

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. | Define image pyramid. List and explain different types of image pyramid. | 5 | CO1 | K2 |
| | b. | Illustrate about various components of digital camera in detail. | 5 | CO1 | K2 |
| (OR) | | | | | |
| 2. | | Explain how do you perform histogram equalization in image processing? | 10 | CO1 | K2 |
| <u>UNIT-II</u> | | | | | |
| 3. | | Explain about Pose estimation by the direct linear transform algorithm. | 10 | CO2 | K2 |
| (OR) | | | | | |
| 4. | | Apply Expectation-Maximization (EM) algorithm to work in the context of Gaussian Mixture Models? | 10 | CO2 | K3 |
| <u>UNIT-III</u> | | | | | |
| 5. | | What do you mean by two frame structure? How it is useful in reconstruction of 3D structure of a scene explain with example. | 10 | CO3 | K2 |
| (OR) | | | | | |
| 6. | | Explain the key assumptions made in layered motion analysis, and how do they impact the accuracy of the results? | 10 | CO3 | K2 |
| <u>UNIT-IV</u> | | | | | |
| 7. | a. | Explain about cylindrical and spherical coordinates of an image. | 5 | CO4 | K2 |
| | b. | Illustrate about HDR image encoding formats. | 5 | CO4 | K2 |
| (OR) | | | | | |
| 8. | | Explain about block diagram showing the various sources of noise as well as the digital post processing steps. | 10 | CO4 | K2 |
| <u>UNIT-V</u> | | | | | |
| 9. | | Explain how a shape of an object variate from its shape? Give an example. | 10 | CO5 | K2 |
| (OR) | | | | | |
| 10. | a. | Discuss about how bundle adjustment plays in improving the accuracy of Structure from Motion? | 5 | CO5 | K2 |
| | b. | Explain about 3 cues in Shape from X which are used to reconstruct 3D geometry. | 5 | CO5 | K2 |
| <u>UNIT-VI</u> | | | | | |
| 11. | a. | Illustrate about Layered depth images. | 5 | CO6 | K2 |
| | b. | Explain about video-based animation technique. | 5 | CO6 | K2 |
| (OR) | | | | | |
| 12. | | Write sort note on i) Unstructured Lumigraph ii) View Interpolation . | 10 | CO6 | K2 |

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|------------------------|---|--------------------------------------------------------------------------------------------------------------------|-------|-----|--------------|
| <u>UNIT-I</u> | | | | | |
| 1. | a | Define term Data Wrangling. What is the importance of Data Wrangling Explain. | 5M | CO1 | L2 |
| | b | Compare and contrast CSV, JSON, and XML formats. Discuss the scenario where these file formats are useful? | 5M | CO1 | L3 |
| (OR) | | | | | |
| 2. | a | List different data wrangling tools and explain them briefly. | 5M | CO1 | L2 |
| | b | Write a python program to read csv file in python. | 5M | CO1 | L3 |
| <u>UNIT-II</u> | | | | | |
| 3. | a | Which Python libraries are commonly used for parsing Excel files? Can you compare the capabilities of pandas? | 5M | CO2 | L3 |
| | b | Write the python program to convert PDF files into text or tabular format? | 5M | CO2 | L3 |
| (OR) | | | | | |
| 4. | a | Write a Python script to Splitting PDFs & Save the first page to a new PDF? | 5M | CO2 | L3 |
| | b | What are some common challenges encountered while parsing PDFs programatically? How can they be mitigated? Explain | 5M | CO2 | L2 |
| <u>UNIT-III</u> | | | | | |
| 5. | a | Describe how databases are created and managed for data wrangling purposes. Explain with examples the role of SQL. | 5M | CO3 | L2 |
| | b | When would you choose NoSQL over a relational database? | 5M | CO3 | L2 |

(OR)

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|----|---|--------------------------------------------------------------------------------------------|----|-----|----|
| 6. | a | Discuss the use of a NoSQL database while handling semi-structured data. Provide examples. | 5M | CO3 | L3 |
| | b | Write the differences between relational and non-relational databases? | 5M | CO3 | L2 |

