L-2] **10**
- Q.5 a) Following data are given for an item of uniform demand instantaneously delivery time and back order facility:
Annual demand = 800 units
Cost of an item = Rs. 40
Ordering cost = Rs. 800 per order
Inventory carrying cost = 40%
Back order cost = Rs. 10
Find out:
i) Minimum order quantity.
ii) Maximum number of back orders.
iii) Maximum inventory level.
iv) Time between orders. [CO-4,6][L-1] **10**
b) Examine the benefits of Just-in-time (JIT) in inventory management. [CO-5][L-4] **10**
- Q.6 Demonstrate the evolution of MRP into manufacturing resource planning (MRP11) in brief. [CO-4][L-3] **20**
- Q.7 a) Discuss "Kanban" in detail. [CO-5][L-2] **12**
b) Interpret the roles of inventory manager in handling enterprise resource planning (ERP) in present day industrial context. [CO-6][L-2] **8**
- Q.8 a) Differentiate between centralized and decentralized stores. [CO-6][L-4] **10**
b) Discuss the various functions and importance of store management. [CO-4][L-2] **10**

End Semester Examination, May 2023
M. Tech. – Second Semester
OPERATIONS PLANNING AND CONTROL (MME-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following:

- a) Define 'PPC and state its objectives'. [CO1][L-1] **5**
- b) State the function of Production Planning and Control (PPC) [CO1][L-2] **5**
- c) Explain the function of production planning control department in a apparel (Clothing) industry. [CO1][L-5] **10**

PART-A

- Q.2 a) Define "Seasonality Index". Why is seasonality important for forecasting? [CO2][L-3] **5**
- b) Should forecast be stable or responsive? Explain in the context of the following:
i) Service industry ii) Manufacturing industry iii) Retail sector. [CO3][L-4] **15**

Q.3 Write short notes on the following:

- a) Usage of VED analysis.
- b) Application of ABC analysis in pharmaceutical industries. [CO3,4][L-3,4] **10×2**

- Q.4 "MRP works because it is a well organized structure of processes and calculation". Elaborate. [CO4,5][L-4,5] **20**

PART-B

- Q.5 a) State the functions of production control. What are the strategies used in production planning and scheduling? [CO1][L-1, L-2] **7**
- b) Brief on the determinant that helps in determining the production system. Explain "intermittent production system" and "continuous production system". [CO5][L3] **13**

- Q.6 In Fixopan Machines (P) Ltd, there are five jobs, each of which has to be processed on two machines A and machine B in the order of AB. Processing time in minutes are given in the following table:

Job	Machine A	Machine B
1	6	3
2	3	7
3	10	8
4	4	9
5	11	5

Determine the optimal sequence in which the jobs should be processed so as to minimize the total processing time. [CO6][L-6] **20**

Q.7 Write short notes on the following:

- a) Aggregate planning.
- b) Make a Buy decision.
- c) Capacity requirement planning.
- d) Master production schedule.

End Semester Examination, May 2023
M. Tech – Second Semester
FLEXIBLE MANUFACTURING SYSTEM (MME-221)

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 flexible manufacturing system and its evolution from mechanized machines to contemporary flexible manufacturing system. [CO-2][L-3] **20**
- Q.2 Discuss in detail the various types of layouts used in FMS design. Explain briefly about their applications. [CO-2][L-2] **20**
- Q.3 Define "Robot" and describe elements of robotic system. Discuss the various types of robotic joints and state their applications. [CO-1][L-2] **20**
- Q.4 Describe various methods of robot programming. Explain the features of VAL and AML robot programming. [CO-2][L-4] **20**
- Q.5 Explain the term group technology. Discuss part classification and write various coding system. Why the group technology is developed? Write its advantages. [CO-3][L-4] **20**
- Q.6 Discuss the automated guided vehicle architecture in detail. Explain its practical applications in modern industries. [CO-4][L-3] **20**
- Q.7 State the various types of material handling and transportation system used in FMS. Describe their individual domain of application for which they are used with their relative advantages and disadvantages. [CO-3][L-2] **20**
- Q.8 Write short notes on the following:
a) Machine tool controllers and handling system.
b) Programmable logic controller. [CO-2][L-3] **10×2**

