

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

	<u>UNIT-I</u>	Marks	CO	Blooms Level
1.	a) Explain the fundamentals of Rapid Prototyping and its key principles	7M	1	2
	b) Describe the historical development of Rapid Prototyping technologies.	7M	1	2
	(OR)			
2.	a) Justify the importance of additive manufacturing in modern days and the impact of AM in manufacturing sectors.	14M	1	2
	<u>UNIT-II</u>			
3.	a) Explain the working principle of Stereo lithography Apparatus (SLA) with a neat sketch	7M	2	2
	b) Explain laser scanning systems used in SLA.	7M	2	2
	(OR)			
4.	a) Explain the working principle of Solid Ground Curing (SGC) process with a neat sketch.	7M	2	2
	b) Discuss the advantages and disadvantages of SGC.	7M	2	2
	<u>UNIT-III</u>			
5.	a) Explain Laminated Object Manufacturing (LOM) process.	7M	3	2
	b) Discuss the applications and limitations of LOM.	7M	3	2
	(OR)			
6.	a) Explain the Fused Deposition Modelling (FDM) process flow with a neat sketch.	7M	3	2
	b) Explain the process parameters affecting ultrasonic consolidation.	7M	3	2
	<u>UNIT-IV</u>			
7.	a) Explain the working principle of Selective Laser Sintering (SLS) with a neat sketch.	10M	4	2
	b) Discuss the applications of SLS.	4M	4	2
	(OR)			
8.	a) Explain the working principle of Binder Jetting.	7M	4	2
	b) List the advantages and disadvantages of Binder Jetting.	7M	4	2
	<u>UNIT-V</u>			
9.	a) Explain STL file format and any three faces of a cube.	7M	5	2
	b) Discuss the generic solutions for STL errors.	7M	5	2
	(OR)			
10.	Describe RP applications in engineering, analysis, and planning. Explain any application with examples	14M	5	2

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UNIT-I

- | | | Marks | CO | BTL |
|----|--|-------|-----|-----|
| 1. | a) Discuss with suitable diagrams the meaning of sampling and quantization. | 7 | CO1 | L2 |
| | b) Explain the binary image, gray-scale image and color image with an example and discuss the process of conversion of gray level image into binary image with an example. | 7 | CO1 | L2 |

(OR)

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|----|--|---|-----|----|
| 2. | a) Define a pixel and explain the basic relationships between the pixels in a Digital Image. | 7 | CO1 | L2 |
| | b) Describe the components of a general-purpose image processing system. | 7 | CO1 | L2 |

UNIT-II

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|----|---|---|-----|----|
| 3. | a) Explain the basic Intensity transformation function of an Image. | 7 | CO2 | L2 |
| | b) Explain the concept of Image Sharpening in Frequency domain. | 7 | CO2 | L2 |

(OR)

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|----|---|---|-----|----|
| 4. | a) Explain the methods used in enhancement of digital images in spatial domain. | 7 | CO2 | L2 |
| | b) Explain about color image smoothing and sharpening process. | 7 | CO2 | L2 |

UNIT-III

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|----|--|---|-----|----|
| 5. | a) Describe and illustrate the Huffman coding algorithm. | 7 | CO2 | L2 |
| | b) Explain Variable Length Coding with suitable example. | 7 | CO2 | L2 |

(OR)

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|----|---|---|-----|----|
| 6. | a) Explain about image compression models. | 7 | CO2 | L2 |
| | b) Explain Bit-Plane Coding with suitable example | 7 | CO2 | L2 |

UNIT-IV

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|----|--|---|-----|----|
| 7. | a) Elaborate on thinning and thickening? | 7 | CO2 | L2 |
| | b) Explain and interpret opening and closing operations with examples. | 7 | CO2 | L2 |

(OR)

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|----|--|---|-----|----|
| 8. | a) Apply erosion and dilation to a sample binary image and illustrate the changes. | 7 | CO2 | L3 |
| | b) Analyze the role of morphology in image segmentation. | 7 | CO2 | L4 |

UNIT-V

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|----|--|---|-----|----|
| 9. | a) Write short notes on the performance of edge detection operators. | 7 | CO2 | L2 |
| | b) Explain how thresholding is important for the image segmentation. | 7 | CO2 | L2 |

(OR)

- | | | | | |
|-----|---|---|-----|----|
| 10. | a) Explain about Region based segmentation. | 7 | CO2 | L2 |
| | b) Discuss the following Image segmentation algorithm?
i. Edge linking | 7 | CO2 | L2 |

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

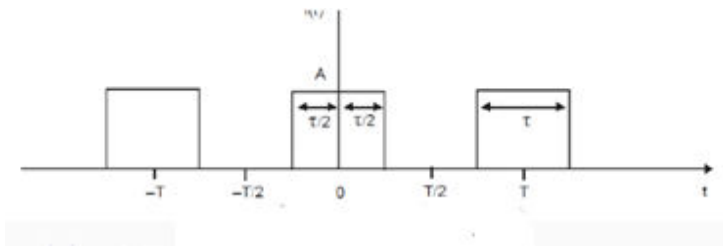
All Questions Carry Equal Marks

All parts of the Question must be answered at one place

- | | <u>UNIT-I</u> | Marks | CO | Blooms Level |
|--|---------------|-------|----|---------------|
| 1. a) Draw the waveforms represented by the following functions | | 7 | 1 | Application |
| i) $f_1(t) = 2 u(t-1)$ ii) $f_2(t) = -2 u(t+3)$ iii) $f_3(t) = u(2-t)$ | | | | |
| b) Check whether the following continuous time systems are time invariant or time variant | | 7 | 1 | Analysis |
| i) $y(t) = \sin x(t)$ ii) $y(t) = tx(t)$ | | | | |
| (OR) | | | | |
| 2. a) Check whether the following signals are periodic or not? If Periodic, determine the fundamental period. | | 7 | 1 | Analysis |
| i) $\cos \frac{2\pi n}{5} + \cos \frac{2\pi n}{7}$ ii) $e^{j\left(\frac{\pi}{4}n\right)}$ | | | | |
| b) Check whether the following signal $x(n)$ is energy signal or power signal | | 7 | 1 | Analysis |
| $x(t) = e^{-2t} u(t)$ | | | | |
| <u>UNIT-II</u> | | | | |
| 3. Determine the convolution of two functions given below with the help of graphs | | 14 | 2 | Application |
| $x(t) = \begin{cases} 2 & \text{for } -2 \leq t \leq 2 \\ 0 & \text{elsewhere} \end{cases}$ $h(t) = \begin{cases} 4 & \text{for } 0 \leq t \leq 2 \\ 0 & \text{elsewhere} \end{cases}$ | | | | |
| (OR) | | | | |
| 4. Determine convolution of following two sequences by | | 14 | 2 | Understanding |
| 1) Graphical method 2) Matrix second method | | | | |
| $x(n) = \{1, -1, 2, 3\}$ | | | | |
| $\begin{array}{c} \uparrow \\ h(n) = \{1, -2, 3, -1\} \\ \uparrow \end{array}$ | | | | |

UNIT-III

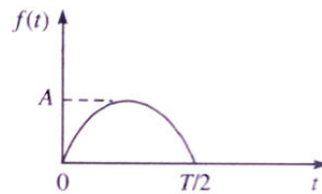
5. a) Find the trigonometric fourier series for the waveform shown in figure below 7 3 Application