UNIT-IV

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|----|---|-------------------------------------------------------------------|----|-----|----|
| 7. | a | How do you handle missing data, outliers, duplicate data? Explain | 5M | CO4 | L3 |
| | b | Explain the procedure involved in Normalizing the Data? | 5M | CO4 | L2 |

(OR)

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|----|---|-----------------------------------------------------------------------------------------------------------------------|----|-----|----|
| 8. | a | How to automate data cleaning? Explain | 5M | CO4 | L2 |
| | b | Write the importance of saving cleaned data. Describe the best practices which ensures data integrity during cleanup. | 5M | CO4 | L3 |

UNIT-V

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|----|---|------------------------------------------------------------------------------------------|----|-----|----|
| 9. | a | Discuss the use of Python tools for visual presentations of data with suitable examples. | 5M | CO5 | L3 |
| | b | What are the methods in determining correlation? | 5M | CO5 | L3 |

(OR)

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|-----|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|----|
| 10. | a | Describe the importance of visualization in data exploration. Explain how to achieve visualization using Python libraries like Matplotlib and Seaborn help. | 5M | CO5 | L3 |
| | b | Write a python program to import data from the local directory and display the features present in the dataset? | 5M | CO5 | L3 |

UNIT-VI

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|-----|---|------------------------------------------------------------------------------------------|----|-----|----|
| 11. | a | Write a program to perform Screen Reading with Ghost? | 5M | CO6 | L2 |
| | b | Explain about web scraping. Discuss the tools used for web scraping and their importance | 5M | CO6 | L3 |

(OR)

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|-----|---|-----------------------------------------------------------------------------------------------------|----|-----|----|
| 12. | a | Explain how to build a web crawler using Python's Scrapy framework. Provide a step-by-step example. | 5M | CO6 | L2 |
| | b | How to scrape data from a website in Python BeautifulSoup? Explain | 5M | CO6 | L3 |

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

**III B. Tech II Semester Regular & Supplementary Examinations, April, 2025
ADVANCED DESIGN OF REINFORCED CONCRETE
(CIVIL ENGINEERING)**

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

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Assume suitable data if necessary

Assume M20 concrete and Fe:415 steel where ever required

| | | Marks | CO | Blooms Level |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----|--------------|
| <u>UNIT-I</u> | | | | |
| 1. | A RC cantilever retaining wall is required to retain an earthen embankment of height 5m. Proportion the retaining wall and carryout the stability checks. Also design the stem of the retaining wall for the following data. Sketch the detailing. Density of earth = 17 kN/m^3 , Safe bearing capacity = 240 kN/m^2 , Angle of internal friction = 30° , Surcharge angle = 15° . | 10 | 1 | 4 |
| (OR) | | | | |
| 2. | Design a combined footing for the two columns at a multi-storey building. The columns of size $450 \times 450 \text{ mm}$ transmit a working load of 350 kN each and they are spaced at 5 m centres. The safe bearing capacity of soil at site is 250 kN/m^2 . Adopt M20 & Fe415. Sketch the details of reinforcement in the combined footing. | 10 | 1 | 4 |
| <u>UNIT-II</u> | | | | |
| 3. | Design a circular water tank to hold $5,50,000$ litres of water. Assume rigid joints between the wall and base slab. Adopt M25 concrete and Fe 415 steel. Sketch details of reinforcements. | 10 | 2 | 4 |
| (OR) | | | | |
| 4. | Design a rectangular water tank $5 \text{ m} \times 4 \text{ m}$ with depth of storage 3 m , resting on ground and whose walls are rigidly joined at vertical and horizontal edges. Assume M25 concrete and Fe415 grade steel. Sketch the details of reinforcement in the tank. | 10 | 2 | 4 |
| <u>UNIT-III</u> | | | | |
| 5. | Design circular slab with fixed edges of room 6 m dia of carrying load 4 kN/m^2 and assume suitable data. Use M20 concrete and Fe:415 steel. | 10 | 3 | 3 |
| (OR) | | | | |
| 6. | Design an interior panel of a flat slab of size $6 \text{ m} \times 6 \text{ m}$ without providing drop. The size of the columns is $600 \text{ mm} \times 600 \text{ mm}$ and the live load on the panel is 4 kN/m^2 , take floor finish 1 kN/m^2 . Use M25 concrete and Fe500 grade steel. | 10 | 3 | 3 |

