

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

<u>UNIT-I</u>		Marks	CO	Blooms Level
1.	a. Explain the key components of the Internet of Things (IOT) reference model and how they contribute to the overall functionality of an IOT ecosystem.	5	CO1	K2
	b. How do IOT platforms facilitate device management, data processing, and communication in the context of large-scale IOT deployments? Provide examples to illustrate your points.	5	CO1	K2
(OR)				
2.	How does the IoT reference model serve as a blueprint for designing robust IoT architectures? Discuss its structure and importance in fostering seamless integration.	10	CO1	K3
<u>UNIT-II</u>				
3.	a. Explain the significance of choosing different formats to store IOT data.	5	CO2	K2
	b. Write a python code to change python data to .json format.	5	CO2	K2
(OR)				
4.	Explain the significance of Spark ML in processing IoT data and its advantages over traditional methods.	10	CO2	K2
<u>UNIT-III</u>				
5.	a. Define personal IOT. List the wearable devices.	5	CO3	K2
	b. Explain the concept of "Super Shoes" developed by MIT for personal IoT. Highlight the key features that make these shoes unique in the realm of wearable technology.	5	CO3	K2

(OR)

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|----|--|----|-----|----|
| 6. | Design an innovative system for hypoglycemia prediction using CGM data. Outline the steps for data collection, processing, and the implementation of real-time alert mechanisms. | 10 | CO3 | K2 |
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UNIT-IV

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|----|--|---|-----|----|
| 7. | a. Explain the concept of Human Activity Recognition (HAR) using wearable sensors. | 5 | CO4 | K2 |
| | b. Compare and contrast HAR using wearable sensors with video-based HAR. | 5 | CO4 | K2 |

(OR)

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|----|--|----|-----|----|
| 8. | Compare the advantages and disadvantages of video-based HAR versus wearable sensor-based HAR in smart homes. | 10 | CO4 | K2 |
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UNIT-V

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|----|--|---|-----|----|
| 9. | a. Describe three specific use cases of AI-powered Industrial IoT in the context of predictive maintenance. | 5 | CO5 | K2 |
| | b. Discuss the advantages and disadvantages of utilizing Long Short-Term Memory (LSTM) networks for predictive maintenance in industrial applications. | 5 | CO5 | K2 |

(OR)

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|-----|---|---|-----|----|
| 10. | a. How does AI, particularly LSTM models, improve short-term load forecasting (STLF) accuracy in industrial environments? | 5 | CO5 | K2 |
| | b. Discuss the potential of AI in transforming industrial IoT applications with examples. | 5 | CO5 | K3 |

UNIT-VI

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|-----|---|---|-----|----|
| 11. | a. Explain how smart traffic management systems contribute to the efficiency and sustainability of urban transportation. | 5 | CO6 | K2 |
| | b. Analyze the role of technology in transforming traditional waste management practices into smart waste management systems. | 5 | CO6 | K2 |

(OR)

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|-----|---|----|-----|----|
| 12. | Discuss the economic, environmental, and social benefits that AI-powered IoT solutions bring to smart cities. | 10 | CO6 | K3 |
|-----|---|----|-----|----|

Answer ONE Question from each Unit

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		Marks	CO	Blooms Level
<u>UNIT-I</u>				
1.	Explain the framework of Business Intelligence	10 M	1	K1
(OR)				
2.	Analyse the Architecture of Business Intelligence	10 M	1	K3
<u>UNIT-II</u>				
3.	Explain the characteristics of Data Warehousing	10 M	2	K1
(OR)				
4.	Discuss in brief data integration and extraction	10 M	2	K1
<u>UNIT-III</u>				
5.	Explain the importance of Data Visualization and Business performance management	10 M	3	K1
(OR)				
6.	Analyse on the usage of different types of charts & graphs in Business	10 M	3	K3
<u>UNIT-IV</u>				
7.	Explain the methods of Data Mining	10 M	4	K1
(OR)				
8.	Discuss in brief the rules of Association Mining	10 M	4	K1
<u>UNIT-V</u>				
9.	Explain various applications of Sentiment Analysis	10 M	5	K1
(OR)				
10.	Elaborate on various text mining tools with suitable examples.	10 M	5	K2
<u>UNIT-VI</u>				
11.	Elaborate on the various techniques and uses of search engine optimization	10 M	6	K2
(OR)				
12.	Elaborate on web analytics maturity models.	10 M	6	K2