- b) State and prove symmetry and time scaling property of Fourier Transform 7 3 Understanding

(OR)

6. a) Find the Fourier transform of sinusoidal pulse shown in figure below 7 3 Application



- b) Derive the relation between Trigonometric and exponential Fourier series 7 3 Understanding

UNIT-IV

7. a) Define Region of Convergence (ROC) of Laplace Transforms and discuss the properties of ROC for various classes of ROC 7 4 Understanding

- b) Find the Laplace transform of $x(t) = e^{-at}u(t)$ and plot ROC 7 4 Application

(OR)

8. a) State and prove the time shifting property of Laplace transform 7 4 Understanding

- b) Find the inverse Laplace transform of $F(s) = \frac{2}{(s+1)(s+5)}$ 7 4 Application

UNIT-V

9. a) Find the z-transform and ROC of 7 5 Application

i) $x(n) = a^n u(n)$ ii) $x(n) = -a^n u(-n-1)$

- b) Find the inverse z-transform of $X(z) = \frac{z^2}{z^2 - 1.5z + 0.5}$ 7 5 Application
ROC $|z| > 1$

(OR)

10. a) Find the z-transform of $\cos \omega(n) u(n)$ 7 5 Application

- b) State and prove convolution in time domain and differentiation in z-domain properties of Z-transforms 7 5 Understanding

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UNIT-I

- | | | Marks | CO | BTL |
|----|--|-------|----|-----|
| 1. | a) Explain the physical design of IoT. Differentiate between "Things" in IoT and standard network devices. | 7 | 1 | 2 |
| | b) With a neat diagram, explain the basic networking concepts relevant to IoT, including topology and communication paradigms. | 7 | 1 | 2 |

(OR)

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|----|--|---|---|---|
| 2. | a) Describe the role of sensor networks as an enabling technology for IoT. Explain the key components of a wireless sensor node. | 7 | 1 | 2 |
| | b) List and explain any four major applications of IoT, providing a real-world example for each. | 7 | 1 | 2 |

UNIT-II

- | | | | | |
|----|---|---|---|---|
| 3. | a) Draw and explain the four-layer architecture of IoT. Elaborate on the function of the application layer. | 7 | 2 | 2 |
| | b) Write an Arduino program to interface a Light Dependent Resistor (LDR) with an LED. The LED should turn ON when it is dark and OFF when it is bright. Provide a circuit diagram. | 7 | 2 | 3 |

(OR)

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|----|---|---|---|---|
| 4. | a) Compare and contrast the features of Arduino and Raspberry Pi for IoT applications. When would you prefer one over the other? | 7 | 2 | 4 |
| | b) Explain the steps to interface a DHT11 (temperature and humidity) sensor with a Raspberry Pi. Describe the necessary Python libraries and a simple code snippet to read sensor data. | 7 | 2 | 3 |

UNIT-III

- | | | | | |
|----|---|---|---|---|
| 5. | a) Compare IoT and M2M communication based on communication patterns, protocols, and scope. | 7 | 3 | 4 |
| | b) Explain the concept of interoperability in IoT. Why is it a critical challenge, and how does it impact the growth of IoT ecosystems? | 7 | 3 | 2 |

(OR)

- | | | | | |
|----|---|---|---|---|
| 6. | a) Explain how Software Defined Networking (SDN) decouples the control plane from the data plane. How does this benefit IoT networks? | 7 | 3 | 2 |
| | b) Describe the architecture of Network Function Virtualization (NFV). How does it improve the flexibility and scalability of network services for IoT? | 7 | 3 | 2 |

UNIT-IV

- | | | | | |
|----|--|---|---|---|
| 7. | a) With a neat diagram, explain the protocol stack of IEEE 802.15.4. Discuss its role in Low-Rate Wireless Personal Area Networks (LR-WPANs). | 7 | 4 | 2 |
| | b) What are constrained nodes and constrained networks? Discuss the challenges they pose for implementing standard internet protocols like TCP/IP. | 7 | 4 | 2 |

(OR)

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|----|--|---|---|---|
| 8. | a) Draw and explain the message format for MQTT. Explain the concept of publish-subscribe messaging with the roles of broker, publisher, and subscriber. | 7 | 4 | 2 |
| | b) Compare and contrast the CoAP and MQTT protocols in terms of transport layer, message model, and suitability for different IoT scenarios. | 7 | 4 | 4 |

UNIT-V

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|----|--|---|---|---|
| 9. | a) Explain how IoT enables smart home applications. Discuss at least three use cases, such as smart lighting, security, and energy management. | 7 | 5 | 2 |
| | b) Describe the role of IoT in smart agriculture. How can IoT-based soil moisture sensors and automated irrigation systems improve water efficiency? | 7 | 5 | 2 |

(OR)

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|-----|--|---|---|---|
| 10. | a) With a neat block diagram, explain the architecture of an Industrial IoT (IIoT) system for predictive maintenance. | 7 | 5 | 2 |
| | b) Design a conceptual IoT solution for remote patient monitoring. Identify the key components (sensors, gateways, cloud) and explain the data flow. | 7 | 5 | 6 |

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	<u>UNIT-I</u>	Marks	CO	Blooms Level
1.	a) Define bioelectric potentials and explain their sources in the human body.	7M	CO1	L2
	b) Define and explain action and resting of bioelectric potentials	7M	CO1	L2
	(OR)			
2.	a) Describe the propagation of action potential in nerve fibers	7M	CO1	L2
	b) Explain skin surface electrodes and their applications.	7M	CO1	L2
	<u>UNIT-II</u>			
3.	a) Describe measurement of blood flow using electromagnetic method.	7M	CO2	L2
	b) With a neat diagram illustrate the electrical conduction system of the heart.	7M	CO2	L2
	(OR)			
4.	a) Construct and explain Einthoven triangle and ECG lead configurations.	7M	CO2	L3
	b) Briefly explain the ultrasonic method of blood flow measurement.	7M	CO2	L3
	<u>UNIT-III</u>			
5.	a) List and explain the elements of intensive care monitoring system.	7M	CO3	L1
	b) Explain the working of pacemaker with diagram.	7M	CO3	L1
	(OR)			
6.	a) Explain the working of ventilators and respirators.	7M	CO3	L2
	b) Illustrate the operation of spirometer with diagram.	7M	CO3	L2
	<u>UNIT-IV</u>			
7.	a) Discuss and explain the components of bio-telemetry system with block diagram.	7M	CO4	L2
	b) Explain the Biolink PWM telemetry system.	7M	CO4	L2
	(OR)			
8.	a) Apply telemetry concepts to explain monitoring during exercise conditions.	7M	CO4	L3
	b) Discuss the applications of telemetry in emergency patient care.	7M	CO4	L3
	<u>UNIT-V</u>			
9.	a) Write about instrumentation used for diagnostic X-rays.	7M	CO5	L2
	b) Describe the medical applications of radioisotopes.	7M	CO5	L2
	(OR)			
10.	a) Explain about physiological effects of electrical current on human body.	7M	CO5	L2
	b) Apply safety principles to outline methods for prevention of electrical hazards.	7M	CO5	L3