UNIT-IV

7. Design a pile under a column transmitting an axial load of 600kN. The pile is to be driven to a hard stratum available at a depth of 8m. Use M20 concrete and Fe:415 steel. 10 4 4
- (OR)**
8. Design a pile cap which is supporting a group of **4 piles** with load on the column 1000kN. Each pile has a diameter of 500mm. Use M25 concrete and Fe415 steel. 10 4 4

UNIT-V

9. Explain the parameters affecting the ductility of RC sections (Columns and beams) and discuss various methods of improving the ductility. 10 5 2
- (OR)**
10. Find the wind force on the framed building located in terrain with wind speed 30m/s. The building is 35 x 20m in plan and 50m in height, braced in longitudinal direction by rigid frame section. 10 5 3

UNIT-VI

11. Explain classification of various types of bridges and IRC standard loading on bridges. 10 6 4
- (OR)**
12. Design a deck slab over a span of 6m, carries class AA loading as per IRC. Clear width of road ways – 6m with kerbs 600mm. Use M25 concrete and Fe:415 steel. 10 6 4

**Internet of Things
(Computer science and Engineering)****Time: 3 Hours****Max Marks: 60**

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| | <u>UNIT-I</u> | Marks | CO | Blooms Level |
|-----|---------------------------------------------------------------------------------------------|-------|-----|--------------|
| 1. | a) Define IoT and explain its physical and logical design. | (3M) | CO1 | K2 |
| | b) Describe various IoT enabling technologies with suitable examples. | (7M) | CO1 | K2 |
| | (OR) | | | |
| 2. | Explain different IoT levels and deployment templates with neat diagrams. | (10M) | CO1 | K3 |
| | <u>UNIT-II</u> | | | |
| 3. | a) Differentiate between IoT and M2M communication. | (5M) | CO2 | K4 |
| | b) Explain the role of SDN and NFV in IoT architecture. | (5M) | CO2 | K5 |
| | (OR) | | | |
| 4. | a) Explain the limitations of SNMP and its alternatives in IoT systems. | (5M) | CO2 | K5 |
| | b) Describe NETCONF and YANG models in IoT system management. | (5M) | CO2 | K4 |
| | <u>UNIT-III</u> | | | |
| 5. | Explain the IoT design methodology with steps. | (10M) | CO3 | K3 |
| | (OR) | | | |
| 6. | a) Discuss the control flow statements in Python with examples. | (5M) | CO3 | K3 |
| | b) Explain different Python data types and structures used in IoT applications. | (5M) | CO3 | K3 |
| | <u>UNIT-IV</u> | | | |
| 7. | a) Describe Raspberry Pi board components and their functions. | (5M) | CO4 | K4 |
| | b) Explain the various interfaces available in Raspberry Pi. | (5M) | CO4 | K3 |
| | (OR) | | | |
| 8. | Discuss the architecture and usage of Django as a Python web application framework for IoT. | (10M) | CO4 | K5 |
| | <u>UNIT-V</u> | | | |
| 9. | a) Explain how Apache Storm is used for real-time data analysis in IoT. | (10M) | CO5 | K4 |
| | (OR) | | | |
| 10. | Describe the MapReduce programming model and its role in IoT data processing. | (10M) | CO5 | K5 |
| | <u>UNIT-VI</u> | | | |
| 11. | Design a productivity application using IoT concepts. | (10M) | CO6 | K6 |
| | (OR) | | | |
| 12. | Develop a weather monitoring system using IoT. | (10M) | CO6 | K6 |

