

Time: 3 Hours**Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

- | | | Marks | CO | BTL |
|----|--|-------|-----|-----|
| 1. | a) What is meant by ethics? Discuss the importance of ethics in Artificial Intelligence, and explain why ethical considerations are crucial in the development and deployment of AI systems. | 7 | CO1 | K2 |
| | b) Explain Deontological ethics and examine how it is applied in rule-based AI systems, particularly in safety-critical domains. | 7 | CO1 | K4 |

(OR)

- | | | | | |
|----|--|---|-----|----|
| 2. | a) Discuss the importance of ethics in Artificial Intelligence in today's digital society, and explain the potential risks associated with unethical AI systems. | 7 | CO1 | K4 |
| | b) Explain Utilitarianism as an ethical theory, and analyze how its principles can be applied in AI decision-making systems. | 7 | CO1 | K4 |

UNIT-II

- | | | | | |
|----|---|---|-----|----|
| 3. | a) Examine the impact of human bias on AI systems, and explain how biases from developers, annotators, and decision-makers shape the behaviour and outcomes of AI. | 7 | CO2 | K4 |
| | b) Describe the key approaches to mitigating bias in AI systems, and explain pre-processing, in-processing, and post-processing techniques with appropriate examples. | 7 | CO2 | K3 |

(OR)

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|----|---|---|-----|----|
| 4. | a) Case Study: Facial recognition systems have been criticized for higher error rates among certain demographic groups. a) Identify the different types of bias present. b) Discuss the ethical and social implications of this bias. | 7 | CO2 | K4 |
| | b) Case Study: Predictive algorithms used in criminal justice or hiring systems often show biased outcomes. a) Explain why such biases occur. b) Identify the stakeholders affected. | 7 | CO2 | K4 |

UNIT-III

5. a) Explain the significance of data privacy in AI systems and discuss why safeguarding personal data is essential in modern AI applications. 7 CO3 K4
- b) Define privacy-preserving AI techniques and explain any three methods, such as data anonymization, differential privacy, and federated learning. 7 CO3 K3

(OR)

6. a) Define surveillance technologies and describe the various types of surveillance systems used today along with their applications. 7 CO3 K2
- b) How does differential privacy protect individual data? Explain its working principle and discuss its practical applications. 7 CO3 K3

UNIT-IV

7. a) What is meant by a “black-box” AI model, and why do such models present challenges to transparency and trust? 7 CO4 K4
- b) Explain the concept of Explainable AI (XAI) and discuss how it enhances transparency and accountability in AI systems. 7 CO4 K2

(OR)

8. a) Compare interpretable models with post-hoc explanation methods, highlighting their respective advantages and limitations. 7 CO4 K4
- b) Explain how transparency contributes to accountability in AI systems, using suitable real-world examples. 7 CO4 K4

UNIT-V

9. a) What is Human-Centred AI? Explain its core principles and discuss its significance in ethical AI design. 7 CO5 K4
- b) What are the future trends in AI ethics and regulation? Discuss the emerging challenges associated with generative AI, surveillance, and automation. 7 CO5 K4

(OR)

10. a) Discuss the ethical challenges associated with autonomous systems, with particular reference to self-driving cars. 7 CO5 K4
- b) Analyze the role of international organizations in shaping global AI ethics guidelines and regulations. 7 CO5 K4

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UNIT-I

| Marks | CO | BTL |
|-------|-----|-----|
| 14M | CO1 | K3 |

1. Solve the following linear programming problem using graphical method

$$\text{Minimize } Z = 4x_1 + 6x_2$$

Subjective to the constraints

$$x_1 \leq 2$$

$$x_2 \leq 4$$

$$x_1 + x_2 \geq 3$$

$$x_1, x_2 \geq 0$$

(OR)

2. Solve the following linear programming problem using Simplex method

| Marks | CO | BTL |
|-------|-----|-----|
| 14M | CO1 | K3 |

$$\text{Maximize } Z = 24x_1 + 48x_2$$

Subject to the constraints

$$x_1 + 2x_2 \leq 48$$

$$2x_1 + x_2 \leq 60$$

$$x_1, x_2 \geq 0$$

UNIT-II

3. a) Explain the classification of assignment problem with examples.

| Marks | CO | BTL |
|-------|-----|-----|
| 4M | CO2 | K2 |

- b) A company has four machines are available to do four different jobs. Time (hrs) that each machine takes to do each job is known and given in following table. Determine the assignment of machines to jobs that will minimize the total time.

| Marks | CO | BTL |
|-------|-----|-----|
| 10M | CO2 | K3 |

| | Jobs | | | | |
|----------|------|----|----|----|----|
| Machines | | J1 | J2 | J3 | J4 |
| | M1 | 18 | 26 | 17 | 11 |
| | M2 | 13 | 28 | 14 | 26 |
| | M3 | 38 | 19 | 18 | 15 |
| | M4 | 19 | 26 | 24 | 10 |

(OR)

4. a) Explain the classification of transportation problem with examples. 4M CO2 K2
- b) A company has three factory F1, F2 and F3 each producing 75, 95 and 125 units of a similar product. There are three warehouses W1, W2, W3 having demand 55, 65 and 75 units respectively. Find the cost of transportation from factories to warehouse by using i) North West corner method, ii) least cost method iii) Vogel's approximation method. 10M CO2 K3

| Factory | Warehouse | | | Capacities |
|---------|-----------|----|----|------------|
| | W1 | W2 | W3 | |
| F1 | 18 | 21 | 15 | 75 |
| F2 | 16 | 22 | 26 | 95 |
| F3 | 16 | 15 | 16 | 125 |
| Demand | 55 | 65 | 75 | |