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UNIT-I

- | | | Marks | CO | BTL |
|----|--|-------|-----|-----|
| 1. | a) Define User Interface (UI) and explain its importance in software systems. | 7 | CO1 | L2 |
| | b) Illustrate how good UI design improves user experience in a mobile application. | 7 | CO1 | L3 |

(OR)

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|----|---|---|-----|----|
| 2. | a) Apply the principles of consistency and usability to design a simple login interface | 7 | CO1 | L3 |
| | b) Compare GUI-based interfaces and web user interfaces in terms of usability and user experience | 7 | CO1 | L3 |

UNIT-II

- | | | | | |
|----|---|---|-----|----|
| 3. | a) Describe the role of ergonomics in designing effective user interfaces. | 7 | CO2 | L2 |
| | b) Apply HCI principles to design an interface that minimizes cognitive load. | 7 | CO2 | L3 |

(OR)

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|----|--|---|-----|----|
| 4. | a) Analyze the relationship between business functions and UI design in a real-world system. | 7 | CO2 | L3 |
| | b) What are user interaction patterns? List different types and discuss | 7 | CO2 | L2 |

UNIT-III

- | | | | | |
|----|---|---|-----|----|
| 5. | a) What are the key principles of formatting and phrasing menu options? Discuss | 7 | CO3 | L2 |
| | b) Describe pull-down, pop-up, cascading, and context menus with suitable examples. | 7 | CO3 | L3 |

(OR)

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|----|--|---|-----|----|
| 6. | a) Discuss the importance of crafting clear and concise messages in user interfaces. | 7 | CO3 | L2 |
| | b) Create examples of effective system messages for error, warning, and confirmation scenarios | 7 | CO3 | L4 |

UNIT-IV

- | | | | | |
|----|---|---|-----|----|
| 7. | a) What are modal and modeless windows? Define with examples. | 7 | CO4 | L2 |
| | b) Compare different types of device-based controls in terms of usability and efficiency. | 7 | CO4 | L3 |

(OR)

- | | | | | |
|----|--|---|-----|----|
| 8. | a) Design a window layout for an online shopping application considering usability principles. | 7 | CO4 | L4 |
| | b) How to design a responsive web interface for multiple screen sizes
Discuss | 7 | CO4 | L3 |

UNIT-V

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|----|--|---|-----|----|
| 9. | a) What are usability testing tools? Discuss with examples | 7 | CO5 | L2 |
| | b) Compare different UI design tools in terms of features and usability. | 7 | CO5 | L3 |

(OR)

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|-----|--|---|-----|----|
| 10. | a) Explain the role of multimedia elements in enhancing user interfaces. | 7 | CO5 | L2 |
| | b) Analyze the role of usability testing tools in improving interface design quality | 7 | CO5 | L3 |

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	<u>UNIT-I</u>	Marks	CO	Blooms Level
1.	a) Explain image sampling and quantization.	7	CO1	1
	b) Describe different types of display devices.	7	CO1	2
	(OR)			
2.	a) Explain color image processing and color models.	7	CO1	1
	b) Discuss image acquisition and digitization process.	7	CO1	2
	<u>UNIT-II</u>			
3.	a) Explain intensity transformation functions.	7	CO2	1
	b) Describe histogram equalization.	7	CO2	3
	(OR)			
4.	a) Explain spatial filtering in image processing.	7	CO2	1
	b) Discuss sharpening filters with examples.	7	CO2	2
	<u>UNIT-III</u>			
5.	a) Explain coding redundancy and inter-pixel redundancy.	7	CO3	1
	b) Describe fidelity criteria in compression.	7	CO3	2
	(OR)			
6.	a) Explain bit-plane coding technique.	7	CO3	1
	b) Describe variable length coding.	7	CO3	3
	<u>UNIT-IV</u>			
7.	a) Explain basic concepts of set theory in morphology.	7	CO4	1
	b) Describe hit-or-miss transformation.	7	CO4	2
	(OR)			
8.	a) Explain connected component extraction.	7	CO4	1
	b) Describe pruning operation.	7	CO4	2
	<u>UNIT-V</u>			
9.	a) Explain discontinuity detection in images	7	CO5	2
	b) Describe edge detection filters.	7	CO5	3
	(OR)			
10.	a) Explain region-based segmentation.	7	CO5	1
	b) Describe region splitting and merging techniques	7	CO5	3

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	<u>UNIT-I</u>	Marks	CO	Blooms Level
1.	a) Explain image sampling and quantization.	7	CO1	1
	b) Describe different types of display devices.	7	CO1	2
	(OR)			
2.	a) Explain color image processing and color models.	7	CO1	1
	b) Discuss image acquisition and digitization process.	7	CO1	2
	<u>UNIT-II</u>			
3.	a) Explain intensity transformation functions.	7	CO2	1
	b) Describe histogram equalization.	7	CO2	3
	(OR)			
4.	a) Explain spatial filtering in image processing.	7	CO2	1
	b) Discuss sharpening filters with examples.	7	CO2	2
	<u>UNIT-III</u>			
5.	a) Explain coding redundancy and inter-pixel redundancy.	7	CO3	1
	b) Describe the steps in JPEG- image compression standards.	7	CO3	2
	(OR)			
6.	a) Explain bit-plane coding technique.	7	CO3	1
	b) Describe variable length coding.	7	CO3	3
	<u>UNIT-IV</u>			
7.	a) Explain basic concepts of set theory in morphology.	7	CO4	1
	b) Describe hit-or-miss transformation.	7	CO4	2
	(OR)			
8.	a) Describe region filling algorithm.	7	CO4	1
	b) Describe pruning operation.	7	CO4	2
	<u>UNIT-V</u>			
9.	a) Explain discontinuity detection in images	7	CO5	2
	b) Describe edge detection filters.	7	CO5	3
	(OR)			
10.	a) Explain region-based segmentation.	7	CO5	1
	b) Describe region splitting and merging techniques	7	CO5	3

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

Answer ONE Question from each Unit

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		Marks	CO	Blooms Level
<u>UNIT-I</u>				
1.	a) What is mobile computing? Describe its basic concepts.	7	CO1	L1
	b) What are mobile system networks? Explain their components.	7	CO1	L1
(OR)				
2.	a) Explain the novel applications of mobile computing.	7	CO1	L2
	b) Differentiate between wireless communication and mobile communication.	7	CO1	L2
<u>UNIT-II</u>				
3.	a) Explain the basic concepts of GSM.	7	CO2	L2
	b) What is handover in GSM? Explain its types.	7	CO2	L1
(OR)				
4.	a) Explain the GSM radio interface and its features.	7	CO2	L2
	b) Explain the protocols used in GSM architecture.	7	CO2	L2
<u>UNIT-III</u>				
5.	a) Explain the hidden terminal problem with an example.	7	CO3	L2
	b) Differentiate between FDMA, TDMA, and CDMA.	7	CO3	L2
(OR)				
6.	a) Explain Slotted Aloha and compare it with Classical Aloha.	7	CO3	L2
	b) What is polling? Explain its working in MAC protocols.	7	CO3	L1
<u>UNIT-IV</u>				
7.	a) What is Mobile IP? Explain its purpose and features.	7	CO4	L1
	b) Explain how handover management is handled in Mobile IP.	7	CO4	L2
(OR)				
8.	a) What is tunnelling in Mobile IP? Explain its working.	7	CO4	L1
	b) How does DHCP function in mobile networks, and what role does it play in IP address assignment?	7	CO4	L1
<u>UNIT-V</u>				
9.	a) What are the concepts of fast retransmit and fast recovery in mobile networks? How do these mechanisms improve TCP performance in mobile environments?	7	CO5	L1
	b) Explain Indirect TCP and its advantages.	7	CO5	L2
(OR)				
10.	a) Explain the applications and challenges of a MANET.	7	CO5	L2
	b) Compare DSR and DSDV routing protocols.	7	CO5	L2