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

Answer ONE Question from each Unit

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	<u>UNIT-I</u>	Marks	CO	Blooms Level
1.	a) Explain the importance of maintenance in civil structures. Discuss different types of maintenance strategies with examples.	7m	1	2
	b) What are the major causes of deterioration in reinforced concrete structures?	3m	1	1
	(OR)			
2.	a) Describe the step-by-step procedure for assessing a damaged structure.	7m	1	2
	b) How does rehabilitation contribute to sustainability in infrastructure projects?	3m	1	1
	<u>UNIT-II</u>			
3.	a) Explain the different types of repair materials used in concrete structures.	5m	2	2
	b) Describe the working and application of epoxy-based bonding agents in structural repairs.	5m	2	2
	(OR)			
4.	a) Compare polymer concrete with conventional concrete in terms of strength, durability, and application.	5m	2	2
	b) What are gas-forming grouts? Explain their function and significance in structural repairs.	5m	2	1
	<u>UNIT-III</u>			
5.	a) Differentiate between quality assurance and quality control in concrete construction.	6m	3	2
	b) How does the water-cement ratio affect the compressive strength and durability of concrete?	4m	3	1

(OR)

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|----|----|---|----|---|---|
| 6. | a) | What are the major factors affecting the tensile and flexural strength of concrete? Explain with examples | 5m | 3 | 1 |
| | b) | Discuss the role of cover thickness in preventing corrosion in reinforced concrete structures. | 5m | 3 | 2 |

UNIT-IV

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|----|----|--|----|---|---|
| 7. | a) | Explain various Non-Destructive Testing (NDT) techniques used in concrete structures. | 5m | 4 | 2 |
| | b) | Describe the working principle and applications of ultrasonic pulse velocity (UPV) testing in assessing structural damage. | 5m | 4 | 2 |

(OR)

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|----|----|---|----|---|---|
| 8. | a) | What is epoxy injection? Explain its working mechanism and application in repairing cracks. | 6m | 4 | 1 |
| | b) | What are the advantages of cathodic protection in reinforced concrete structures? | 4m | 4 | 1 |

UNIT-V

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|----|----|---|----|---|---|
| 9. | a) | Define and differentiate between repair, rehabilitation, and retrofitting in structural engineering. | 5m | 5 | 2 |
| | b) | How does fiber-reinforced polymer (FRP) wrapping improve the strength and durability of concrete beams? | 5m | 5 | 1 |

(OR)

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|-----|----|---|----|---|---|
| 10. | a) | Explain various engineered demolition techniques used for structures that need to be dismantled safely. | 5m | 5 | 2 |
| | b) | What are the applications of jacketing as a structural strengthening method? | 5m | 5 | 1 |

UNIT-VI

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|-----|----|--|----|---|---|
| 11. | a) | Explain the objectives and significance of seismic retrofitting in reinforced concrete buildings. | 5m | 6 | 2 |
| | b) | What are the key considerations before selecting a seismic retrofitting strategy for an existing building? | 5m | 6 | 1 |

(OR)

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|-----|----|--|----|---|---|
| 12. | a) | Describe the different types of seismic retrofitting techniques used for reinforced concrete structures. | 6m | 6 | 2 |
| | b) | What are the basic factors affecting the cost of retrofitting an existing structure? | 4m | 6 | 1 |