UNIT-III

5. a) Find the maximum or minimum of the function 7M CO3 K3
 $Z = X_1^2 + X_2^2 + X_3^2 - 4X_1 - 8X_2 - 12X_3 + 100$
- b) Maximize 7M CO3 K3

$$Z = 2X_1^2 - 7X_2^2 + 12X_1X_2$$

$$\text{Subjected to } 2X_1 + 5X_2 \leq 98$$

$$X_1, X_2 \geq 0$$

using Kuhn-Tucker conditions

(OR)

6. a) Differentiate linear programming problem and non-linear programming problem 7M CO3 K3
- b) Solve the following problem using method of Lagrangian multipliers 7M CO3 K3

$$Z = 4X_1^2 + 2X_2^2$$

$$\text{Subjected to}$$

$$X_1 + X_2 = 15,$$

$$X_1, X_2 \geq 0$$

UNIT-IV

7. a) Explain the characteristics of queuing theory. 7M CO4 K2
- b) A department store has only one cashier. During the rush hours customer arrives at a rate of 20 customers per hour. The average number of customers that can be handled by the cashier is 24 customers per hour. Assume that the condition for use of the single channel queuing model determine 7M CO4 K3
- (a) Utilization parameter (or) Traffic intensity
- (b) Average number of customers in the queue.
- (c) Average number of customers in the system
- (d) Average time a customer spends in the queue.
- (e) Average number of customers spend in the system
- (f) Probability that cashier is idle

(OR)

8. a) If for a period of two hours in a day (8-10 AM) train arrives at the yard every 20 minutes. But the service time continues the remaining 36 minutes then calculate for this period. 7M CO4 K3
(a) Utilization parameter (or) Traffic intensity
(b) Average number of trains in the system.
(c) Average number of trains in the system
(d) Average waiting time a train spend in the queue
(e) Average number of trains spend in the system
(f) The Probability that the yard is empty.
- b) Train arrives at the yard at every 15 minutes and service time is 33 minutes. If the capacity of the yard is limited to 4 trains. Determine 7M CO4 K3
(a) Utilization parameter (or) Traffic intensity
(b) Average number of trains in the system.
(c) Average number of trains in the system
(d) Average waiting time a train spend in the queue
(e) Average number of trains spend in the system
(f) The Probability that the yard is empty.

UNIT-V

9. a) ABC Corporation to launch one of its mega campaigns to promote a special product. The promotion budgets not yet finalized, but they know that some Rs. 55,00,000 is available for advertising and promotion. Management wants to know how much they should spend for television spots, which is the most appropriate medium for their product. They have created five 'T.V. campaign strategies' with their projected outcome in terms of increase in sales. Find which one they have to select to yield maximum utility. The data required is given below. 7M CO5 K3

| <i>Strategy</i> | <i>Cost in lakhs of Rs.</i> | <i>Increased in sales in lakhs of Rs.</i> |
|-----------------|-----------------------------|---|
| <i>A</i> | 1.80 | 1.78 |
| <i>B</i> | 2.00 | 2.02 |
| <i>C</i> | 2.25 | 2.42 |
| <i>D</i> | 2.75 | 2.68 |
| <i>E</i> | 3.20 | 3.24 |

- b) A marketing manager of an insurance company has kept complete records of the sales effort of the sales personnel. These records contain data regarding the number of insurance policies sold and net revenues received by the company as a function of four different sales strategies. The manager has constructed the conditional payoff matrix given below, based on his records. (The state of nature refers to the number of policies sold). The number within the table represents utilities. Suppose you are a new salesperson and that you have access to the original records as well as the payoff matrix. Which strategy would you follow?

| State of nature | N_1 | N_2 | N_3 |
|----------------------------------|---------|---------|---------|
| Probability | 0.2 | 0.5 | 0.3 |
| Strategy ↓ | Utility | Utility | Utility |
| S_1 (1 call, 0 follow up) | 4 | 6 | 10 |
| S_2 (1 call, one follow up) | 6 | 5 | 9 |
| S_3 (1 call, two follow-ups) | 2 | 10 | 8 |
| S_4 (1 call, three follow-ups) | 10 | 3 | 7 |

10. a) Differentiate decision making under certainty, decision making under risk, decision making under uncertainty
- b) A company is planning for its sales targets and the strategies to achieve these targets. The data in terms of three sales targets, their respective utilities, various strategies and appropriate probability distribution are given in the table given below. What is the optimal strategy?

| Sales targets (\times lakhs) | 50 | 75 | 100 | | | |
|---------------------------------|-------|-------|-------|--|--|--|
| Utility | 4 | 7 | 9 | | | |
| | Prob. | Prob. | Prob. | | | |
| Strategies | | | | | | |
| S_1 | 0.6 | 0.3 | 0.1 | | | |
| S_2 | 0.2 | 0.5 | 0.3 | | | |
| S_3 | 0.5 | 0.3 | 0.2 | | | |