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<u>UNIT-I</u>		Marks	CO	Blooms Level
1.	a) Calculate the number of sleepers required for a 2.5 km long Broad Gauge track if sleeper density is given as $(M + 5)$.	7M	CO1	Apply
	b) Explain different types of ballast and state their suitability under various conditions.	7M	CO1	Understand
(OR)				
2.	a) Explain the components of permanent way with their functions.	7M	CO1	Understand
	b) Define rail creep and explain its causes, effects, and prevention methods.	7M	CO1	Analyze
<u>UNIT-II</u>				
3.	a) A 3° curve is located on a ruling gradient of 1 in 150. Determine the compensated gradient.	6M	CO2	Apply
	b) Briefly describe about different types of gradients used in railway track construction.	8M	CO2	Evaluate
(OR)				
4.	a) Explain cant deficiency and negative super elevation with neat sketches.	6M	CO2	Analyze
	b) Calculate the super elevation for a BG track with curve radius 500 m and speed 90 km/h. Also determine maximum permissible speed.	8M	CO2	Evaluate
<u>UNIT-III</u>				
5.	a) Explain requirements of a good crossing with a neat sketch.	7M	CO3	Understand
	b) Classify railway signals and explain any one type with working.	7M	CO3	Apply
(OR)				
6.	a) Explain the components of a turnout and their functions.	8M	CO3	Apply
	b) Discuss urban rail transit systems in India with emphasis on metro rail.	6M	CO3	Understand
<u>UNIT-IV</u>				
7.	a) Explain aircraft characteristics affecting airport design.	7M	CO4	Understand
	b) Differentiate between VFR and IFR with suitable examples.	7M	CO4	Analyze
(OR)				
8.	a) Explain factors affecting airport site selection.	6M	CO4	Understand
	b) Calculate corrected runway length for: Elevation = 300 m, airport reference Temperature = 27°C , Gradient = 0.2%, Basic length = 1800 m.	8M	CO4	Apply
<u>UNIT-V</u>				
9.	a) Explain requirements of a good port.	7M	CO5	Understand
	b) Draw and explain components of an artificial harbour.	7M	CO5	Analyze
(OR)				
10.	a) Differentiate between dry dock and wet dock	7M	CO5	Analyze
	b) Define breakwater and explain any one type.	7M	CO5	Understand

**III B.Tech II Semester Regular Examinations, April, 2026
ESSENTIALS NATURAL LANGUAGE PROCESSING
(CSE(DS))****Time: 3 Hours****Max Marks: 70**

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		<u>UNIT-I</u>	Marks	CO	BTL
1.	a)	Define Natural Language Processing and analyze its role in artificial intelligence systems.	7	CO1	K3
	b)	Explain the key challenges in NLP with suitable examples.	7	CO1	K2
(OR)					
2.	a)	Describe the study of language and explain its components in NLP.	7	CO1	K2
	b)	Analyze the significance of semantic and pragmatic analysis in language understanding.	7	CO1	K3
<u>UNIT-II</u>					
3.	a)	Discuss the Shannon Game and evaluate its contribution to language modelling concepts.	7	CO2	K4
	b)	Analyze the working of Top-Down and Bottom-Up parsers with suitable examples.	7	CO2	K3
(OR)					
4.	a)	Describe Feature Systems and explain their role in grammar representation.	7	CO2	K2
	b)	Discuss Transition Network Grammars and explain their role in parsing.	7	CO2	K2
<u>UNIT-III</u>					
5.	a)	Explain Grammars for Natural Language and summarize their importance in NLP systems.	7	CO3	K2
	b)	Compare deterministic and non-deterministic parsing approaches in NLP.	7	CO3	K4
(OR)					
6.	a)	Analyze how questions are handled in Context-Free Grammars with suitable examples.	7	CO3	K3
	b)	Evaluate how human parsing strategies differ from computational parsing models.	7	CO3	K4
<u>UNIT-IV</u>					
7.	a)	Summarize the major types of language models and differentiate them with examples.	7	CO4	K3
	b)	Detail parameter estimation in language models and highlight its importance.	7	CO4	K2
(OR)					
8.	a)	Elaborate the concept of semantic interpretation in NLP and illustrate its role in language understanding.	7	CO4	K2
	b)	Explain about N gram model and differentiate its role in defining semantic structures.	7	CO4	K3
<u>UNIT-V</u>					
9.	a)	Identify different approaches to Machine Translation.	7	CO5	K1
	b)	List the key components of the Anusaraka system.	7	CO5	K2
(OR)					
10.	a)	Discuss the idea of giving up agreement in Anusaraka output.	7	CO5	K2
	b)	Differentiate between different Machine Translation approaches in a simple way.	7	CO5	K3

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

		<u>UNIT-I</u>	Marks	CO	BTL
1.	a)	Discuss the concept of data wrangling pipelines. How does data move through each stage of the pipeline? Explain with a real-world example.	7	CO1	L2
	b)	Explain the structure and syntax of JSON data format. How does JSON differ from XML in terms of readability and use cases? Provide examples.	7	CO1	L2
(OR)					
2.	a)	Describe the role of Python in automating data wrangling tasks. Illustrate with examples involving file reading and data transformation using Python.	7	CO1	L2
	b)	Compare and contrast CSV and XML data formats. Describe the scenarios to extract the statistics of any dataset using these two formats.	7	CO1	L3
<u>UNIT-II</u>					
3.	a)	Describe the process of parsing PDF files in Python using pdf miner. Explain the steps involved and challenges faced during PDF text extraction.	7	CO2	L2
	b)	Explain how to read multiple sheets from an Excel workbook using Python. Describe the use of open pyxl or xlrd libraries with examples.	7	CO2	L2
(OR)					
4.	a)	Describe the data storage process and various method used for storing data.	7	CO2	L3
	b)	Explain how to identify and treat outliers in dataset.	7	CO2	L2
<u>UNIT-III</u>					
5.	a)	Explain the concept of finding and removing duplicates in a dataset. Describe the methods and Python libraries used to remove duplications.	7	CO3	L2
	b)	Explain the process of Normalizing and Standardizing the data with examples.	7	CO3	L2
(OR)					
6.	a)	Explain Fuzzy Matching and RegEx matching. Explain its role in data cleanup with Python examples.	7	CO3	L3
	b)	Describe the process of saving cleaned data in different formats using Python. Explain how to determine the suitable format for different scenarios.	7	CO3	L2
<u>UNIT-IV</u>					
7.	a)	Explain the process of importing and exploring tabular data using Python pandas. Describe key functions used for initial data exploration.	7	CO4	L2
	b)	Explain how to create groupings in data using Python. Illustrate with examples using group by functions in pandas for aggregate analysis.	7	CO4	L3
(OR)					
8.	a)	What is data visualization? Explain different types of charts used in data analysis and their appropriate use cases with examples.	7	CO4	L2
	b)	Describe time-related data analysis. How are time-series datasets explored and visualized in Python? Explain with suitable examples.	7	CO4	L3
<u>UNIT-V</u>					
9.	a)	Explain how to scrape a web page using Python's requests and BeautifulSoup libraries. Describe the steps involved with a practical example.	7	CO5	L2
	b)	Describe XPath and its role in advanced web scraping. How does XPath differ from CSS selectors? Provide examples of XPath expressions.	7	CO5	L2
(OR)					
10.	a)	Explain Selenium for browser-based web scraping. How does it handle JavaScript-heavy websites? Describe the setup and usage with examples.	7	CO5	L2
	b)	Describe how to build a web spider using Scrapy. Explain the components of a Scrapy spider and how it crawls multiple pages.	7	CO5	L3