End Semester Examination, May 2023

M. Tech – Second Semester COMPUTER VISION (MME-223)

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) Differentiate between computer vision and image processing. Discuss any three application areas of computer vision. [CO-1][L-4] **10**
b) Compare and contrast the human imaging system with the computer imaging system. [CO-1][L-4] **10**
- Q.2 a) List out any three edge detection methodologies. Write a program in python to detect the edges of an image using these methods. [CO-2][L-1] **10**
b) Discuss the purpose of the corner detection in an image. [CO-2][L-2] **10**
- Q.3 a) Write a program in python to perform the following operations:
i) rotate the image.
ii) scale the image.
iii) add two images.
iv) convert the color image to grayscale image.
v) perform bit-wise operations. [CO-3][L-2] **2×5**
b) Discuss the significance of image segmentation. Write a program in python for image segmentation and also apply blur and smoothing operations to the image. [CO-3][L-2] **10**
- Q.4 a) Illustrate the significance of filters. Write a program in python to show the role of different filters. [CO-3][L-3] **10**
b) State and explain the convolution methodology. Briefly explain each of its components. [CO-3][L-2] **10**
- Q.5 a) Demonstrate why data preprocessing and feature extraction are essential factors of image classification. [CO-4][L-3] **10**
b) Differentiate between supervised and unsupervised learning. List out any two algorithms of each and discuss their pros and cons. [CO-5][L-4] **10**
- Q.6 a) Demonstrate the principle of the bayes classifier with a suitable example. [CO-5][L-3] **10**
b) Illustrate the importance of k-means clustering in pattern analysis. [CO-5][L-3] **10**
- Q.7 a) Demonstrate how a face recognition system works. [CO-6][L-3] **10**
b) Show the effectiveness of computer vision technology in healthcare. [CO-6][L-2] **10**
- Q.8 Describe the following terms:
a) Image histograms.
b) Artificial neural network.
c) Principal component analysis.
d) Erosion and dilation. [CO-3,4,5][L-2] **4×5**

End Semester Examination, May 2023
M. Tech – Second Semester
QUALITY CONTROL TECHNIQUES (MME-231)

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 Demonstrate quality and discuss the critical dimensions of product quality with a case study. In addition, discuss cost of quality in detail. [CO-2,3][L-3] **20**
- Q.2 Discuss the significant of QFD and QFD steps in detail. In addition, draw house of quality with sketches. [CO-2,3,][L-3] **20**
- Q.3 Differentiate control charts for variables and attributes in detail with help of examples in addition discuss the significance of control chart for variables. [CO-3,4][L-4] **20**
- Q.4 Demonstrate seven tools of quality control in detail with help of examples. [CO-4,5][L-4] **20**
- Q.5 Describe six sigma DMAIC methods and tools used in detail. In addition, discuss the role of key players in six sigma organizational structure. [CO-4,6][L-2] **20**
- Q.6 Discuss the significance of FMEA and illustrate various steps of failure modes and effects analysis in detail with suitable examples. [CO-5,6][L-4] **20**
- Q.7 Taguchi quality loss functions with help of examples. Compare goal post approach with Taguchi loss function approach. [CO-5][L-6] **20**
- Q.8 Demonstrate the steps for successful implementation of ISO in an organization with help of a case study. [CO-5][L-6] **20**

End Semester Examination, May 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 the following in brief:

- a) What are bulk and trace elements? Give examples.
- b) Define the structure and function of mitochondria with a diagram.
- c) Compare BER and NER.
- d) What are the functions of DNA polymerase III?
- e) What is charged RNA?
- f) What is a nucleosome?
- g) What is a BAC?
- h) What is alternate splicing?
- i) What is wobble hypothesis?
- j) List various kinds of cellular communication.

2×10

PART-A

Q.2 Explain the composition, structure and function of plasma membrane. [CO-2][L-2] **20**

Q.3 Explain the semi conservative DNA replication in eukaryotes with a schematic. Give reasons how the fidelity of the double helix is maintained. [CO-3][L-2] **20**

Q.4 Explain a prokaryotic promoter. Discuss in detail eukaryotic transcription and post transcriptional RNA processing using a schematic. [CO-4][L-2] **20**

PART-B

Q.5 DNA damage can be repaired by various pathways. List various physical and chemical modifiers of DNA and explain briefly various repair processes. [CO-1] [L-2] **20**

Q.6 Make use of your understanding of the course and explain the journey of a polypeptide post translation in eukaryotes, with illustration. [CO-5] [L-3] **20**

Q.7 Phenotype is the outcome of the gene and environment effect. Using a flow chart, explain various steps wherein gene expression is regulated. [CO-6] [L-3] **20**

End Semester Examination, May 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.