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| | | Marks | CO | BTL |
|-----------------|---|-------|----|-----|
| UNIT-I | | | | |
| 1. | a) Define Blockchain and explain its fundamental components such as blocks, hashing, nodes, and consensus mechanisms. | 7 | 1 | L1 |
| | b) What are Smart Contracts ? Explain their working mechanism and advantages. | 7 | 1 | L1 |
| (OR) | | | | |
| 2. | a) Compare Public, Private, and Hybrid Blockchains with suitable examples. | 7 | 1 | L2 |
| | b) Explain the concept of a Blockchain Wallet . Describe its types and working process. | 7 | 1 | L2 |
| UNIT-II | | | | |
| 3. | a) Explain about any three types of consensus mechanisms. | 7 | 2 | L2 |
| | b) How is a new block validated in a Blockchain? Explain the validation process. | 7 | 2 | L1 |
| (OR) | | | | |
| 4. | a) Compare centralized vs decentralized consensus mechanisms and their impact on security and performance. | 7 | 2 | L5 |
| | b) Explain the concept of Mining in Blockchain and its significance. | 7 | 2 | L2 |
| UNIT-III | | | | |
| 5. | a) Describe the steps to create an account in MetaMask and explain its key features. | 7 | 3 | L4 |
| | b) Explain the Bitcoin scripting language and its role in transaction validation. | 7 | 3 | L2 |
| (OR) | | | | |
| 6. | a) Analyse the process of funding a wallet using a faucet and its importance in testing environments. | 7 | 3 | L4 |
| | b) Discuss the structure of the Bitcoin blockchain and the working of Bitcoin transactions. | 7 | 3 | L6 |
| UNIT-IV | | | | |
| 7. | a) Explain the architecture of Ethereum and the role of Ethereum Virtual Machine (EVM). | 7 | 4 | L5 |
| | b) Discuss identities and policies in Hyperledger Fabric and their significance. | 7 | 4 | L6 |
| (OR) | | | | |
| 8. | a) Explain the role of Ethereum in building DeFi (Decentralized Finance) applications. | 7 | 4 | L2 |
| | b) Describe the transaction validation process in Hyperledger Fabric . | 7 | 4 | L4 |
| UNIT-V | | | | |
| 9. | a) Explain how Internet of Things and Blockchain work together. Discuss real-world applications. | 7 | 5 | L2 |
| | b) Discuss the role of government regulations in Blockchain adoption. Discuss their advantages and limitations. | 7 | 5 | L6 |
| (OR) | | | | |
| 10. | a) Explain how fraud detection works using blockchain and ML. | 7 | 5 | L2 |
| | b) Discuss the major technical challenges in Blockchain , such as scalability, security, and energy consumption. | 7 | 5 | L6 |

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UNIT-I

- | | | Marks | CO | BTL |
|----|--|-------|-----|-----|
| 1. | a) Define E-waste and explain its sources with suitable examples. | 7 | CO1 | L2 |
| | b) Describe the composition of E-waste in detail, mentioning metals, plastics, glass, and other materials. | 7 | CO1 | L2 |

(OR)

- | | | | | |
|----|---|---|-----|----|
| 2. | a) Summarize the Indian scenario of E-waste generation and management with suitable data. | 7 | CO1 | L2 |
| | b) Discuss the environmental and health implications caused by improper handling and disposal of E-waste. | 7 | CO1 | L2 |

UNIT-II

- | | | | | |
|----|---|---|-----|----|
| 3. | a) Explain the objectives and key provisions of the Basel Convention. | 7 | CO2 | L2 |
| | b) Demonstrate the India's stand on liberalizing while importing hazardous e waste. | 7 | CO2 | L2 |

(OR)

- | | | | | |
|----|---|---|-----|----|
| 4. | a) Differentiate the e-waste economy in the organized and unorganized sectors in India. | 7 | CO2 | L2 |
| | b) Discuss the estimation and recycling of e-waste in major metro cities of India. | 7 | CO2 | L2 |

UNIT-III

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|----|--|---|-----|----|
| 5. | a) Outline the concept, objectives and implementation of Extended Producer Responsibility (EPR) with respect to E-waste Management | 7 | CO3 | L2 |
| | b) Illustrate the importance of permissions related to import of E waste. | 7 | CO3 | L2 |

(OR)

- | | | | | |
|----|--|---|-----|----|
| 6. | a) Elaborate the Administrative and Engineering Controls required for e-waste management in India. | 7 | CO3 | L2 |
| | b) Explain various strategies for reduction of e-waste at source. | 7 | CO3 | L2 |

UNIT-IV

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|----|---|---|-----|----|
| 7. | a) Summarize the salient features of E-waste (Management and Handling) Rules, 2011 | 7 | CO4 | L2 |
| | b) Compare the advantages and disadvantages of E-waste management rules of 2011 and 2016 rules. | 7 | CO4 | L2 |

(OR)

- | | | | | |
|----|--|---|-----|----|
| 8. | a) Explain the implications of E-waste (Management) Rules, 2016 rules on E-waste management practices in India | 7 | CO4 | L2 |
| | b) Discuss the significance of government assistance for Treatment, Storage, and Disposal Facilities of E-waste. | 7 | CO4 | L2 |

UNIT-V

- | | | | | |
|----|---|---|-----|----|
| 9. | a) Explain the Basel Convention on Control of Transboundary Movements of Hazardous Waste. | 7 | CO5 | L2 |
| | b) Discuss the significance of the Bamako Convention | 7 | CO5 | L2 |

(OR)

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|-----|--|---|-----|----|
| 10. | a) Illustrate the WEEE directive in terms of collection, recycling and recovery of targets. | 7 | CO5 | L2 |
| | b) Summarize the features of Restrictions of Hazardous substances (ROHS) directive to solve the toxic E-waste in Electrical and electronics equipment. | 7 | CO5 | L2 |