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

		Marks	CO	Blooms Level
	<u>UNIT-I</u>			
1.	a) Explain the importance of modeling in software development.	7	CO1	K2
	b) Analyze the role of UML across different phases of the SDLC.	7	CO1	K4
	(OR)			
2.	a) Describe the basic elements of UML conceptual model.	7	CO1	K2
	b) Compare and analyze object-oriented modeling with procedural modeling.	7	CO1	K4
	<u>UNIT-II</u>			
3.	a) Differentiate between class diagram and object diagram.	7	CO2	K3
	b) Analyze the differences between class diagrams and object diagrams with example	7	CO2	K4
	(OR)			
4.	a) Analyze the differences between class diagrams and object diagrams with examples	7	CO2	K4
	b) Explain the terms: class, object, attribute, and operation.	7	CO2	K2
	<u>UNIT-III</u>			
5.	a) Differentiate between sequence diagram and collaboration diagram.	5	CO3	K3
	b) Construct a state diagram for an online order processing system.	9	CO3	K4
	(OR)			
6.	a) Explain the concept of time and space in behavioral modeling.	7	CO3	K3
	b) Analyze how time and space constraints affect system behavior.	7	CO3	K4
	<u>UNIT-IV</u>			
7.	a) Explain the purpose of using design patterns in software development.	7	CO4	K2
	b) Analyze the advantages and limitations of using design patterns.	7	CO4	K3
	(OR)			
8.	a) Apply the steps involved in selecting a suitable design pattern for a given problem.	7	CO4	K4
	b) Explain the role of View and Controller in MVC.	7	CO4	K2
	<u>UNIT-V</u>			
9.	a) Analyze the advantages and limitations of the Singleton pattern.	7	CO5	K4
	b) Explain how structural patterns help in system design.	7	CO5	K2
	(OR)			
10.	a) Differentiate between Adapter and Bridge patterns.	7	CO5	K3
	b) What is the purpose of behavioral patterns? Discuss	7	CO5	K2

III B. Tech II Semester Supplementary Examinations, April-2026
DYNAMIC SYSTEMS & MECHANICAL VIBRATIONS
(MECHANICAL 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 | BTL |
|----|---|-------|----|-----|
| 1. | A CAM is to give the following motion to a knife-edge follower:
1. Outstroke during 60° of CAM rotation with Simple Harmonic Motion (SHM).
2. Dwell for the next 30° .
3. Return stroke during the next 60° with Simple Harmonic Motion (SHM).
4. Dwell for the remaining part of the cycle.
The minimum radius of the CAM is 50 mm and the lift (stroke) is 40 mm. The CAM rotates at 150 rpm clockwise. Draw the displacement diagram and the CAM profile if the axis of the follower passes through the axis of the CAM shaft. | 10 | 1 | 3 |

(OR)

- | | | | | |
|----|--|----|---|---|
| 2. | Draw the profile of a CAM operating a roller follower of diameter 20 mm. The lift is 30 mm and the minimum radius of the CAM is 40 mm. The motion sequence is:
1. Outer stroke for 90° of CAM rotation with Uniform Velocity.
2. Dwell for 45° .
3. Return stroke for 90° with Uniform Velocity.
4. Dwell for the remaining period.
The axis of the follower is offset by 15 mm towards the right from the CAM shaft center. | 10 | 1 | 3 |
|----|--|----|---|---|

UNIT-II

- | | | | | |
|----|---|----|---|---|
| 3. | Four masses A, B, C and D are attached to a shaft and revolve in different planes. The masses are 12 kg, 10 kg, 18 kg and 15 kg respectively. The radii of rotation are 40 mm, 50 mm, 60 mm and 30 mm. The planes of B, C and D are at distances of 100 mm, 200 mm, 300 mm respectively from plane A. The angular positions of B, C and D measured anticlockwise from A are 45° , 120° , 255° . Determine the magnitude and angular position of the balancing masses to be placed in a planes X and Y, X located midway between A and B whereas Y located midway between C and D, at a radius of 100 mm. | 10 | 2 | 3 |
|----|---|----|---|---|

(OR)

- | | | | | |
|------|---|---|---|---|
| 4. a | Derive the expressions for Variation in Tractive Effort and Swaying Couple for an uncoupled two-cylinder locomotive with inside cylinders | 6 | 2 | 3 |
| b | Define Hammer Blow and explain its significance in the design of locomotive rails. | 4 | 2 | 1 |

UNIT-III

- | | | | | |
|------|--|----|---|---|
| 5. | A cylinder of mass M and radius R rolls without slipping on a horizontal surface. It is attached to a spring of stiffness k at its center of gravity. Derive the differential equation of motion using the Energy Method and determine the natural frequency of the system. | 10 | 3 | 3 |
| (OR) | | | | |
| 6. | A mass of 5 kg is supported by a spring of stiffness $k = 1000 \text{ N/m}$ and a dashpot. It is observed that the amplitude of vibration decreases to $1/10^{\text{th}}$ of its initial value after 5 complete cycles. Calculate: (a) The damping ratio, (b) The actual damping coefficient and (c) The damped natural frequency. | 10 | 3 | 2 |

UNIT-IV

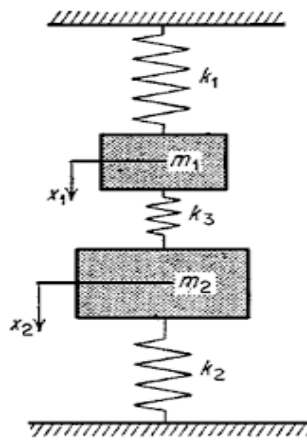
7. A shaft 50 mm in diameter and 3 m long is simply supported at the ends. It carries three loads: 1000 N at 1 m from the left support, 1500 N at the center, and 800 N at 1 m from the right support. $E = 200 \text{ GPa}$. Find the natural frequency of transverse vibration using Dunkerley's method. 10 4 1

(OR)

8. A shaft 12 mm in diameter and 0.6 m long is held in long bearings (fixed ends). It carries a rotor of mass 15 kg at its mid-span. The center of gravity of the rotor is 0.3 mm from the shaft axis. $E = 200 \text{ GPa}$. Determine: (a) The critical speed in rpm, and (b) The range of speed within which the bending stress exceeds 150 MPa. 10 4 3

UNIT-V

9. Consider a system of two masses m_1 and m_2 supported by three springs with stiffness k_1 , k_2 and k_3 . Derive the differential equations of motion using Newton's Second Law and obtain the general "Characteristic Equation" (Frequency Equation) for the system. 10 5 3



(OR)