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

Answer ONE Question from each Unit

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	<u>UNIT-I</u>	Marks	CO	Blooms Level
1.	a) Discuss the need for densification of granular soils	5	1	1
	b) Discuss ground modification by sand drains in detail	5	1	1
	(OR)			
2.	Discuss preloading technique of soil modification in detail	10	1	1
	<u>UNIT-II</u>			
3.	a) Discuss mechanical stabilization of soil	5	2	1
	b) Discuss cement stabilization in detail	5	2	1
	(OR)			
4.	a) Discuss bituminous stabilization of soil in detail	5	2	2
	b) Discuss chemical stabilization of soil with calcium chloride in detail.	5	2	2
	<u>UNIT-III</u>			
5.	a) Discuss dewatering by sumps	5	3	2
	b) Discuss various criteria for selection of fill material	5	3	2
	(OR)			
6.	Discuss electro osmosis process in detail	10	3	2
	<u>UNIT-IV</u>			
7.	Discuss functions and applications of geotextiles	10	4	2
	(OR)			
8.	Discuss in short applications of geogrids and geo membranes in soil strengthening	10	4	1
	<u>UNIT-V</u>			
9.	Discuss various design principles of reinforced earth walls.	10	5	3
	(OR)			
10.	Discuss soil nailing with neat sketch	10	5	4
	<u>UNIT-VI</u>			
11.	a) Discuss Objectives of grouting	5	6	1
	b) Discuss various stages of grouting	5	6	1
	(OR)			
12.	Discuss various grouting methods	10	6	1

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

Answer ONE Question from each Unit

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All parts of the Question must be answered at one place

<u>UNIT-I</u>		Marks	CO	Blooms Level
1.	a. What is data mining? Explain about the KDD process?	5	CO1	K1
	b. Explain different types of data mining task primitives?	5	CO1	K1
(OR)				
2.	Explain various data pre-processing techniques.	10	CO1	K1
<u>UNIT-II</u>				
3.	Explain data warehousing and OLAP Technologies?	10	CO2	K1
(OR)				
4.	Design and explain Data warehouse architecture?	10	CO2	K3
<u>UNIT-III</u>				
5.	a. What is Data Generalization and summarization based on characterization?	5	CO3	K2
	b. What is data analytical characterization?	5	CO3	K2
(OR)				
6.	a. What is attribute relevance analysis?	4	CO3	K2
	b. How to discriminating between different classes?	6	CO3	K2
<u>UNIT-IV</u>				
7.	a. What is Association rule? Explain market basket analysis?	4	CO4	K2
	b. What is Apriori algorithm explain how it is used to find frequent sets?	6	CO4	K2
(OR)				
8.	What is FP growth algorithm? Explain in detail?	10	CO4	K1
<u>UNIT-V</u>				
9.	a. What is classification and prediction Explain in detailed?	4	CO5	K2
	b. How do you write an algorithm for a Decision Tree Induction?	6	CO5	K2
(OR)				
10.	What is accuracy of a classifier? Explain how to evaluate the accuracy of a classifier.	10	CO5	K2
<u>UNIT-VI</u>				
11.	a. What is clustering? Explain different types of clustering methods?	4	CO6	K2
	b. Explain K-Means clustering algorithm?	6	CO6	K1
(OR)				
12.	Explain DBSCAN algorithm in detail.	10	CO6	K2

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

	<u>UNIT-I</u>	Marks	CO	Blooms Level
1. a)	What are the key differences between embedded systems and general computing systems?	6	1	K2
b)	What are the major application areas of Embedded systems?	4	1	K2
	(OR)			
2. a)	Why do embedded systems require real-time processing capabilities?	6	1	K2
b)	How does "timeliness" impact the performance of an embedded system?	4	1	K2
	<u>UNIT-II</u>			
3. a)	How does hardware/software partitioning affect embedded system design?	5	2	K2
b)	Explain the impact of memory constraints on embedded system performance.	5	2	K2
	(OR)			
4. a)	How do single-purpose processors differ from general-purpose processors?	5	2	K2
b)	What is an RT-level combinational logic circuit? Give an example.	5	2	K2
	<u>UNIT-III</u>			
5. a)	Why are communication interfaces necessary in embedded systems?	5	3	K3
b)	What are the limitations of infrared communication compared to other wireless communication methods?	5	3	K2

(OR)

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|----|----|---|---|---|----|
| 6. | a) | Explain about Bluetooth architecture. | 5 | 3 | K3 |
| | b) | What are the key advantages of Ethernet over USB for embedded system communication? | 5 | 3 | K2 |

UNIT-IV

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|----|----|---|---|---|----|
| 7. | a) | Explain kernel architectures in RTOS. | 5 | 4 | K3 |
| | b) | Explain the different types of task scheduling algorithms in an RTOS. | 5 | 4 | K2 |

(OR)