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- | | | | Marks | CO | BTL |
|------------------------|----|---|-------|-----|----------|
| <u>UNIT-I</u> | | | | | |
| 1. | a) | Apply the concept of Business Planning to explain the fundamental overview of business planning for a new venture. | 7M | CO1 | Apply |
| | b) | Analyze the differences between the three types of business pitches. | 7M | CO1 | Analyze |
| (OR) | | | | | |
| 2. | a) | Analyze why Business Planning is considered a critical first step for any entrepreneur. | 7M | CO1 | Analyze |
| | b) | Evaluate the effectiveness of Elevator Pitch, Investor Pitch, and Product Pitch for different business situations | 7M | CO1 | Evaluate |
| <u>UNIT-II</u> | | | | | |
| 3. | a) | Apply the concept of the Business Model Canvas (BMC) to explain how it can be used in developing a business idea. | 7M | CO2 | Apply |
| | b) | Evaluate how an entrepreneur can design a UVP that distinguishes their product from existing market solutions | 7M | CO2 | Analyze |
| (OR) | | | | | |
| 4. | a) | Analyze the nine building blocks of the Business Model Canvas and their interaction in forming a cohesive business strategy | 7M | CO2 | Apply |
| | b) | Apply the concept of Unique Value Proposition (UVP) in identifying value for a new product or service | 7M | CO2 | Evaluate |
| <u>UNIT-III</u> | | | | | |
| 5. | a) | Apply the concept of financial projections while planning a start-up venture. | 7M | CO3 | Apply |
| | b) | Analyze the importance of realistic financial forecasts for the sustainability of a start-up. | 7M | CO3 | Analyze |
| (OR) | | | | | |
| 6. | a) | Write a note on impact of Financial statement while planning a start-up venture. | 7M | CO3 | Apply |
| | b) | Analyze the sources of funds to start a business? | 7M | CO3 | Analyze |
| <u>UNIT-IV</u> | | | | | |
| 7. | a) | Apply the fundamentals of public speaking in delivering an effective business presentation | 7M | CO4 | Apply |
| | b) | Evaluate different techniques for overcoming stage fright before and during a pitch. | 7M | CO4 | Analyze |
| (OR) | | | | | |
| 8. | a) | Analyze the core skills required by an entrepreneur to deliver a successful pitch. | 7M | CO4 | Apply |
| | b) | Apply suitable techniques to manage anxiety during a business presentation. | 7M | CO4 | Evaluate |
| <u>UNIT-V</u> | | | | | |
| 9. | a) | Apply professional presentation etiquette in preparing for a final business presentation. | 7M | CO5 | Apply |
| | b) | Evaluate how elements such as attire, opening remarks, and closing statements contribute to professional delivery. | 7M | CO5 | Evaluate |
| (OR) | | | | | |
| 10. | a) | Analyze the role of storytelling and Q&A management in an effective presentation | 7M | CO5 | Apply |
| | b) | Evaluate how a presenter can maintain narrative flow while responding to disjointed audience questions | 7M | CO5 | Evaluate |

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| | | <u>UNIT-I</u> | Marks | CO | BTL |
|------------------------|----|--|-------|-----|-----|
| 1. | a) | Define Human Resource Development (HRD). Explain its scope and significance in modern organizations. | 7 | CO1 | K2 |
| | b) | Discuss the concept of Training and Development. Differentiate between training and development with suitable examples. | 7 | CO1 | K2 |
| (OR) | | | | | |
| 2. | a) | Explain the various methods of training. Classify them into on-the-job and off-the-job training methods. | 7 | CO1 | K2 |
| | b) | Describe the process of Assessing Training Needs and explain how Training and Development programmes are designed and evaluated. | 7 | CO1 | K2 |
| <u>UNIT-II</u> | | | | | |
| 3. | a) | Explain the concept and importance of Performance Appraisal in an organization. | 7 | CO2 | K2 |
| | b) | Discuss the traditional methods of performance appraisal with their merits and limitations. | 7 | CO2 | K2 |
| (OR) | | | | | |
| 4. | a) | Explain the modern methods of performance appraisal and highlight how they differ from traditional methods. | 7 | CO2 | K2 |
| | b) | Define Job Evaluation. Explain the methods of job evaluation used in organizations. | 7 | CO2 | K2 |
| <u>UNIT-III</u> | | | | | |
| 5. | a) | Explain various methods of payment and discuss the role of incentives and rewards in employee motivation. | 7 | CO3 | K2 |
| | b) | Explain the concept of Industrial Relations and discuss the emerging trends and practices in Human Resource Management. | 7 | CO3 | K2 |
| (OR) | | | | | |
| 6. | a) | Define Compensation Management. Explain the principles and factors influencing compensation. | 7 | CO3 | K2 |
| | b) | Discuss the emerging trends in compensation management in the context of globalization and technology. | 7 | CO3 | K2 |
| <u>UNIT-IV</u> | | | | | |
| 7. | a) | Define Organizational Behaviour (OB). Explain its scope, challenges, and opportunities in organizations. | 7 | CO4 | K2 |
| | b) | Discuss the foundations of individual behaviour in organizations. | 7 | CO4 | K2 |
| (OR) | | | | | |
| 8. | a) | Explain the motivation theories of Maslow, ERG, and McGregor and compare their relevance in the workplace. | 7 | CO4 | K2 |
| | b) | Explain group dynamics and discuss different leadership styles and their impact on organizational performance. | 7 | CO4 | K2 |
| <u>UNIT-V</u> | | | | | |
| 9. | a) | Define Organizational Conflict. Explain its causes and consequences in organizations. | 7 | CO5 | K2 |
| | b) | Discuss the process of conflict and negotiation and their role in organizational effectiveness. | 7 | CO5 | K2 |
| (OR) | | | | | |
| 10. | a) | Explain organizational change and describe the change management process. | 7 | CO5 | K2 |
| | b) | Define Organizational Development (OD). Explain its concept, significance, and role in managing resistance to change. | 7 | CO5 | K2 |