Time: 3 Hours

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| <u>UNIT-I</u> | | Marks | CO | Blooms Level |
|-----------------|-----------------------------------------------------------------------------------------------|-------|-----|---------------|
| 1. | a) Explain basics of Switching System. | [5M] | CO1 | Understanding |
| | b) Elaborate classification of switching systems | [5M] | CO1 | Understanding |
| (OR) | | | | |
| 2. | a) Explain the evolution of telecommunications | [5M] | CO1 | Understanding |
| | b) Describe the principle of crossbar switching with neat diagrams | [5M] | CO1 | Understanding |
| <u>UNIT-II</u> | | | | |
| 3. | a) Explain different approaches in stored SPC | [5M] | CO2 | Understanding |
| | b) Distinguish between Two Stage Networks and Three Stage Networks. | [5M] | CO2 | Understanding |
| (OR) | | | | |
| 4. | a) Explain synchronous duplex in detail | [5M] | CO2 | Understanding |
| | b) Compare the centralised SPC and distributed SPC. | [5M] | CO2 | Understanding |
| <u>UNIT-III</u> | | | | |
| 5. | a) Explain in detail about Time division Space switching | [5M] | CO3 | Understanding |
| | b) Explain output controlled time division space switch | [5M] | CO3 | Understanding |
| (OR) | | | | |
| 6. | a) Explain Time Multiplexed Space Switching, and list its applications. | [5M] | CO3 | Understanding |
| | b) Compare and Contrast Time Multiplexed Space Switching and Time Multiplexed Time Switching. | [5M] | CO3 | Understanding |
| <u>UNIT-IV</u> | | | | |
| 7. | a) Write a short notes on DTMF dialing | [5M] | CO4 | Understanding |
| | b) Explain in detail about charging plan | [5M] | CO4 | Evaluating |
| (OR) | | | | |
| 8. | a) Explain different modes of operation of common channel signaling. | [5M] | CO4 | Evaluating |
| | b) Explain about the traffic load and grade of service | [5M] | CO4 | Understanding |
| <u>UNIT-V</u> | | | | |
| 9. | Describe the seven layers of the OSI model and the functions of each layer. | [10M] | CO5 | Evaluating |
| (OR) | | | | |
| 10. | a) What is data communication, and why is it essential in modern networks? | [5M] | CO5 | Understanding |
| | b) What is the difference between serial and parallel data transmission? | [5M] | CO5 | Understanding |
| <u>UNIT-VI</u> | | | | |
| 11. | a) What is circuit switching explain briefly | [5M] | CO6 | Understanding |
| | b) Compare and contrast packet switching with message switching and circuit switching. | [5M] | CO6 | Understanding |
| (OR) | | | | |
| 12. | Discuss the evolution of ISDN from traditional analog telephony to digital networks. | [10M] | CO6 | Understanding |