Q.1 Answer the following in brief:

- a) Differentiate between 'discrete and continuous random' variable. [CO1] [L2]
- b) What is a sampling distribution? [CO4] [L2]
- c) What is the difference between 'skewness and kurtosis'? [CO1] [L2]
- d) How is mean related to mode? Give example. [CO1] [L2]
- e) Derive a relationship between 'arithmetic mean' and 'geometric mean'. [CO1] [L4]
- f) For a certain population we define the following events for mother's age at time of giving birth: A = under 20 years; B = 20–24 years; C = 25–29 years; D = 30–44 years. Are the events A, B, C, and D pairwise mutually exclusive? [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 = {56, 10, 15, 27, 45, 96, 78, 100, 36, 66, 75} [CO1] [L4]
- i) What are moments? [CO1] [L2]
- j) Give two examples of events with mutually exclusive outcomes? [CO2] [L2] **2×10**

PART-A

Q.2 a) The following data on serum cholesterol levels was collected for U.S. females:

Population	Age	Mean	Standard Deviation
A	20–29	183	37.2
B	30–39	189	34.7

- Suppose we select a simple random sample of size 50 independently from each population. What is the probability that the difference between sample means will be more than 8? [CO4] [L5] **10**
- b) Smith et al. performed a retrospective analysis of data on 782 eligible patients admitted with myocardial infarction to a 46-bed cardiac service facility. Of these patients, 248 (32 percent) reported a past myocardial infarction. Use 0.32 as the population proportion. Suppose 50 subjects are chosen at random from the population. What is the probability that over 40 percent would report previous myocardial infarctions? [CO4] [L5] **10**

- Q.3 For the following set of observations, calculate the 1st, 2nd and 3rd quartile along with the interquartile range:

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

[CO3] [L5] **20**

- Q.4 Coughlin et al. examined the breast and cervical screening practices of Hispanic and non-Hispanic women in counties that approximate the U.S. southern border region. The study used data from the Behavioral Risk Factor Surveillance System surveys of adults age 18 years or older conducted in 1999 and 2000. The table below reports the number of observations of Hispanic and non-Hispanic women who had received a mammogram in the past 2 years cross-classified with marital status.

Marital Status	Hispanic	Non-Hispanic	Total
Currently Married	319	738	1057
Divorced or Separated	130	329	459
Widowed	88	402	490
Never Married or Living As an Unmarried Couple	41	95	136
Total	578	1564	2142

- We select at random a subject who had a mammogram. What is the probability that she is divorced or separated?
- We select at random a subject who had a mammogram and learn that she is Hispanic. With that information, what is the probability that she is married?
- We select at random a subject who had a mammogram. What is the probability that she is non-Hispanic and divorced or separated?
- We select at random a subject who had a mammogram. What is the probability that she is Hispanic or she is widowed?
- We select at random a subject who had a mammogram. What is the probability that she is not married?

[CO4] [L6] **4×5**

PART-B

- Q.5 The following are the cystatin C levels (mg/L) for the patients. Cystatin C is a cationic basic protein that was investigated for its relationship to GFR levels. In addition, creatinine levels are also given. Calculate the coefficient of variation comparing the variability of Cystatin C and Creatinine. Which according to you is more variable?

Cystatin C (mg/L)		Creatinine (mmol/L)	
1.78	4.69	0.35	0.14
2.16	3.78	0.30	0.11
1.82	2.24	0.20	0.09
1.86	4.93	0.17	0.12
1.75	2.71	0.15	0.07
1.83	1.76	0.13	0.12
2.49	2.62	0.14	0.11
1.69	2.61	0.12	0.07
1.85	3.65	0.24	0.10
1.76	2.36	0.16	0.13
1.25	3.25	0.17	0.09
1.50	2.01	0.11	0.12
2.06	2.51	0.12	0.06
2.34			

Q.6 Butz et al. evaluated the duration of benefit derived from the use of noninvasive positive pressure ventilation by patients with amyotrophic lateral

Sclerosis on symptoms, quality of life, and survival. One of the variables of interest is partial pressure of arterial carbon dioxide (PaCO₂). The values below (mm Hg) reflect the result of baseline testing on 30 subjects as established by arterial blood gas analyses. For the following set of observations, calculate the mean, median, mode and range.