III B. Tech II Semester Supplementary Examinations, April-2026
UNCONVENTIONAL MACHINING PROCESS
(MECHANICAL ENGINEERING)

Time: 3 Hours

Max Marks: 60

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| | | <u>UNIT-I</u> | Marks | CO | BTL |
|-----|----|--|-------|----|-----|
| 1. | a) | Explain the need for unconventional machining processes with suitable industrial examples. | 5 M | 1 | K2 |
| | b) | Describe the working principle of Ultrasonic Machining (USM) with neat sketch. | 5 M | 1 | K2 |
| | | (OR) | | | |
| 2. | a) | Discuss the mechanism of material removal in USM. | 5 M | 1 | K3 |
| | b) | Explain various process parameters affecting MRR in USM. | 5 M | 1 | K3 |
| | | <u>UNIT-II</u> | | | |
| 3. | a) | Explain Abrasive Jet Machining (AJM) with a neat sketch. | 5 M | 2 | K2 |
| | b) | Compare WJM and AWJM processes with applications. | 5 M | 2 | K2 |
| | | (OR) | | | |
| 4. | a) | Explain the working principle of Water Jet Machining (WJM). | 5 M | 2 | K2 |
| | b) | Discuss the effect of abrasive size and velocity on MRR in AJM. | 5 M | 2 | K3 |
| | | <u>UNIT-III</u> | | | |
| 5. | a) | Explain the fundamentals of Electro Chemical Machining (ECM). | 5 M | 3 | K2 |
| | b) | Discuss tool design considerations in ECM | 5 M | 3 | K2 |
| | | (OR) | | | |
| | a) | Discuss advantages and limitations of CHM. | 5 M | 3 | K2 |
| 6. | b) | Explain Chemical Machining (CHM) process with masking techniques. | 5 M | 3 | K2 |
| | | <u>UNIT-IV</u> | | | |
| 7. | a) | Explain the general principle of Electric Discharge Machining (EDM) with a neat sketch. Discuss its working steps in detail. | 5 M | 4 | K2 |
| | b) | Describe the mechanics of material removal in EDM. | 5 M | 4 | K2 |
| | | (OR) | | | |
| 8. | a) | Explain the working principle of Electric Discharge Grinding (EDG) with a neat sketch. | 5 M | 4 | K2 |
| | b) | Analyze the factors affecting surface finish and machining accuracy in EDM. Suggest methods to improve them. | 5 M | 4 | K2 |
| | | <u>UNIT-V</u> | | | |
| 9. | a) | Explain basic principle of Plasma Arc Machining (PAM). | 5 M | 5 | K2 |
| | b) | Compare EBM and LBM processes. | 5 M | 5 | K2 |
| | | (OR) | | | |
| 10. | a) | Discuss process parameters affecting EBM performance. | 5 M | 5 | K2 |
| | b) | Explain applications of LBM in modern industries. | 5 M | 5 | K2 |
| | | <u>UNIT-VI</u> | | | |
| 11. | a) | Explain the principle and working of Electro Stream Drilling (ESD) with a neat sketch. | 5 M | 6 | K2 |
| | b) | Discuss the factors influencing surface finish and dimensional accuracy in STEM. | 5 M | 6 | K2 |
| | | (OR) | | | |
| 12. | a) | Differentiate between penetration drilling and dwell drilling in ESD. Explain their working mechanisms. | 5 M | 6 | K2 |
| | b) | Explain the principle and working of Shaped Tube Electrolytic Machining (STEM) with a neat sketch. | 5 M | 6 | K2 |

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| | | <u>UNIT-I</u> | Marks | CO | BTL |
|-----|----|---|-------|-----|-----|
| 1. | a. | Design a simple network architecture using TCP/IP model and explain how data flows through layers. | 5 | CO1 | K3 |
| | b. | Compare wired and wireless access networks based on performance and reliability. | 5 | CO1 | K4 |
| | | (OR) | | | |
| 2. | a. | Demonstrate how different access networks (DSL, Cable, Wireless) are used in real scenarios. | 5 | CO1 | K3 |
| | b. | Apply the ATM reference model to design a basic communication system. | 5 | CO1 | K3 |
| | | <u>UNIT-II</u> | | | |
| 3. | a. | Describe the working of Distance Vector Routing Protocols (RIP, RIPv2, EIGRP). | 5 | CO2 | K2 |
| | b. | Describe different congestion control algorithms used in networks. | 5 | CO2 | K2 |
| | | (OR) | | | |
| 4. | a. | Explain the concept of Link State Routing Protocol (OSPF) and its features. | 5 | CO2 | K2 |
| | b. | What is flooding? Write applications of Flooding | 5 | CO2 | K2 |
| | | <u>UNIT-III</u> | | | |
| 5. | a. | Explain the structure of a network switch and its components. | 5 | CO3 | K2 |
| | b. | Illustrate the configuration of VLAN Trunking Protocol (VTP) in a network. | 5 | CO3 | K3 |
| | | (OR) | | | |
| 6. | a. | Apply Spanning Tree Protocol (STP) to identify root bridge and prevent loops. | 5 | CO3 | K3 |
| | b. | Describe the basic switch configuration process in a LAN environment. | 5 | CO3 | K2 |
| | | <u>UNIT-IV</u> | | | |
| 7. | a. | Explain the Point-to-Point Protocol (PPP) and its features in WAN communication. | 5 | CO4 | K2 |
| | b. | What is the Dynamic Host Configuration Protocol (DHCP) and Describe the DHCP process from the initial request to the final configuration. | 5 | CO4 | K2 |
| | | (OR) | | | |
| 8. | a. | Compare PPP and HDLC protocols in terms of features and performance. | 5 | CO4 | K4 |
| | b. | Compare IPv4 and IPv6 in terms of addressing, header format, and features. | 5 | CO4 | K4 |
| | | <u>UNIT-V</u> | | | |
| 9. | a. | Explain how MANETs differ from traditional infrastructure-based networks. | 5 | CO5 | K2 |
| | b. | Explain the application of MANETs in Vehicular Ad hoc Networks (VANETs). | 5 | CO5 | K2 |
| | | (OR) | | | |
| 10. | a. | Describe proactive, reactive, and hybrid routing protocols in MANETs. | 5 | CO5 | K2 |
| | b. | Explain the differences between AODV and DSR protocols. | 5 | CO5 | K4 |
| | | <u>UNIT-VI</u> | | | |
| 11. | a. | Explain the architecture of a sensor network with neat diagram. | 5 | CO6 | K2 |
| | b. | Discuss various applications of sensor networks in different domains. | 5 | CO6 | K2 |
| | | (OR) | | | |
| 12. | a. | Explain the major challenges in sensor networks. | 5 | CO6 | K2 |
| | b. | What is the significance and importance of Sensor Networks in modern technology | 5 | CO6 | K2 |