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|----|----|--|---|---|----|
| 8. | a) | Explain the concept of priority inversion and how semaphores can contribute to it. | 5 | 4 | K2 |
| | b) | Explain the problem of deadlock when using mutexes in RTOS. | 5 | 4 | K3 |

UNIT-V

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|----|----|--|---|---|----|
| 9. | a) | What are the advantages and disadvantages of using pipes for communication in an RTOS? | 5 | 5 | K3 |
| | b) | Explain about the timers in RTOS. | 5 | 5 | K1 |

(OR)

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|-----|----|--|---|---|----|
| 10. | a) | What are the different types of memory management techniques in an RTOS? | 5 | 5 | K3 |
| | b) | What are the limitations of priority inheritance in real-time systems? | 5 | 5 | K2 |

UNIT-VI

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|-----|----|--|---|---|----|
| 11. | a) | What are the major applications of Embedded NT in real-time systems? | 5 | 6 | K3 |
| | b) | What are the advantages of using Embedded Linux in real-time applications? | 5 | 6 | K3 |

(OR)

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|-----|----|--|---|---|----|
| 12. | a) | How does an Embedded OS handle real-time constraints? | 5 | 6 | K3 |
| | b) | What are the key advantages of using Windows XP Embedded in industrial applications? | 5 | 6 | K3 |

**WIRELESS COMMUNICATION NETWORKS
(ELECTRONICS AND COMMUNICATION 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

	<u>UNIT-I</u>	Marks	CO	Blooms Level
1. a)	Explain how a cellular telephone call is made?	5M	1	K2
b)	Explain the classification of Mobile Radio transmission systems	5M	1	K2
	(OR)			
2. a)	Describe cordless Telephone system with necessary diagram	5M	1	K2
b)	Explain evolution of Mobile Radio Communications	5M	1	K2
	<u>UNIT-II</u>			
3. a)	Describe FDMA with the help of diagram and explain features of FDMA	5M	2	K3
b)	Explain Slotted ALOHA Protocol	5M	2	K2
	(OR)			
4. a)	Describe TDMA with the help of diagram and explain features of TDMA	5M	2	K3
b)	Explain Near far problem in CDMA	5M	2	K2
	<u>UNIT-III</u>			
5. a)	Explain 3G Spectrum with the help of diagram	5M	3	K2
b)	Describe 1G and 2G	5M	3	K2
	(OR)			
6. a)	What are the limitations of 3G and explain	5M	3	K2
b)	Describe GSM system architecture with the help of block diagram	5M	3	K3
	<u>UNIT-IV</u>			
7. a)	What are the applications of 4G and explain	5M	4	K2
b)	Describe evolutionary path for 4G technology with the help of diagram	5M	4	K2
	(OR)			
8. a)	Explain objectives of 4G wireless communication standard	5M	4	K2
b)	Explain the features of 5G technology	5M	4	K2
	<u>UNIT-V</u>			
9. a)	Explain HIPERLAN/1 with the help of diagram	5M	5	K2
b)	Explain the advantages of Wireless Local Loop	5M	5	K2
	(OR)			
10. a)	Explain the applications of Wireless PAN	5M	5	K2
b)	Compare adhoc and infrastructure network topologies of Wireless LAN	5M	5	K2
	<u>UNIT-VI</u>			
11. a)	What is RFID and what are the frequency bands and various types of RFID tags? and Explain	5M	6	K2
b)	Compare Bluetooth and Wi-Fi technologies	5M	6	K2
	(OR)			
12. a)	What is WiMAX? and explain the need for WiMAX	5M	6	K2
b)	Describe various types of network configurations for Bluetooth devices with the help of diagram	5M	6	K2

**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

- | | | Marks | CO | Blooms Level |
|----|--|-------|----|---------------|
| 1. | a. Explain how the time-shifting, time scaling, time reversal operations performed on signals with one example | 5 | 1 | Understanding |
| | b. Define even and odd signals? Determine the even and odd component of the signal $x(t) = \cos t + \sin t$ | 5 | 1 | Understanding |

(OR)

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|----|--|---|---|---------------|
| 2. | a. Differentiate between continuous and discrete signals with neat explanation | 5 | 1 | Understanding |
| | b. Differentiate between signal and a system clearly. | 5 | 1 | Understanding |