10. Define "Principal Modes of Vibration" for a 2-DOF system. Mathematically derive the expression for the amplitude ratio (X_1/X_2) and explain the physical significance of "In-phase" and "Out-of-phase" vibrations using sketches. 10 5 3

UNIT-VI

11. A shaft of length L and negligible mass has two rotors with mass moments of inertia J_1 and J_2 at its ends. The torsional stiffness of the shaft is q . a). Derive the frequency equation for the free torsional vibrations of this system. b). Derive the expression for the position of the "Node" from rotor J_1 . 10 6 3

(OR)

12. Define Transmissibility. a). Derive the expression for the Force Transmissibility ratio for a single-degree-of-freedom system with damping. b). Sketch the Transmissibility curve against frequency ratio for different damping ratios. 10 6 3

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

			Marks	CO	Blooms Level
<u>UNIT-I</u>					
1.	a	Explain the nature, scope, and significance of Managerial Economics in decision-making	5M	CO1	L2
	b	Discuss the Law of Demand along with its assumptions and exceptions.	5M	CO1	L2
(OR)					
2.	a	Explain determinants of demand with suitable examples.	5M	CO1	L2
	b	Discuss the relationship between price elasticity of demand and total revenue	5M	CO1	L2
<u>UNIT-II</u>					
3.	a	Explain the concept of production function and its types	5M	CO2	L2
	b	Discuss Isoquants and Isocost curves with graphical explanation	5M	CO2	L2
(OR)					
4.	a	Explain Marginal Rate of Technical Substitution (MRTS) and its significance	5M	CO2	L3
	b	Explain internal and external economies of scale.	5M	CO2	L2
<u>UNIT-III</u>					
5.	a	Explain different types of market structures with examples.	5M	CO3	L3
	b	Discuss features of perfect competition	5M	CO3	L2
(OR)					
6.	a	Explain monopoly market and its characteristics.	5M	CO3	L2
	b	Compare perfect competition and monopoly	5M	CO3	L2
<u>UNIT-IV</u>					
7.	a	Discuss Taylor's Scientific Management Theory.	5M	CO4	L2
	b	Explain Fayol's principles of management.	5M	CO4	L2
(OR)					
8.	a	Describe Mayo's Hawthorne experiments and their significance.	5M	CO4	L3
	b	Explain Maslow's hierarchy of needs theory	5M	CO4	L2
<u>UNIT-V</u>					
9.	a	Define marketing and explain its functions	5M	CO5	L2
	b	Discuss the concept of marketing mix (4Ps).	5M	CO5	L2
(OR)					
10.	a	Explain marketing strategies based on product life cycle	5M	CO5	L3
	b	Explain channels of distribution and their types	5M	CO5	L2
<u>UNIT-VI</u>					
11.	a	Define HRM, HRD, and PMIR and explain their differences	5M	CO6	L2
	b	Discuss functions of HR manager in an organization	5M	CO6	L2
(OR)					
12.	a	Explain manpower planning and its importance	5M	CO6	L2
	b	Describe recruitment and selection process.	5M	CO6	L2

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	BTL
1.	a)	Explain about current chopping phenomenon.	5	1	K2
	b)	Describe the operation of Air Blast Circuit Breaker with neat sketches.	5	1	K2
		(OR)			
2.	a)	Explain the importance of resistance switching and current chopping in circuit breaker.	5	1	K2
	b)	A 3-phase alternator has line voltage of 11 KV. The generator is connected to a circuit breaker. The inductive reactance upto circuit breaker is 5Ω per phase. The distributed capacitance up to circuit breaker between phase and neutral is $0.01 \mu\text{F}$. Determine (i) peak restriking voltage across circuit breaker. (ii) frequency of restriking voltage transient (iii) average of restriking voltage up to peak restriking voltage	5	1	K3
		<u>UNIT-II</u>			
3.	a)	Describe the construction, principle of operation of an induction cup type of relay.	5	2	K2
	b)	Explain the operation of static instantaneous over current relay.	5	2	K2
		(OR)			
4.	a)	Derive universal torque equation and explain its significance.	5	2	K2
	b)	Discuss about mho relay with neat diagram?	5	2	K2
		<u>UNIT-III</u>			
5.	a)	Explain the restricted earth fault protection by differential system in the protection of alternator winding?	5	3	K2
	b)	The neutral point of 11kV alternator is earthed through a resistance of 5Ω , the relay is set to operate when there is out of balance current of 1.5A. The C.T.s has a ratio of 1000/5. What percentage of the winding is protected against earth faults?	5	3	K3
		(OR)			
6.	a)	Develop the protection scheme of generator against rotor fault and inter turn fault.	5	3	K2
	b)	Explain Buchholz relay protection in a transformer. Write its merits and demerits.	5	3	K2
		<u>UNIT-IV</u>			
7.	a)	Describe three zone distance relay protection with an example?	5	4	K2
	b)	Explain the differential protection for bus bars.	5	4	K2
		(OR)			
8.	a)	Explain principle of translay relay protection scheme.	5	4	K2
	b)	What are the various schemes of bus bar protection? Discuss bus protection by differential relay.	5	4	K2
		<u>UNIT-V</u>			
9.	a)	Describe the construction and working principle of a zinc oxide gapless arrester with a neat sketch.	5	5	K2
	b)	Explain about insulation co-ordination	5	5	K2
		(OR)			
10.	a)	Describe the construction and principle of operation of valve-type lightning arrester.	5	5	K2
	b)	Illustrate standard impulse test wave with the help of waveform.	5	5	K2
		<u>UNIT-VI</u>			
11.	a)	Explain the methods of neutral grounding with phasor diagram.	5	6	K2
	b)	Differentiate grounded and ungrounded neutral systems	5	6	K2
		(OR)			
12.	a)	What are the different types of grounding? Explain with physical examples	5	6	K2
	b)	Write short notes on reactance grounding?	5	6	K2

III B.Tech II Semester Supplementary Examinations, April, 2026
MICROPROCESSORS AND MICROCONTROLLERS
(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	BTL
1.	Describe register organization of 8086. (OR)	10	CO1	2
2.	a) Draw and explain pin diagram of 8086	5M	CO1	3
	b) Explain interrupt service routine in 8086.	5M	CO1	2
	<u>UNIT-II</u>			
3.	a) Explain flag manipulation instructions.	5M	CO2	2
	b) Write an assembly program to find largest number.	5M	CO2	4
	<u>UNIT-III</u>			
5.	a) Describe operating modes of 8255.	5M	CO3	3
	b) Explain programmable interrupt controller (8259)	5M	CO3	2
	<u>UNIT-IV</u>			
6.	a) Explain modes of operation of 8251.	5M	CO3	3
	b) Compare programmed I/O and DMA.	5M	CO3	4
	<u>UNIT-V</u>			
7.	a) Explain architecture of 80386 microprocessor.	5M	CO4	2
	b) Compare segmentation and paging.	5M	CO4	4
	<u>UNIT-VI</u>			
8.	a) Explain features of 80486 processor.	5M	CO4	2
	b) Explain pipelining in advanced processors.	5M	CO4	3
	<u>UNIT-V</u>			
9.	a) Explain CPSR register in ARM.	5M	CO5	2
	b) Explain exception handling in ARM.	5M	CO5	3
	<u>UNIT-VI</u>			
10.	a) Explain different operating modes of ARM.	5M	CO5	3
	b) Compare ARM and 8086 processors.	5M	CO5	4
	<u>UNIT-VI</u>			
11.	a) Explain internal RAM and ROM of 8051.	5M	CO6	3
	b) Explain timer modes of 8051.	5M	CO6	3
	<u>UNIT-VI</u>			
12.	a) Explain interrupts of 8051.	5M	CO6	2
	b) Write a program for serial data transmission.	5M	CO6	4