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| | <u>UNIT-I</u> | Marks | CO | Blooms Level |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------|-------|----|--------------|
| 1. a) | Describe the phases of an action potential with a labelled diagram. | 5 | 1 | L-2 |
| b) | Draw the circuit model of electrode skin interface of bio signal acquisition | 5 | 1 | L-2 |
| | (OR) | | | |
| 2. a) | Explain in detail the types of surface electrodes | 5 | 1 | L-2 |
| b) | What are polarizable and non-polarizable electrodes | 5 | 1 | L-2 |
| | <u>UNIT-II</u> | | | |
| 3. a) | Describe the cardiac cycle with a labelled diagram | 3 | 2 | L-2 |
| b) | What are the main components of the cardiovascular system? | 7 | 2 | L-2 |
| | (OR) | | | |
| 4. a) | What is the electrical conduction system of the heart? | 5 | 2 | L-2 |
| b) | What are heart murmurs, and what causes them? | 5 | 2 | L-2 |
| | <u>UNIT-III</u> | | | |
| 5. a) | What is the difference between limb leads and chest leads in ECG? | 5 | 3 | L-3 |
| b) | What are augmented leads (aVR, aVL, aVF), and why are they important? | 5 | 3 | L-3 |
| | (OR) | | | |
| 6. a) | How does Doppler ultrasound measure blood flow? | 5 | 3 | L-3 |
| b) | Explain the working principle of strain gage plethysmography. | 5 | 3 | L-3 |
| | <u>UNIT-IV</u> | | | |
| 7. a) | What are the different types of pacemakers? | 5 | 4 | L-2 |
| b) | Differentiate between external and implantable defibrillator | 5 | 4 | L-2 |
| | (OR) | | | |
| 8. a) | Define lung volumes and lung capacities. Differentiate between tidal volume, inspiratory reserve volume, and expiratory reserve volume. | 5 | 4 | L-2 |
| b) | What is a spirometer, and how does it measure lung function? | 5 | 4 | L-3 |
| | <u>UNIT-V</u> | | | |
| 9. a) | What physiological parameters can be monitored using biotelemetry? | 5 | 5 | L-3 |
| b) | What are the essential components of a biotelemetry system? | 5 | 5 | L-3 |
| | (OR) | | | |
| 10. a) | How is telemetry used for remote patient monitoring? | 5 | 5 | L-3 |
| b) | What is a PWM transmitter, and how does it work? | 5 | 5 | L-3 |
| | <u>UNIT-VI</u> | | | |
| 11. a) | Explain the difference between macroshock and microshock | 5 | 6 | L-3 |
| b) | How does leakage current cause electrical hazards in hospitals? | 5 | 6 | L-3 |
| | (OR) | | | |
| 12. a) | How do isolation transformers help in preventing electrical hazards? | 5 | 6 | L-3 |
| b) | How can EMI impact pacemakers and other implantable devices? | 5 | 6 | L-3 |

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UNIT-IMarks CO Blooms
Level

1. Convert the following system matrix to any canonical form. 10M CO1 L3

$$A = \begin{bmatrix} 4 & 1 & -2 \\ 1 & 0 & 2 \\ 1 & -1 & 3 \end{bmatrix}$$

(OR)

2. Define state and state variable. Explain state space representation using Physical variables in detail. 10M CO1 L2

UNIT-II

3. Give the solution of homogeneous and non-homogeneous state equations. What is state transition matrix and give its properties. 10M CO2 L4

(OR)

4. Test for controllability and observability of a system with the following state equations. 10M CO2 L4

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 11 \\ 1 \\ -14 \end{bmatrix} [u] \quad ;$$

$$Y = [-3 \quad 5 \quad -2] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

UNIT-III

5. Consider a system defined by 10M CO3 L3

$$\dot{X} = AX + BU ; Y = CX$$

Where $A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$; $B = \begin{bmatrix} 0 \\ 2 \end{bmatrix}$; $C = [1 \ 0]$

The Eigen values of matrix 'A' are -1 and -2. It is desired to have Eigen values at -3 and -5 by using a state feedback control $u = -kx$. Calculate the necessary feedback gain matrix 'k' and the control signal 'u'.

(OR)

6. Explain the effect of state feedback on controllability and observability in detail. 10M CO3 L4

UNIT-IV

7. Describe any two methods of generating Lyapunov functions. 10M CO4 L2

(OR)

8. Test the stability of the system described by 10M CO4 L4

$$\dot{x}_1 = -2x_1 + 5x_1^2x_2, \quad \dot{x}_2 = -3x_2$$

Determine the region of asymptotic stability using Krasovskii's method.