Time: 3 Hours

Max Marks: 60

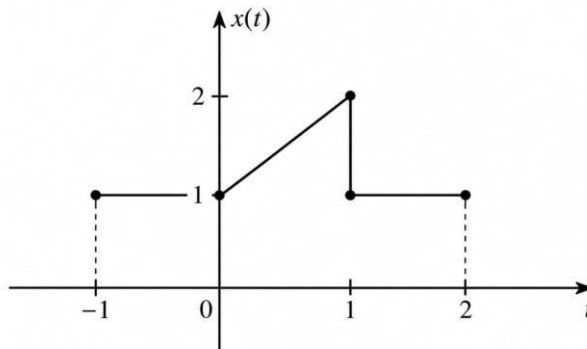
Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

- | | Marks | CO | BTL |
|--|-------|----|-----|
| 1. a) For the signal $x(t)$ shown in figure, find the following signals. | 5 | 1 | K3 |
| a) $x(t-3)$ and $x(t+3)$ | | | |
| b) $x(2t+2)$ and $x(t/2 -2)$ | | | |
| c) $x(5/3t)$ and $x((3/5)t)$ | | | |
| d) $x(-t+2)$ and $x(-t-2)$ | | | |



- | | | | |
|---|---|---|----|
| b) Whether the following signals are periodic or not? If periodic determine the fundamental period. | 5 | 1 | K3 |
| (i) $x(t) = 2 \cos(10t + 1) - \sin(4t - 1)$ | | | |
| (ii) $y[n] = \sin(\frac{6\pi}{7}n + 1)$ | | | |

(OR)

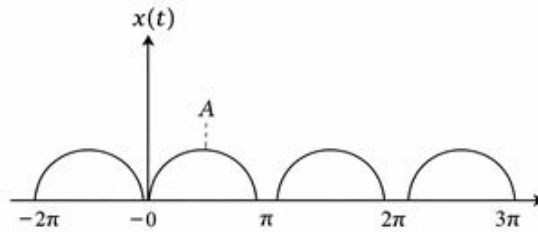
- | | | | |
|---|---|---|----|
| 2. a) Explain any four System properties in detail. | 5 | 1 | K2 |
| b) Explain the following signals: a) Unit Step b) Unit Impulse c) Real Exponential d) Unit Ramp | 5 | 1 | K2 |

UNIT-II

- | | | | |
|--|---|---|----|
| 3. a) Define convolution integral and state the properties of convolution. | 5 | 2 | K2 |
| b) Derive the condition for stability in LTI system. | 5 | 2 | K3 |
| (OR) | | | |
| 4. a) Derive the condition for stability in LTI systems? | 5 | 2 | K2 |
| b) Explain the time domain representation of discrete-time Linear Time Invariant (LTI) systems. Discuss the concept of impulse response. | 5 | 2 | K2 |

UNIT-III

- | | | | | |
|----|---|---|---|----|
| 5. | a) Derive relation between Exponential and Trigonometric fourier Constant. | 5 | 3 | K2 |
| | b) Find the Fourier series expression for the following halfwave rectified sinewave signal. | 5 | 3 | K3 |



(OR)

- | | | | | |
|----|---|---|---|----|
| 6. | a) Discuss the concepts of Trigonometric Fourier series and derive the expression for Trigonometric Fourier coefficients. | 5 | 3 | K2 |
| | b) State and Prove any Five Properties of the Fourier Series. | 5 | 3 | K2 |

UNIT-IV

- | | | | | |
|----|---|---|---|----|
| 7. | a) Find fourier transform of signum function. | 5 | 4 | K3 |
| | b) Find fourier transform of cosine function $\cos(\omega_0 t)$. | 5 | 4 | K2 |

(OR)

- | | | | | |
|----|---|----|---|----|
| 8. | State and prove the sampling theorem for the band-limited signals with the help of graphical representation | 10 | 4 | K3 |
|----|---|----|---|----|

UNIT-V

- | | | | | |
|----|---|----|---|----|
| 9. | State and Explain the Differentiation, linearity and time shifting properties of laplace transform. | 10 | 5 | K3 |
|----|---|----|---|----|