40.0	47.0	34.0	42.0	54.0	48.0	53.6	56.9	58.0	45.0
54.5	54.0	43.0	44.3	53.9	41.8	33.0	43.1	52.4	37.9
34.5	40.1	33.0	59.9	62.6	54.1	45.7	40.6	56.6	59.0

Q.7 Given $\mu = 50$; $\sigma = 16$, and $n = 64$, find:

- (a) $P(45 \leq \bar{x} \leq 55)$ (b) $P(\bar{x} > 53)$
 (c) $P(\bar{x} < 47)$ (d) $P(49 \leq \bar{x} \leq 56)$

Normal Distribution

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	.0001	.0001	-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	.0004	.0004	.0004	-3.30
-3.20	.0005	.0005	.0005	.0005	.0005	.0005	.0005	.0005	.0005	.0005	-3.20
-3.10	.0007	.0007	.0008	.0008	.0008	.0008	.0009	.0009	.0009	.0009	-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	.0025	-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	.1095	.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

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	.9994	.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

1.

2.

End Semester Examination, May 2023
M. Sc. (Biotechnology) – Second Semester
GENETIC ENGINEERING AND APPLICATIONS (MS-BT-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 Answer the following in brief:

- a) Describe atleast two utilities of the Taq polymerase. [CO-1][L-2]
- b) For cloning into a TOPO vector, how would you treat your blunt ended insert which has a 5' phosphate group and why? [CO-2][L-3]
- c) Would you choose Klenow fragment for converting sticky ends of a piece of DNA to blunt ends? Give reasons. [CO-5] [L-5]
- d) For construction of a human genomic DNA library, what vector would you select? Give reasons for your choice. [CO-5] [L-5]
- e) Describe the principle of Nanopore sequencing technology. [CO-1] [L-2]
- f) Differentiate between DNA foot printing different and DNA finger printing. [CO-4] [L-2]
- g) For transformation of plant embryos, would you choose biolistics method or calcium chloride method of DNA transfer? Why? [CO-3] [L-3]
- h) You performed site-directed mutagenesis to introduce a point mutation in your gene of interest. How would you confirm that the gene has been mutated? [CO-6] [L-3]
- i) Is it possible to sequence an RNA without converting it into cDNA? Explain. [CO-6][L-3]
- j) List at least three reasons for cloning a gene in mammalian cells. [CO-5][L-2] **2×10**

PART-A

Q.2. Design an experiment to examine methylation status of a DNA sequence by using a combination of Mbo I/Nde II, Dpn I and Sau3A I restriction enzymes. Explain the substrate specificity of these enzymes. [CO-5][L-6] **20**

Q.3 Illustrate the steps for Topo-cloning. [CO-2] [L-3] **20**

Q.4 Mention two of the selectable markers carried by cloning vectors and their usage. [CO-1][L-2] **20**

PART-B

Q.5 Propose a methodology for sequencing the genome of an isolated bacteria. [CO-3][L-6] **20**

Q.6 Design a methodology for identifying DNA binding sequence of a protein. [CO-6][L-6] **20**

Q.7 Describe the DNA transfer by microinjection, biolistics transformation, calcium chloride method, lipid mediated transfer, electroporation and Ti plasmid mediated transformation. [CO-2][L-3] **20**

End Semester Examination, May 2023
M. Sc. (Biotechnology/Microbiology) – Second Semester
BIOPROCESS TECHNOLOGY (MS-BT-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

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

Q.1 Answer the following in brief:

- | | |
|---|-----------------------|
| a) List various inoculation methods. | [CO1][L1] |
| b) What are growth factors? Name the various growth factors. | [CO3][L1] |
| c) What are secondary metabolites? | [CO2][L1] |
| d) Write the Monod equation for specific growth. | [CO3][L1] |
| e) Draw the labeled diagram of a bioreactor. | [CO3][L3] |
| f) List significance of RSM. | [CO1][L1] |
| g) Name the various types of culture media based on consistency. | [CO3][L1] |
| h) Draw the diagram of radiant streaking. | [CO2][L1] |
| i) Distinguish between submerged and solid-state fermentation. | [CO3][L1] |
| j) Draw the labeled diagram of dead end and cross flow filtrations. | [CO3][L3] 2×10 |

PART-A

- Q.2 Describe general features of an ideal strain. Describe the various strategies for strain improvement. [CO1][L2] **20**
- Q.3 Explain the bioprocess optimization. Describe the various strategies for bioprocess optimization. [CO3][L2] **20**
- Q.4 Explain the basic design and operation of a bioreactor. [CO6][L2] **20**