UNIT-V

9. Define an adaptive control system. Explain its key functions with suitable examples. 10M CO5 L2

(OR)

10. Describe the industrial applications of adaptive control systems in various sectors. 10M CO5 L4

UNIT-VI

11. Explain the formulation of an optimal control problem, including system dynamics, performance index, and constraints. 10M CO6 L2

(OR)

12. Explain the concept of the state regulator problem in optimal control. Derive its performance index and discuss its applications. 10M CO6 L3

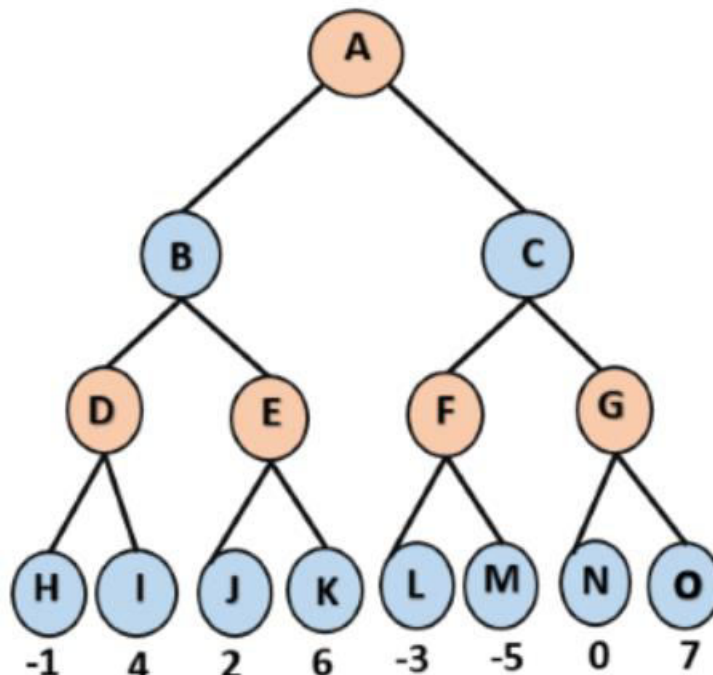
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UNIT-I

| | | Marks | CO | Blooms Level |
|----|----------------|-------|-----|--------------|
| 1. | a | 5M | CO1 | K2 |
| | b | 5M | CO1 | K2 |
| | (OR) | | | |
| 2. | a | 5M | CO1 | K2 |
| | b | 5M | CO1 | K2 |
| | UNIT-II | | | |
| 3. | a | 7M | CO2 | K3 |



| | | | | |
|----|----------------------------------------------------------|----|-----|----|
| b | Represent the following in First Order Logic | 3M | CO2 | K3 |
| | i) All birds fly. | | | |
| | ii) Every man respects his parent. | | | |
| | iii) Not all students like both Mathematics and Science. | | | |
| | iv) Some boys play cricket. | | | |
| | v) Only one student failed in Mathematics. | | | |
| | vi) All kings who are greedy are Evil. | | | |
| | (OR) | | | |
| 4. | a | 5M | CO2 | K2 |
| | b | 5M | CO2 | K2 |

UNIT-III

5. a Represent the following statements using Semantic Network 5M CO3 K3
a. Jerry is a cat.
b. Jerry is a mammal
c. Jerry is owned by Priya.
d. Jerry is brown colored.
e. All Mammals are animal.
Explain the advantages and disadvantages of Semantic Networks.
b Explain Rule based knowledge representation with examples. 5M CO3 K2
- (OR)
6. a Explain various knowledge representations in detail. 5M CO3 K2
b How to represent knowledge using Semantic Web. Explain with an example. 5M CO3 K2

UNIT-IV

7. a List and explain different types of machine learning with example. 5M CO4 K2
b Identify the Task, Experience and Performance measure for the following applications: 5M CO4 K2
i) Credit card fraud detection
ii) Digit Recognition
iii) Autonomous Vehicle System
- (OR)
8. a Differentiate between classification and regression. 5M CO4 K2
b What are the components of Reinforcement learning. Explain in detail. 5M CO4 K2