UNIT-II

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|----|---|---|---|---------------|
| 3. | a. What are the Conditions for a System to be an LTI System? | 5 | 2 | Remembering |
| | b. Define convolution integral and state the properties of convolution? | 5 | 2 | Understanding |

(OR)

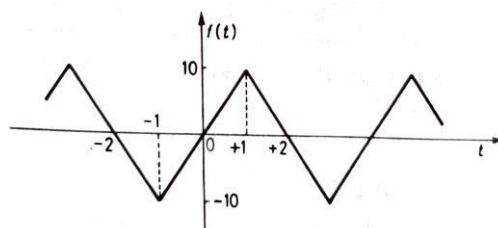
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|----|---|----|---|-------------|
| 4. | Determine convolution of following two sequences by 1) Graphical method 2) Matrix second method $x(n) = \{1, -1, 2, 3\}$
$h(n) = \{1, -2, 3, -1\}$ | 10 | 2 | Application |
|----|---|----|---|-------------|

UNIT-III

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|----|--|---|---|---------------|
| 5. | a. What is the difference between Fourier series Analysis and Fourier Transforms? Explain with an example. | 5 | 3 | Understanding |
| | b. Derive the relation between trigonometric Fourier series and exponential Fourier series | 5 | 3 | Remembering |

(OR)

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|----|---|----|---|-------------|
| 6. | Find the trigonometric Fourier series and exponential Fourier series for the waveform shown in figure below and draw their line spectrum. | 10 | 3 | Application |
|----|---|----|---|-------------|



UNIT-IV

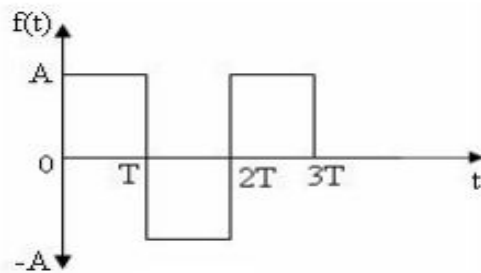
7. a. Find Fourier transform of signum function 5 4 Understanding
b. Find the Fourier transform of the signals 5 4 Application
 $x_1(t) = e^{-5t}u(t)$ and $x_2(t) = u(t)$

(OR)

8. a. Use the inverse Fourier transform analysis equation to evaluate the inverse continuous Fourier transform of 5 4 Application
 $X(\omega) = 1+3(j\omega)/(3+j\omega)^2$
b. State and proof Sampling theorem 5 4 Remembering

UNIT-V

9. a. Find the Laplace transform of the periodic rectangular wave shown in figure 5 5 Application



- b. State and Prove Initial value theorem with respect to Laplace transform 5 5 Remembering

(OR)

10. a. Find the inverse Laplace transform of 5 5 Application
 $F(s) = (s-5)/s(s+2)^2$ using Partial Fraction expansion.
b. Find the Laplace Transform of the signal 5 5 Application
 $x(t) = e^{-a|t|}$

UNIT-VI

11. a. Using differentiation property, find the Z-transform of $x(n) = n^2 u(n)$ 5 6 Application
b. Find the inverse Z Transform of 5 6 Application
 $X(z) = 1/(1-0.5z^{-1}+0.5z^{-2})$ for ROC $|z| > 1$
(OR)
12. a. Obtain the Z-transform of $x(n) = a^n u(n)$ and find its ROC 5 6 Application
b. State and prove the Convolution Property of Z Transform. 5 6 Understanding

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Answer ONE Question from each Unit

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	<u>UNIT-I</u>	Marks	CO	Blooms Level
1.	a) Explain the differences between the TCP/IP model and the OSI model.	5M	CO1	L2
	b) Identify the role of ISPs and Internet backbones in real-world network architecture.	5M	CO1	L3
	(OR)			
2.	a) Justify why the TCP/IP model is widely used over other networking models.	5M	CO1	L5
	b) Demonstrate how a physical medium affects network performance in different environments.	5M	CO1	L3
	<u>UNIT-II</u>			
3.	a) Define static routing and dynamic routing with examples.	5M	CO2	L1
	b) Compare the efficiency of RIP, OSPF, and EIGRP in handling network congestion.	5M	CO2	L5
	(OR)			
4.	a) Demonstrate how Link-State Routing Protocols optimize data transmission in a network.	5M	CO2	L3
	b) Assess the limitations of traditional routing methods in modern networking environments.	5M	CO2	L5
	<u>UNIT-III</u>			
5.	a) Explain the purpose of VLANs and their impact on network segmentation.	5M	CO3	L2
	b) Design a network that incorporates VLANs to enhance security and efficiency.	5M	CO3	L6