PART-B

- Q.5 Explain the various steps involved in downstream processing. [CO5][L2] **20**
- Q.6 Describe cell disruption. Explain various methods of cell disruption. [CO4][L2] **20**
- Q.7 What is primary and secondary purification? Describe the various methods of purification of an API. [CO6][L2] **20**

End Semester Examination, May 2023
M. Sc. (Biotechnology) – Second Semester
BIOINFORMATICS AND COMPUTATIONAL BIOLOGY (MS-BT-203)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- | | |
|--|-------------------------|
| a) What do you mean by maximum parsimony? | [CO-3][L-1] |
| b) Distinguish between 'CDS and ORF'. | [CO-4][L-1] |
| c) Enlist two pair wise sequence alignment tool used to find homology. | [CO-5][L-1] |
| d) Explain role of promoter in gene prediction. | [CO-6][L-3] |
| e) Define "paralogous and orthologous gene". | [CO-5][L-1] |
| f) What are the factors considered while comparing gene structure? | [CO-4][L-1] |
| g) Why structure of gene is so important? | [CO-5][L-1] |
| h) Explain "Nucleotide sequence databases". | [CO-1][L-3] |
| i) Explain "Contrast global alignment with local alignment. | [CO-2][L-2] |
| j) Define "Infer bio-simulation using suitable example". | [CO-2][L-1] 2×10 |

PART-A

- Q.2 a) Discuss the approaches used to analyze biological sequences. [CO-1][L-3] **5**
b) Explain the process of collecting and storing sequences in laboratory. [CO1][L-3] **15**

- Q.3 a) Examine any sequencing method used to annotate sequence. [CO-2][L-1] **14**
b) Compare Genbank and EMBL sequence format using suitable example. [CO-2][L-2] **6**

- Q.4 Show sequence alignment using dynamic programming for the given sequences GCTG and GTTC upto trace back using +1, -1 and 0 for match, mismatch and gap penalty respectively. [CO-2][L-4] **20**

PART-A

- Q.5 Construct multiple sequence alignment using UPGMA method taking five species nucleotide sequence of 8 base pair for phylogenetic prediction? [CO-4][L-3] **20**

- Q.6 a) Apply computational steps involved in gene prediction. [CO-5][L-5] **10**
b) Compile information one can extract from comparison of different genome. [CO-5][L-5] **10**

- Q.7 Explain the method which helps to annotate functional classification of gene. [CO-6][L-6] **20**

End Semester Examination, May 2023

M. Sc. (Biotechnology) – Second Semester IMMUNOLOGY (MS-BT-222)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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) Granulocyte monocyte progenitor is the precursor of which cell types. [CO1][L1]
- b) Draw and label the general structure of an antibody. [CO3][L1]
- c) What are polyclonal antibodies? [CO3][L1]
- d) List the enzymes which aid in antimicrobial activity by producing reactive oxygen/nitrogen species. [CO2][L2]
- e) What are anaphylatoxins? [CO4][L1]
- f) What is HAT medium? [CO4][L1]
- g) What is the significance of RAG? [CO5][L2]
- h) What is a xenograft? [CO6][L1]
- i) Compare tumor specific antigen and tumor associated antigen. [CO6][L2]
- j) What is type I hypersensitivity reaction? [CO5][L1] **2×10**

PART-A

- Q.2 a) Define 'immunity'. Classify various types of immunity. [CO-1][L-2] **10**
b) Differentiate between 'innate' and 'adaptive immunity'. [CO-1][L-2] **10**
- Q.3 a) Compare monoclonal and polyclonal antibodies. [CO-3][L-2] **10**
b) How are mAbs produced? Describe with well labeled diagram. [CO-3][L-2] **10**
- Q.4 SARS CoV 2 infects the human respiratory epithelial cells. Discuss the mechanism of antigen presentation and effector immune response in Covid 19 infection. [CO-4][L3] **20**

PART-B

- Q.5 a) Explain the significance of complement. [CO-2] [L-2] **10**
b) Compare classical and alternate complement pathways. [CO-2] [L-2] **10**
- Q.6 a) What are primary and secondary immunodeficiency disorders? [CO-5] [L-1] **10**
b) Histoincompatibility leads to host vs graft disease. Discuss the effector mechanisms resulting in graft rejection. [CO-5] [L-3] **10**
- Q.7 Population in the Indian sub-continent is being detected with novel infection, which is being rapidly spread. Detection and diagnosis are essential for containment. If you are given the task to identify the pathogen and diagnose it, how would you do it? Explain the process. [CO-6] [L-6] **20**