UNIT-V

9. Construct a decision tree for the following data: 10M CO5 K3

| Day | outlook | temperature | humidity | wind | playtennis |
|-----|----------|-------------|----------|--------|------------|
| D1 | sunny | hot | high | weak | no |
| D2 | sunny | hot | high | strong | no |
| D3 | overcast | hot | high | weak | yes |
| D4 | rain | mild | high | weak | yes |
| D5 | rain | cool | normal | weak | yes |
| D6 | rain | cool | normal | strong | no |
| D7 | overcast | cool | normal | strong | yes |
| D8 | sunny | mild | high | weak | no |
| D9 | sunny | cool | normal | weak | yes |
| D10 | rain | mild | normal | weak | yes |
| D11 | sunny | mild | normal | strong | yes |
| D12 | overcast | mild | high | strong | yes |
| D13 | overcast | hot | normal | weak | yes |
| D14 | rain | mild | high | strong | no |

(OR)

10. a Explain classification tree and regression trees. 5M CO5 K2
b Define Bayes Theorem. Explain Naïve Bayes classification. 5M CO5 K2
- UNIT-VI
11. Explain Backpropagation algorithm with your own neural network. 10M CO6 K3
Explain the forward pass and backward pass in detail.
- (OR)
12. a Differentiate between biological neuron and artificial neuron. 5M CO6 K2
b Construct a neural network with perceptron for AND operation. 5M CO6 K2

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|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----|--------------|
| <u>UNIT-I</u> | | | | |
| 1. | Classify robots based on configuration and control and robot impact on automation. | 10 | CO1 | L1 |
| (OR) | | | | |
| 2. | Explain the working principle of magnetic gripper with detailed illustrations and Identify its limitation for industrial use. | 10 | CO1 | L1 |
| <u>UNIT-II</u> | | | | |
| 3. | Explain the working principle of servo motor in robotics with schematic of a servo controller, state its advantages and limitation for industrial use. | 10 | CO2 | L1 |
| (OR) | | | | |
| 4. | Classify the sensors and explain about Force sensing wrist with a neat sketch. | 10 | CO2 | L1 |
| <u>UNIT-III</u> | | | | |
| 5. | Define homogeneous transformation and explain its significance in robot kinematics. A vector $v=3i+2j+7k$ is rotated about 60° about the z-axes of the reference frame. It is then rotated by 30° about the x-axes of the rotated frame. Find the rotation transformation. | 10 | CO3 | L3 |
| (OR) | | | | |
| 6. | Define forward kinematics & inverse kinematics. Write down the forward kinematics equations for position of the origin of a frame attached to a rigid body has 3 DOF in Cartesian, Cylindrical and Spherical coordinates. | 10 | CO3 | L3 |
| <u>UNIT-IV</u> | | | | |
| 7. | Differentiate between path planning and trajectory planning and explain in detail about the Trajectory for cubic polynomials | 10 | CO4 | L1 |
| (OR) | | | | |
| 8. | Calculate the Jacobian matrix for the differential motions of a robot and its hand frame. | 10 | CO4 | L3 |
| <u>UNIT-V</u> | | | | |
| 9. | Give short notes on Leadthrough Method and Textual robot languages in robot programming and explain WAIT, SIGNAL and DELAY commands utilized in industrial robots. | 10 | CO5 | L1 |
| (OR) | | | | |
| 10. | List Down the graph-based approaches for obstacle avoidance? Explain about tangent graph method with a neat sketch. | 10 | CO5 | L1 |
| <u>UNIT-VI</u> | | | | |
| 11. | State the problems for Robots in Arc welding, explain the technical features to be considered in arc-welding application and identify the different sensors required to do the task efficiently. | 10 | CO6 | L3 |
| (OR) | | | | |
| 12. | Explain the Robot-centered, In-line robot, Mobile Robot cell layouts with neat sketches. | 10 | CO6 | L1 |

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UNIT-I

- | | | Marks | CO | Bloom
s Level |
|-------------|------------------------------------------------------------------------------------------|-------|-----|------------------|
| 1. | Explain the working of important components in a refrigerator system with a neat sketch. | 10 M | CO1 | K2 |
| (OR) | | | | |
| 2. | Explain different types of refrigeration cycles briefly. | 10 M | CO1 | K2 |