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	BTL
1. a)	Explain the objectives and importance of soil exploration in engineering projects.	5M	CO1	2
b)	A sampling tube has inner diameter of 70mm and cutting edge of 68mm. its outside diameters are 72 mm and 74mm respectively. Determine area ratio, inside clearance, outside clearance of the sampler. This tube is pushed at the bottom of the borehole to a distance of 600mm with length of sample recorded being 500mm. find the recovery ratio.	5M	CO1	4
	(OR)			
2. a)	Explain the plate load test procedure and its applications.	5M	CO1	2
b)	Discuss the preparation of soil investigation report and interpretation of borehole logs.	5M	CO1	4
	<u>UNIT-II</u>			
3. a)	Explain types of slope failures with neat sketches .	5M	CO2	2
b)	An embankment 10 m high is inclined at an angle of 36° to the horizontal. A stability analysis by the method of slices given the following forces per running meter. $\sum T = \sum$ Shearing forces = 450 kN, $\sum N = \sum$ Normal forces = 900 kN and $\sum U = \sum$ pore water pressure forces = 216 kN. The length of failure arc is 27 m Laboratory tests on the soil indicate the effective values C' and ϕ' as 20 kN/m ² and 18° respectively. Determine the factor of safety of the slope with respect to i) shearing strength ii) cohesion.	5M	CO2	4
	(OR)			
4. a)	Discuss Bishop's simplified method and its advantages over other methods.	5M	CO2	2
b)	An infinite slope is made of clay with the following properties $\gamma_{sat}=18\text{kN/m}^3$, $g^I=9\text{kN/m}^3$, $C^I=25\text{kN/m}^2$, $\phi^I=28^\circ$. If the slope has an inclination of 35° and height equal to 12m, Determine the stability of slope, When i) The slope is submerged and ii) There is seepage parallel to the slope.	5M	CO2	4
	<u>UNIT-III</u>			
5. a)	Explain Rankine's theory of earth pressure with assumptions and applications.	5M	CO3	2
b)	A retaining wall 8m high retains cohesion less backfill. The top 3m of the fill has a unit weight of 17 kN/m ³ and $\phi = 33^\circ$ and the rest has unit weight of 18.5 kN/m ³ and $\phi = 28^\circ$. Draw the active earth pressure distribution diagram? Also find the total active earth thrust and its location from the bottom of the wall.	5M	CO3	4
	(OR)			
6. a)	Derive expressions for active and passive earth pressures using Rankine's theory.	5M	CO3	2
b)	Write the difference between rankine theory and coulomb wedge theory of earth pressures.	5M	CO3	3

UNIT-IV

7. a) Describe Terzaghi's bearing capacity theory and its limitations. 5M CO4 2
- b) A circular footing is placed at a depth of 3m and is resting on stiff saturated clay. The unconfined compressive strength of clay is 300kN/m^2 and the unit weight of soil is 20kN/m^3 . Determine the diameter of the footing if the columns load is 700kN. Assume a factor of safety of 2.5. Use Terzaghi's theory and bearing capacity factors are $N_c=5.7$, $N_q=1$ and $N_\gamma=0$. 5M CO4 4

(OR)

8. a) Explain IS code method for determining bearing capacity of shallow foundations. 5M CO4 2
- b) A column carries a load of 900 kN. The soil is a dry sand with density = 19 kN/m^3 and having an angle of internal friction of 40° . A minimum factor of safety of 2.5 is required and Terzaghi factors are required to be used. ($N_\gamma = 42$ and $N_q = 21$). Find the size of a square footing required if it is placed at 1m below ground surface with water table at ground surface. Assume $\gamma_{\text{sat}} = 18\text{kN/m}^3$. 5M CO4 4

UNIT-V

9. a) Describe dynamic pile formulae and their limitations. 5M CO5 3
- b) A group of 16 piles with 4 piles in a row were driven into soft clay extending from ground level to a great depth. The diameter and length of piles are 30cm and 10m respectively. The unconfined compressive strength of clay is 100 kPa. If the piles were spaced at 90cm c/c, compute the allowable load on the pile group on the basis of shear failure criterion for a factor of safety of 2.5, Assume adhesion factor 0.6. 5M CO5 4

(OR)

10. a) Classify types of piles based on function and installation methods. 5M CO5 2
- b) Explain the concept of load carrying capacity of piles using static formulae. 5M CO5 4

UNIT-VI

11. a) Discuss problems encountered during well sinking and their remedies. 5M CO6 2
- b) Explain the causes and corrections of tilts in well foundations. 5M CO6 4
- (OR)
12. a) Discuss the causes and control measures of shifts in well foundations. 5M CO6 2
- b) Explain the importance of well foundations in river bridge construction. 5M CO6 4

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	BTL
1. a)	Explain the objectives and importance of soil exploration in engineering projects.	5M	CO1	2
b)	A sampling tube has inner diameter of 70mm and cutting edge of 68mm. its outside diameters are 72 mm and 74mm respectively. Determine area ratio, inside clearance, outside clearance of the sampler. This tube is pushed at the bottom of the borehole to a distance of 600mm with length of sample recorded being 500mm. find the recovery ratio.	5M	CO1	4
	(OR)			
2. a)	Explain the plate load test procedure and its applications.	5M	CO1	2
b)	Discuss the preparation of soil investigation report and interpretation of borehole logs.	5M	CO1	4
	<u>UNIT-II</u>			
3. a)	Explain types of slope failures with neat sketches .	5M	CO2	2
b)	An embankment 10 m high is inclined at an angle of 36° to the horizontal. A stability analysis by the method of slices given the following forces per running meter. $\sum T = \sum$ Shearing forces = 450 kN, $\sum N = \sum$ Normal forces = 900 kN and $\sum U = \sum$ pore water pressure forces = 216 kN. The length of failure arc is 27 m Laboratory tests on the soil indicate the effective values $C/$ and $\phi/$ as 20 kN/m ² and 18° respectively. Determine the factor of safety of the slope with respect to i) shearing strength ii) cohesion.	5M	CO2	4
	(OR)			
4. a)	Discuss Bishop's simplified method and its advantages over other methods.	5M	CO2	2
b)	An infinite slope is made of clay with the following properties $\gamma_{sat}=18\text{kN/m}^3$, $g^I=9\text{kN/m}^3$, $C^I=25\text{kN/m}^2$, $\phi^I=28^\circ$. If the slope has an inclination of 35° and height equal to 12m, Determine the stability of slope, When i) The slope is submerged and ii) There is seepage parallel to the slope.	5M	CO2	4
	<u>UNIT-III</u>			
5. a)	Explain Rankine's theory of earth pressure with assumptions and applications.	5M	CO3	2
b)	A retaining wall 8m high retains cohesion less backfill. The top 3m of the fill has a unit weight of 17 kN/m ³ and $\phi = 33^\circ$ and the rest has unit weight of 18.5 kN/m ³ and $\phi = 28^\circ$. Draw the active earth pressure distribution diagram? Also find the total active earth thrust and its location from the bottom of the wall.	5M	CO3	4
	(OR)			
6. a)	Derive expressions for active and passive earth pressures using Rankine's theory.	5M	CO3	2
b)	Write the difference between rankine theory and coulomb wedge theory of earth pressures.	5M	CO3	3