(OR)

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|----|----|--|----|-----|----|
| 6. | a) | Compare VLANs and Inter-VLAN Routing in terms of network efficiency. | 5M | CO3 | L4 |
| | b) | Justify the need for VLAN Trunking in large enterprise networks. | 5M | CO3 | L5 |

UNIT-IV

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|----|----|--|----|-----|----|
| 7. | a) | Define the key characteristics of WANs and their role in networking. | 5M | CO4 | L1 |
| | b) | Differentiate between Frame Relay and traditional circuit-switched networks. | 5M | CO4 | L4 |

(OR)

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|----|----|--|----|-----|----|
| 8. | a) | Compare the scalability of IPv4 and IPv6 in modern network infrastructure. | 5M | CO4 | L5 |
| | b) | What is Network Address Translation (NAT)? Why is it required? | 5M | CO4 | L2 |

UNIT-V

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|----|----|--|----|-----|----|
| 9. | a) | Define MANET and list its major properties. | 5M | CO5 | L1 |
| | b) | Compare different routing algorithms used in MANETs. | 5M | CO5 | L4 |

(OR)

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|-----|----|---|----|-----|----|
| 10. | a) | Assess the security vulnerabilities associated with MANETs and propose countermeasures. | 5M | CO5 | L5 |
| | b) | Demonstrate how self-organization in MANETs enhances communication efficiency. | 5M | CO5 | L3 |

UNIT-VI

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|-----|----|--|----|-----|----|
| 11. | a) | Differentiate between sensor networks and traditional ad-hoc networks. | 5M | CO6 | L2 |
| | b) | Illustrate how sensor networks are used in smart agriculture. | 5M | CO6 | L3 |

(OR)

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|-----|----|--|----|-----|----|
| 12. | a) | What is the significance and importance of Sensor Networks in modern technology? | 5M | CO6 | L1 |
| | b) | Evaluate the challenges of energy efficiency in sensor networks. | 5M | CO6 | L5 |

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	<u>UNIT-I</u>	Marks	CO	Blooms Level
1. a)	Write short notes on the following related to ultrasonic machining (USM): (i) Functions of slurry and oscillator in USM (ii) Grain size Vs. Machining rate.	5M	CO1	L1
b)	Explain the function of transducer and tool cone in Ultrasonic machining.	5M	CO1	L2
	(OR)			
2. a)	Explain the various parameters influencing the MRR in USM process.	5M	CO1	L2
b)	Discuss the important factors that should be considered during the selection of a modern machining process for a given job.	5M	CO1	L2
	<u>UNIT-II</u>			
3. a)	Explain the working of an Abrasive Jet Machine with the help of a neat sketch.	5M	CO2	L2
b)	Explain the factors that affects the performance of WJM process. Discuss their effects in brief.	5M	CO2	L2
	(OR)			
4. a)	Derive the expression for metal removal rate in abrasive jet machining of brittle materials.	5M	CO2	L2
b)	With neat sketch, explain magnetic abrasive finishing process.	5M	CO2	L2
	<u>UNIT-III</u>			
5. a)	Explain the electrochemical machining process with a neat sketch and state its advantages over conventional machining.	5M	CO3	L2
b)	Briefly discuss the economics of ECM process.	5M	CO3	L2
	(OR)			
6. a)	Discuss different process parameters of electro chemical machining process.	5M	CO3	L2
b)	Sketch and explain electro chemical honing process	5M	CO3	L2

UNIT-IV

7. a) With the help of a neat sketch explain the working principle of Electro discharge grinding process and write its applications. 5M CO4 L2
- b) For an electrical discharge machining process discuss the following: 5M CO4 L2
- (i) Dielectric system and (ii) Electrodes.