(OR)

- | | | | | |
|-----|---|----|---|----|
| 10. | Find the Inverse Laplace transform of $X(s) = \frac{1}{(s+4)(s-2)}$ if the ROC is | 10 | 5 | K3 |
| | (i) $-4 < \text{Re}(s) < 2$ (ii) $\text{Re}(s) > 2$ (iii) $\text{Re}(s) < -4$ (iv) $2 < \text{Re}(s) < -4$ | | | |

UNIT-VI

- | | | | | |
|-----|---|----|---|----|
| 11. | Find the Z-transform of the signal $x(n) = [\sin(\omega_0 n)] U(n)$ and hence find ROC. | 10 | 6 | K3 |
|-----|---|----|---|----|

(OR)

- | | | | | |
|-----|---|---|---|----|
| 12. | a) Find the Z-Transform and ROC following sequence $\sin \omega_0 n u(n)$ | 5 | 6 | K3 |
| | b) Find the Inverse Z-Transform of $X(z) = \frac{z^{-1}}{3-4z^{-1}+z^{-2}}$; ROC $ z > 1$ | 5 | 6 | K3 |

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

- UNIT-I**
- | | | | | | | |
|----|--|----|----|---|-----|----|
| 1. | What is data mining? Discuss KDD process to extract knowledge from databases with a neat sketch. | 10 | CO | 1 | BTL | K1 |
|----|--|----|----|---|-----|----|
- (OR)**
- | | | | | | | |
|----|---|----|----|---|-----|----|
| 2. | List the various pre processing techniques available. Discuss Aggregation and sampling in detail. | 10 | CO | 1 | BTL | K1 |
|----|---|----|----|---|-----|----|
- UNIT-II**
- | | | | | | | |
|----|---|---|----|---|-----|----|
| 3. | a Discuss the architecture of a Data Warehouse with a neat sketch. | 5 | CO | 2 | BTL | K2 |
| | b Discuss the various operations that can be performed on a data cube with a neat sketch. | 5 | | 2 | | K2 |
- (OR)**
- | | | | | | | |
|----|---|----|----|---|-----|----|
| 4. | Define dimensions and facts. Discuss star schema, snowflake schema and facts constellation with an example. | 10 | CO | 2 | BTL | K1 |
|----|---|----|----|---|-----|----|
- UNIT-III**
- | | | | | | | |
|----|---|---|----|---|-----|----|
| 5. | a Discuss the data cube approach for data generalization. | 4 | CO | 3 | BTL | K2 |
| | b Discuss attribute oriented induction in detail. | 6 | | 3 | | K2 |
- (OR)**
- | | | | | | | |
|----|--|----|----|---|-----|----|
| 6. | Discuss the various ways in which the descriptions can be presented to the user in detail. | 10 | CO | 3 | BTL | K2 |
|----|--|----|----|---|-----|----|
- UNIT-IV**
- | | | | | | | |
|----|---|----|----|---|-----|----|
| 7. | Generate frequent itemsets for the following transactional databases using Apriori Algorithm. Assume minimum support count to be 3. | 10 | CO | 4 | BTL | K3 |
|----|---|----|----|---|-----|----|
- | TID | List of item IDs |
|------|------------------|
| T100 | I1, I2, I5 |
| T200 | I2, I4 |
| T300 | I2, I3 |
| T400 | I1, I2, I4 |
| T500 | I1, I3 |
| T600 | I2, I3 |
| T700 | I1, I3 |
| T800 | I1, I2, I3, I5 |
| T900 | I1, I2, I3 |
- (OR)**
- | | | | | | | |
|----|---|----|----|---|-----|----|
| 8. | Discuss various methods to improve the efficiency of Apriori Algorithm. | 10 | CO | 4 | BTL | K2 |
|----|---|----|----|---|-----|----|
- UNIT-V**
- | | | | | | | |
|----|---|---|----|---|-----|----|
| 9. | a What is classification? Discuss the various issues related to classification. | 5 | CO | 5 | BTL | K1 |
| | b Write the algorithm for Decision Tree induction. | 5 | | 5 | | K1 |
- (OR)**
- | | | | | | | |
|-----|--|----|----|---|-----|----|
| 10. | Write the algorithm for naïve Bayesian classifier. | 10 | CO | 5 | BTL | K1 |
|-----|--|----|----|---|-----|----|
- UNIT-VI**
- | | | | | | | |
|-----|--|----|----|---|-----|----|
| 11. | What is clustering? Discuss the various types of clustering methods available in detail. | 10 | CO | 6 | BTL | K2 |
|-----|--|----|----|---|-----|----|
- (OR)**
- | | | | | | | |
|-----|---------------------------------|----|----|---|-----|----|
| 12. | Write the algorithm for DBSCAN. | 10 | CO | 6 | BTL | K1 |
|-----|---------------------------------|----|----|---|-----|----|