UNIT-IV

7. a) Describe Terzaghi's bearing capacity theory and its limitations. 5M CO4 2
- b) A circular footing is placed at a depth of 3m and is resting on stiff saturated clay. The unconfined compressive strength of clay is 300kN/m^2 and the unit weight of soil is 20kN/m^3 . Determine the diameter of the footing if the columns load is 700kN. Assume a factor of safety of 2.5. Use Terzaghi's theory and bearing capacity factors are $N_c=5.7$, $N_q=1$ and $N_\gamma=0$. 5M CO4 4

(OR)

8. a) Explain IS code method for determining bearing capacity of shallow foundations. 5M CO4 2
- b) A column carries a load of 900 kN. The soil is a dry sand with density = 19 kN/m^3 and having an angle of internal friction of 40° . A minimum factor of safety of 2.5 is required and Terzaghi factors are required to be used. ($N_\gamma = 42$ and $N_q = 21$). Find the size of a square footing required if it is placed at 1m below ground surface with water table at ground surface. Assume $\gamma_{\text{sat}} = 18\text{kN/m}^3$. 5M CO4 4

UNIT-V

9. a) Describe dynamic pile formulae and their limitations. 5M CO5 3
- b) A group of 16 piles with 4 piles in a row were driven into soft clay extending from ground level to a great depth. The diameter and length of piles are 30cm and 10m respectively. The unconfined compressive strength of clay is 100 kPa. If the piles were spaced at 90cm c/c, compute the allowable load on the pile group on the basis of shear failure criterion for a factor of safety of 2.5, Assume adhesion factor 0.6. 5M CO5 4

(OR)

10. a) Classify types of piles based on function and installation methods. 5M CO5 2
- b) Explain the concept of load carrying capacity of piles using static formulae. 5M CO5 4

UNIT-VI

11. a) Discuss problems encountered during well sinking and their remedies. 5M CO6 2
- b) Explain the causes and corrections of tilts in well foundations. 5M CO6 4
- (OR)**
12. a) Discuss the causes and control measures of shifts in well foundations. 5M CO6 2
- b) Explain the importance of well foundations in river bridge construction. 5M CO6 4

AR18

CODE: 18ECT315

SET-1

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

III B.Tech II Semester Supplementary Examinations, April, 2026

**MICROPROCESSORS AND MICROCONTROLLERS
(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

UNIT-I

1. a) Discuss the physical memory organization of 8086. 6M
b) Sketch and explain minimum mode read cycle timing diagram of 8086. 6M
- (OR)**
2. a) Draw the flag register structure of 8086 and explain the function of each flag. 6M
b) Illustrate the following addressing modes of 8086 with examples. 6M
 - i) Immediate ii) Register iii) Direct iv) Register Indirect

UNIT-II

3. a) Compare Macro and Procedure. 6M
b) Write the description of following assembler directives with examples. 6M
 - i) SEGMENT ii) PROC iii) DW iv) GLOBAL
- (OR)**
4. a) Develop an assembly language program in 8086 to arrange given array of numbers in ascending order. 6M
b) Write the description of following instructions of 8086 with examples. 6M
 - i) PUSH ii) CALL iii) MUL iv) TEST

UNIT-III

5. a) Draw and explain the architecture of 8255. 8M
b) Discuss the significance of DMA data transfer. 4M
- (OR)**
6. a) Draw and explain the architecture of PIC 8259. 8M
b) List the features of USART. 4M

UNIT-IV

7. a) Illustrate the registers of ARM processor. 8M
b) Discuss the different data types supported by 80386 processor. 4M
- (OR)**
8. a) List and explain the different exceptions of ARM. 6M
b) Explain the physical memory organization of 80386. 6M

UNIT-V

9. a) Discuss the registers of 8051. 8M
b) List the features of 8051. 4M
- (OR)**
10. a) Write an assembly language program in 8051 to perform 8-bit division and multiplication. 6M
b) Explain the following addressing modes of 8051 with examples. 6M
 - i) Register Indirect ii) Indexed iii) Direct

AR18

CODE: 18CET316

SET-1

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

III B.Tech II Semester Supplementary Examinations, April, 2026

**Geotechnical Engineering-II
(CIVIL 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) Describe with a neat sketch how will you carry out the wash boring method of soil exploration. 6 M
- b) What are its merits and demerits of the wash boring method of soil exploration? 6 M

(OR)

2. a) Write short notes on: 6 M
(a) Geophysical methods, (b) Penetration Tests.
- b) Write differences between undisturbed and disturbed soil samples 6 M

UNIT-II

3. a) Explain types of slope failures with neat sketches 6 M
- b) Explain the Classification of Slopes. 6 M

(OR)

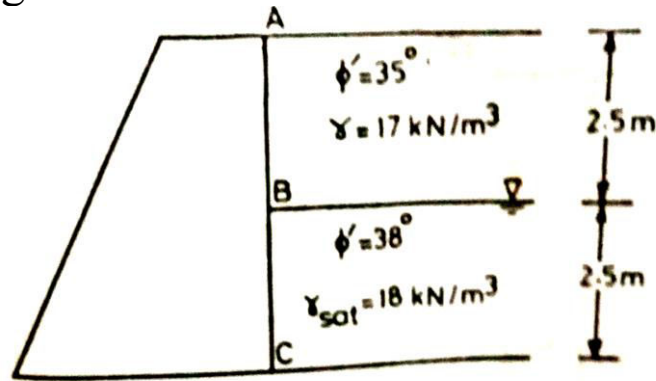
4. a) Explain stability of slopes of earth dams under different conditions. 6 M
- b) Explain Stability of Finite Slopes with neat sketch. 6 M

UNIT-III

5. a) Explain lateral earth pressure at rest with neat sketch. 6 M
- b) What is active earth pressure and passive earth pressure and earth pressure at rest. Explain in detail. 6 M

(OR)

6. a) Determine active pressure on the retaining wall as shown in figure and take $\gamma_w = 10 \text{ kN/m}^3$. 6 M



- b) Explain Rankine's theory of earth pressure and also state its advantage. 6 M

UNIT-IV

7. a) What are the assumptions in Terzaghi's theory for shallow foundations 6 M
- b) What is the safe bearing capacity of a circular footing of 1.5 m diameter resting on the surface of a saturated clay of unconfined compression strength of 120 kN/m², if the factor of safety is 3? 6 M

(OR)

8. a) Explain the differences between local and general shear failures and factors considered for their identification. 6 M
- b) Explain how to find allowable settlements of structures. 6 M

UNIT-V

9. a) Discuss what is the necessity of pile foundation. 6 M
- b) Explain different classifications of piles 6 M

(OR)

10. a) A timber pile was driven by a drop hammer weighing 30 kN with a free fall of 1.2 m. The average penetration of the last few blows was 5 mm. What is the capacity of the pile according to engineering News Formula. 6 M
- b) Explain plate load test in detail and its limitations 6 M