(OR)

8. a) Explain the factors to be considered in selecting tool electrode and dielectric fluid in EDM process. 5M CO4 L2
- b) Explain the principle of Wire EDM with suitable diagram. 5M CO4 L2

UNIT-V

9. a) Discuss the metal removal mechanism in Plasma Arc Machining. 5M CO5 L2
- b) Explain the working principle of electron beam machining. 5M CO5 L2

(OR)

10. a) Explain the commonly used gas mixture in plasma machining and their corresponding work materials. 5M CO5 L2
- b) Explain the advantages, limitations and applications of LBM process? 5M CO5 L2

UNIT-VI

11. a) Explain the role of electrolyte in the ESD process and its impact on material removal. 5M CO6 L2
- b) Discuss the significance of right-angle drilling in Electro Stream Drilling and its applications. 5M CO6 L2

(OR)

12. a) Explain the working principle of Electro Stream Drilling (ESD) and its main components. 5M CO6 L2
- b) Explain the construction details of the Shaped Tube Electrolytic Machining (STEM) process. 5M CO6 L2

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CODE: 18EEE321

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

III B.Tech II Semester Supplementary Examinations, April, 2025

**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

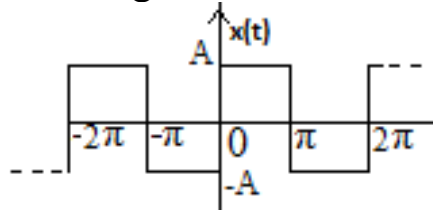
1. a) Define the following with waveforms 6M
 - i. unit function
 - ii. ramp function
 - iii. impulse function
 - iv. Parabolic function
 - b) Determine the following signals is energy signal or power signal 6M
 - i. $x(t) = A \sin(\omega t + \theta)$
 - ii. $x(n) = (1/2)^n u(n)$
- (OR)**
2. a) Determine whether the following continuous system is $y(t) = x(t) \cos(100 \pi t)$ 6M
 - i. Static or Dynamic
 - ii. Linear or Non-linear
 - b) Draw the waveforms of following functions 6M
 - i. $F(t) = r(t) - r(t-1) - r(t-3) + r(t-4)$
 - ii. $F(t) = 2u(t+2) - 2u(t-3)$

UNIT-II

3. a) The impulse response of the LTI system is $h(t) = u(t+2)$. Determine the output of the system by graphical analysis if input $x(t) = e^{-2t} u(t)$. 6M
 - b) Discuss about the impulse sampling with necessary diagrams? 6M
- (OR)**
4. a) Prove that the convolution of any sequence with the unit sample sequence results in the same sequence? 6M
 - b) Define LTI systems? what are the properties of LTI system? 6M

UNIT-III

5. a) Obtain the Fourier transform of the following functions 6M
- Impulse function
 - Constant amplitude
- b) Find the exponential Fourier series expansion for the waveform shown in the figure 6M



(OR)

6. a) Define trigonometric fourier series and evaluate the fourier coefficients of the trigonometric fourier series 6M
- b) Find the Fourier transform of the signal $x_1(t) = e^{-5|t|}$ 6M

UNIT-IV

7. a) State and prove the properties of Laplace transform? 6M
- b) Find the inverse Laplace transform of $X(s) = \frac{1}{s^2 + 3s + 2}$; ROC: $-2 < \text{Re}(s) < -1$? 6M

(OR)

8. a) Derive relation between Laplace transform & Fourier transform? 6M
- b) Find the Laplace transform of the signal $x(t) = A \sin \omega_0 t u(t)$? 6M

UNIT-V

9. a) Determine the z-transform of following sequence $x(n) = \{1, 2, 3, 4, 5, 0, 7\}$ 6M
- b) Find the inverse z-transform of $X(z) = 1/(1 - az^{-1})$ with ROC $|z| < |a|$? 6M

(OR)

10. a) Prove that the sequences $x_1(n) = a^n u(n)$ and $x_2(n) = -a^n u(-n-1)$ have the same $X(z)$ and differ only in ROC's. Plot their ROC's? 6M
- b) Define ROC & List the properties of ROC for Z-transforms? 6M