Time: 3 Hours**Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

| | | UNIT-I | Marks | CO | BTL |
|-----|----|---|-------|----|-----|
| 1. | a) | List and explain the primary causes of deterioration in concrete structures. | 5m | 1 | 1 |
| | b) | Explain the role of daily and periodic inspections in infrastructure management. | 5m | 1 | 2 |
| | | (OR) | | | |
| 2. | a) | Describe the detailed assessment procedure for evaluating a damaged structure. | 5m | 1 | 1 |
| | b) | Discuss the advantages and disadvantages of different maintenance strategies. | 5m | 1 | 2 |
| | | UNIT-II | | | |
| 3. | a) | What are the methodology steps involved in the selection of repair materials? | 5m | 2 | 2 |
| | b) | Differentiate between Gas-forming grouts and Polymer grouts | 5m | 2 | 2 |
| | | (OR) | | | |
| 4. | a) | Describe the use of FRP (Fiber Reinforced Polymer) sheets as a protective coating. | 5m | 2 | 1 |
| | b) | What are the advantages and disadvantages of using polymer concrete in construction? | 5m | 2 | 2 |
| | | UNIT-III | | | |
| 5. | a) | Discuss the various types of cracks in concrete and their underlying causes. | 5m | 3 | 3 |
| | b) | Describe the thermal properties of concrete and how they affect durability. | 5m | 3 | 2 |
| | | (OR) | | | |
| 6. | a) | What are the factors affecting the tensile and flexural strength of concrete? | 5m | 3 | 1 |
| | b) | Explain the mechanism of corrosion in reinforced concrete structures. | 5m | 3 | 2 |
| | | UNIT-IV | | | |
| 7. | a) | Explain the working principle and application of Ultrasonic Pulse Velocity (UPV) testing | 5m | 4 | 3 |
| | b) | What are corrosion inhibitors, and how do they function when added to concrete? | 5m | 4 | 1 |
| | | (OR) | | | |
| 8. | a) | How is the Rebound Hammer test used to assess the surface hardness of concrete? | 5m | 4 | 1 |
| | b) | What are the limitations of epoxy injection in structural repairs? | 5m | 4 | 1 |
| | | UNIT-V | | | |
| 9. | a) | What is the difference between repair, rehabilitation, and retrofitting of structures? | 5m | 4 | 2 |
| | b) | How does fiber-reinforced polymer (FRP) wrapping improve beam strength? | 5m | 4 | 2 |
| | | (OR) | | | |
| 10. | a) | What role do non-destructive testing (NDT) methods play in assessing structural damage? | 5m | 4 | 2 |
| | b) | What are the different methods used for strengthening concrete beams? | 5m | 4 | 1 |
| | | UNIT-VI | | | |
| 11. | a) | Define Seismic Retrofitting and explain its importance for existing RC buildings. | 5m | 5 | 3 |
| | b) | What factors should be considered before selecting a specific retrofitting strategy for an RC building? | 5m | 5 | 2 |
| | | (OR) | | | |
| 12. | a) | How does the quality of workmanship and materials impact the seismic performance of a building? | 5m | 5 | 1 |
| | b) | Discuss the use of shear walls or steel bracing as a global retrofitting strategy. | 5m | 5 | 2 |

**PRINCIPLES OF SIGNALS AND SYSTEMS
(ELECTRICAL AND ELECTRONICS ENGINEERING)****Time: 3 Hours****Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Define the following properties for continuous time system. 6M
 - i. Causal or Non causal
 - ii. Time variant or time invariant
 - iii. Linear or Non linear
- b) Determine whether the following signals are periodic or not? If periodic determine fundamental period 6M
 - i. $3\sin 200\pi t + 4\cos 100t$
 - ii. $e^{(j\pi/4)n}$

(OR)

2. a) Explain how the time-shifting, time scaling, time reversal operations performed on signals with one example 6M
- b) Define even and odd signals? Determine the even and odd component of the signal $x(t) = \cos t + \sin t$ 6M

UNIT-II

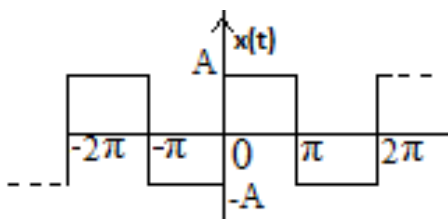
3. a) Find the convolution between the following two sequences? 6M
 $x(n) = \{1, 1, 1, 1\}$, $h(n) = \{2, 2\}$
- b) State and prove the sampling theorem with necessary expressions? 6M

(OR)

4. a) Derive the condition for stability in LTI systems? 6M
- b) Define convolution integral and state the properties of convolution? 6M

UNIT-III

5. a) Find the trigonometric Fourier series for the waveform shown in the figure 6M



- b) Define and prove the following properties of fourier transform 6M
 - i. Convolution theorem
 - ii. Parseval's theorem

(OR)

6. a) State and prove the following properties of continuous time Fourier series 6M
- Linearity
 - Time shifting
- b) Find the Fourier transform of the signals 6M
- $x_1(t) = e^{-5t}u(t)$ and $x_2(t) = u(t)$

UNIT-IV

7. a) Define ROC & List the properties of ROC for Laplace transforms? 6M
- b) Determine the inverse Laplace of the following function. 6M

$$X(S) = \frac{1}{S(S+1)(S+3)}$$

(OR)

8. a) State and prove time convolution, differentiation in S domain properties of Laplace Transform? 6M
- b) Determine the Laplace transform of $x(t) = e^{-at} \cos(\omega_0 t) u(-t)$ and Indicate its ROC? 6M

UNIT-V

9. a) State and prove the time shifting, differentiation properties of Z transform? 6M
- b) Find the Z - transform of the signal 6M
- $x(n) = n.a^n u(n)$
 - $x(n) = a^n \cos(\omega_0 n) u(n)$?

(OR)

10. a) Determine z-transform of following sequences 6M
- $(0.2)^n \{u(n) - u(n-4)\}$
 - $\frac{a^n}{n!}$ for $n > 0$
- b) Determine inverse z-transform of 6M
- $X(z) = \frac{1}{(1+z^{-1})(1-z^{-1})^2}$, ROC: $|Z| > 1$