End Semester Examination, May 2023
M. Sc. (Biotechnology)/(Microbiology) – Second Semester
HUMAN GENOME (MS-BT-223)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 genome? [CO-1][L-2]
- b) Give two examples of types of RNA. [CO-2][L-2]
- c) Differentiate between 'A- and Z-DNA'. [CO-3][L-2]
- d) What is haplotype? [CO-2][L-1,2]
- e) What are biomarkers? [CO-2][L-1,2]
- f) What is polymorphism? [CO-2][L-1,2]
- g) How are microsatellites different from mini satellites? [CO-2][L-1,2]
- h) What DNA markers can be typed using capillary electrophoresis? [CO-4][L1,2]
- i) What is an F plasmid? [CO-4][L1,2]
- j) What is an ARMS test? [CO-4][L1,2] **2×10**

PART-A

Q.2 Write short notes on **(any four)**:

- a) VNTRs.
- b) SSLPs.
- c) SNPs.
- d) Mutation as double edged sword.
- e) Solution hybridization techniques. [CO3][L3] **5×4**

Q.3 Write a note on next generation sequencing. Use diagrams wherever necessary.

[CO-2][L2] **20**

Q.4 Explain what is massively parallel signature sequencing? Use diagrams wherever necessary.

[CO-2][L2] **20**

PART B

Q.5 Discuss the objectives of human genome sequencing project and the salient features of the human genome. [CO-3][L1] **20**

Q.6 Discuss the methodology used during the human genome project. Elaborate in detail using a flowchart/diagram. [CO-3][L3] **20**

Q.7 What is comparative Genomics? What is Hapmap and 1000 genomes project? How they are utilized? [CO-4][L2] **20**

End Semester Examination, May 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 the following in brief:

- a) Assess the use of activated sludge in waste water treatment.
- b) What do you mean by reed-swamp stage?
- c) What are the characteristic effluents of tanning industry?
- d) Differentiate between 'phyco-volatization' and 'myco-remediation'.
- e) Give three examples of metal-microbe interactions.
- f) Explain the concept of bioavailable fraction of heavy metals in soil.
- g) Define 'resources according to CBD'.
- h) Define 'hotspots of biodiversity'.
- i) Differentiate between endemic and keystone species.
- j) Evaluate the relationship between bio prospecting and bio piracy.

2×10

PART-A

- Q.2 a) What do you understand by waste water treatment? Explain the classification of waste water treatment systems with the help of the flow charts and suitable diagrams. [CO-3] [L-2] **15**
- b) How oil and grease can be removed from waste water? [CO-2] [L-3] **5**
- Q.3 a) Give a detailed account of mechanisms of metal resistance in microorganisms. [CO-4] [L-1] **10**
- b) Classify the most common ways microbes use or interact with metals. [CO-4] [L-1] **10**
- Q.4 a) What is bioremediation? Discuss the role of microbes in environmental cleanup. [CO-5] [L-1] **10**
- b) Differentiate between 'natural and induced hyper accumulators'. Discuss the mechanism and types of phytoremediation. [CO-2] [L-3] **10**

PART-B

- Q.5 a) Summarize the key indicators of sustainable development. [CO-6] [L-2] **10**
- b) Compare the different models of sustainable development. [CO-6] [L-2] **10**
- Q.6 a) Illustrate the Cartagena Protocol and what is its objective? How is Nagoya Protocol different from Cartagena Protocol? [CO-1] [L-2] **15**
- b) Analyze the role of modern Biotechnology in sustainable development. [CO-5][L-3] **5**
- Q.7 a) Define 'biodiversity' and explain its various levels. [CO-1] [L-1] **10**
- b) What is the IUCN? How are species classified in the IUCN red list? [CO-6] [L-1] **10**

End Semester Examination, May 2023
M. Sc. (Microbiology) – Second Semester
SYSTEMATIC BACTERIOLOGY (MS-MB-201)

Time: 3 hrs.
100

Max Marks:

No. of pages: 1

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

- Q.1 Answer the following in brief:
- a) Justify 4 Postulates of Koch's with an example. [CO-6][L-2]
 - b) In what conditions normal flora get converted to opportunistic pathogen. [CO5][L4]
 - c) Microflora is absent in eccrine gland. why so. [CO-6][L-1]
 - d) What are the metabolic reactions performed by the bacteria when they cause dental caries? [CO-5][L-1]
 - e) Compare the cell wall of gram positive bacteria with gram negative bacteria. [CO-3][L-4]
 - f) Explain similarity between the order thermoproteales and desulfurococcales. [CO-3][L-2]
 - g) Methylophils are ecologically significant. Justify the statement. [CO-3][L-5]
 - h) Classify anoxygenic phototrophs. [CO-2][L-2]
 - i) Write important characteristic of sulphur reducing bacteria. [CO-1][L-1]
 - j) The Calvin cycle is dependent on ATP. Justify the statement with a flow diagram. [CO-1][L-5] **2×10**

PART-A

- Q.2 Distinguish the type of bacteria on the basis of bacteria phylogenetics. [CO-1][L-4] **20**
- Q.3
- a) Compare photosystem I and Photosystem II with the help of z scheme. [CO2][L4] **10**
 - b) Discuss the appendages in bacteria. [CO-2][L-2] **10**
- Q.4
- a) Compare archaea with bacteria. Also mention five similarities between archaeobacteria and eubacteria. [CO-3][L-4] **10**
 - b) Define mycoplasma and discuss industrial importance. [CO-4][L-2] **10**

PART-B

- Q.5
- a) Assess the industrial importance of gram positive cocci. [CO-3][L-5] **10**
 - b) Why do you think halophiles are well adapted to their environment? [CO4][L2] **10**
- Q.6
- a) Discuss Human micro flora and what conditions may alter this. [CO-3][L-5] **10**
 - b) Differentiate between probiotics and prebiotics. [CO-3][L-5] **10**
- Q.7
- a) Elaborate the importance of normal flora of human oral cavity. Imagine a situation where the oral-microflora is disturbed due to excessive use of antibiotics, how can this be detrimental to oral cavity? [CO-3][L-5] **10**
 - b) Explain various steps involved in the pathogenesis of caused by a bacteria. [CO-3][L-5] **10**

End Semester Examination, May 2023
M. Sc. (Microbiology) – Second Semester
MOLECULAR IMMUNOLOGY AND IMMUNOGENETICS
(MS-MB-204)

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) Define the terms: 'innate and adaptive immunity'. [CO:1][L-1]
- b) Contrast between humoral and cellular immune response. [CO:2][L-2]
- c) Illustrate the process of phagocytosis. [CO:1][L-3]
- d) Determine the effect of pepsin and papain treatment on antibody structure. [CO:3][L-4]
- e) Outline the ways by which antibody diversity generated. [CO:2][L-4]
- f) Elaborate a technique by which one can detect the presence of antibody in the serum. [CO:6][L-6]
- g) Discuss the principle of Ouchterlony double diffusion immune assay. [CO:4][L-2]
- h) Explain the role of cytokine in cancer immunity. [CO:5][L-2]
- i) Contrast between direct and indirect ELISA. [CO:6][L-4]
- j) Comment on Bombay blood groups. [CO:3][L-1] **2×10**

UNIT-I

- Q.2 a) Describe structure organization and function of skin-associated lymphoid tissue (SALT). [CO:1][L-1] **10**
- b) Discuss the antibody structure, types and functions in detail. [CO:1][L-3] **10**
- Q.3 Contrast classic and Lectin complement pathway. Explain the formation and significance of membrane attack complex. [CO:2][L-5] **20**

UNIT-II

- Q.4 a) Explain major histocompatibility complex? Outline the role of MHC I and MHCII in the activation of T Cell response against antigen. [CO:1][L-4] **10**
- b) Outline the role of TAAs and TSAs in cancer. [CO:2][L-4] **10**
- Q.5 Illustrate cancer immunotherapy. Explain different methods for cancer immunotherapy. [CO:4][L-5] **20**

UNIT-III

- Q.6 a) Describe the genetic basis and significance of ABO blood group. [CO:5][L-2] **10**
- b) Illustrate the molecular genetic basis of Rh blood group system. Why is the D antigen considered the major antigen of the Rh system? [CO:4][L-3] **10**
- Q.7 Discuss the principle of immunoelectrophoresis. Contrast between Direct and Indirect immunoelectrophoresis. Design an experiment for the detection of antibody in the serum by ELISA. [CO:6][L-6] **20**

End Semester Examination, May 2023
M. Sc. (Microbiology) –Second Semester
VIROLOGY, MYCOLOGY AND PARASITOLOGY (MS-MB-224)

Time: 3hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. 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 structural and functional features of viroids and satellites. [CO-1][L-2]
 - b) Prions have fundamental similarities as well as differences from other subviral infectious particles. How? [CO-1][L-3]
 - c) Give examples of two viruses that are associated with cancer. [CO-2][L-1]
 - d) Differentiate between lysogenic and lytic lifestyles of bacteriophages. [CO2][L-2]
 - e) Why is it important to understand the mode of viral transmission? [CO-2][L-3]
 - f) List the five phyla of fungi with the characteristic features associated with each. [CO-3][L-1]
 - g) Differentiate between yeast and mold. [CO-3] [L-2]
 - h) If you need to assign taxonomy to a fungi, design a methodology to do this by using molecular methods. [CO-4][L-6]
 - i) How does *Leishmania* avoid its destruction by the host immune system? [CO-6][L-2]
 - j) Describe the two membrane-bound organelles of endosymbiotic origin that are found in the species of *Plasmodium*. [CO-5][L-2] **2×10**

PART-A

- Q.2 Give examples of oncogenic viruses and explain one of the oncogenic mechanisms used by a virus. [CO-2][L-3] **20**
- Q.3 Describe the replication strategies of the following viruses: i) Positive sense RNA virus with sgRNA; ii) Ambisense RNA virus. [CO-1] [L-3] **20**
- Q.4 Discuss the following translation strategies used by viruses: IRES, leaky scanning, polyprotein processing, ribosome shunting. [CO-1][L-2] **20**

PART-B

- Q.5 Demonstrate the ecological and economic importance of *Ascomycetes* and its contribution to biological research. [CO-4][L-2] **20**
- Q.6 Describe the life cycle of *Plasmodium*. [CO-5] [L-3] **20**
- Q.7 Explain the mechanism(s) by which *Entamoeba histolytica* induces tissue damage. [CO-6][L-3] **20**

End Semester Examination, May 2023

B. Tech. – Second Semester

APPLIED PHYSICS-II (PH-201A)

Time: 3 hrs.

Max. Marks: **100**

No. of pages: **1**

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

Q.1 Answer the following in brief:

- Draw lattice planes (101) and (200) in simple cubic unit cell.
- What is a primitive unit cell?
- What do you understand by a substrate?
- Explain traps in brief.
- Describe in brief the photoconductive process.
- Write an expression for Bohr magneton and explain the terms in it.
- Write one application each of soft and hard magnetic materials.
- Explain isotopic effect in superconductors.
- Name two high temperature superconductors.
- Give two reasons why the properties of materials changes at nanoscale? **2×10**

PART-A

- Q.2
- What do you understand by Schottky defects? Derive an expression for concentration of Schottky defects. [CO-5] [L5] **10**
 - What is Hexagonal closed packed (HCP) structure? Show that c/a ratio for HCP is $(8/3)^{1/2}$. [CO-1] [L5] **7**
 - A simple cubic crystal has atomic radius of 1.75 Å. Determine the spacing of planes having Miller indices as (111). [CO-5] [L5] **3**
- Q. 3
- Discuss Hall Effect and derive an expression for Hall coefficient. [CO-1] [L3] **7**
 - Explain any two of the following epitaxial techniques for crystal growth:
 - Vapour phase epitaxy.
 - Liquid phase epitaxy.
 - Molecular beam epitaxy.[CO-2] [L2] **10**
 - Give three important properties of semiconductors. [CO-1] [L1] **3**
- Q.4
- Discuss the simple model of a photoconductor. [CO-4] [L3] **10**
 - Explain briefly principle, construction and working of a photoconductive cell. Also give its two applications. [CO-3] [L3] **10**

PART-B

- Q. 5
- Derive an expression for the magnetic dipole moment of an atom. [CO-5] [L5] **8**
 - Distinguish between 'diamagnetism' and 'paramagnetism'. [CO-1] [L2] **6**
 - Differentiate between 'hard and soft' magnetic materials. [CO-4] [L3] **6**
- Q. 6
- Derive London equations and discuss how its solution explain Meissner effect and flux penetration. [CO-1] [L2] **12**
 - What are Type I and Type II superconductors? [CO-1] [L2] **8**
- Q. 7
- Explain nanoscience and nanotechnology. Discuss the basics of quantum well, quantum wire and quantum dot. [CO-2] [L2] **10**
 - Write short notes on **(any two)** of the following:
 - Sputtering.
 - Electrical properties of nanomaterials.
 - Applications of Carbon Nanotubes.[CO-6] [L2] **10**