UNIT-II

- | | | | | |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|----|
| 3. | A vapour compression refrigerator working with R12 has its temperature range -10°C and 30°C. The vapour enters the compressor dry and under cooled by 5°C in the condenser. For a capacity of 15 TOR, find: (a) C.O.P (b) mass of R12 (c) Power required. The properties of Freon 12 are | 10 M | CO2 | K3 |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|----|

| Temperature (C) | Enthalpy hf (kJ/kg) | Enthalpy hg (kJ/kg) | Entropy sf (kJ/kg. K) | Entropy sg (kJ/kg. K) |
|--------------------|------------------------|------------------------|-----------------------------|-----------------------------|
| 30 | 64.59 | 199.62 | 0.24 | 0.68 |
| -10 | 26.87 | 183.19 | 0.10 | 0.70 |

C_p (vapour) = 0.56 kJ/kg. K; C_p (liquid) = 1.003 kJ/kg. K

(OR)

- | | | | | |
|----|-------------------------------------------------------------|------|-----|----|
| 4. | List out merits and demerits of commonly used refrigerants. | 10 M | CO2 | K1 |
|----|-------------------------------------------------------------|------|-----|----|

UNIT-III

- | | | | | |
|--------|---------------------------------------------------------------------------------------------------|-----|-----|----|
| 5. (a) | Outline the working principle of vapor absorption refrigeration system with a line diagram. | 6 M | CO3 | K2 |
| (b) | What are the advantages of absorption refrigeration system over compression refrigeration system? | 4 M | CO3 | K1 |

(OR)

6. Explain the working of basic components in an aqua ammonia refrigeration system with a neat sketch. 10 M CO3 K2

UNIT-IV

7. An aircraft moving with speed of 1000 km/h uses simple gas refrigeration cycle for air-conditioning. The ambient pressure and temperature are 0.35 bar and -10°C respectively. The pressure ratio of compressor is 4.5. The heat exchanger effectiveness is 0.95. The isentropic efficiencies of compressor and expander are 0.8 each. The cabin pressure and temperature are 1.06 bar and 25°C . Determine temperatures and pressures at all points of the cycle. Also find the volume flow rate through compressor inlet and expander outlet for 100 TR. Take $c_p = 1.005\text{ kJ/kg K}$; $R = 0.287\text{ kJ/kg K}$ and $c_p / c_v = 1.4$ for air. 10 M CO4 K3

(OR)

8. (a) Why pre cooling is necessary in JT coolers? 4 M CO4 K2
(b) Illustrate working of mixed refrigerant JT coolers. 6 M CO4 K2

UNIT-V

9. (a) Explain the working principle of vortex tube. 6 M CO5 K2
(b) Show that the energy exchange phenomenon in vortex tube is not a violation of second law of thermodynamics. 4 M CO5 K2

(OR)

10. (a) Outline about basic components of steam jet refrigeration. 6 M CO5 K2
(b) List out the advantages and limitations of steam jet refrigeration. 4 M CO5 K1

UNIT-VI

11. (a) Define RSHP, GSHP, ESHP and ADP. 4 M CO6 K1
(b) What are the requirements of comfort air conditioning? 6 M CO6 K1

(OR)

12. (a) Illustrate psychometric process of winter air conditioning system for mild cold weather. 4 M CO6 K2
(b) Demonstrate working of winter air conditioning system with double reheat coils and air washer. 6 M CO6 K2

AR18

CODE: 18ECE321

SET-2

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

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

TELECOMMUNICATION SWITCHING SYSTEMS & NETWORKS

(Professional Elective – II)

(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) Illustrate in detail about simple telephone communication with neat diagrams? 6M
b) Discuss in brief about switching network configurations? 6M
- (OR)**
2. a) Discuss in detail about various elements of switching system? 6M
b) Explain about 6×6 cross bar switch configurations? 6M

UNIT-II

3. a) Write about Stored program control SPC in detail? 6M
b) Discuss in brief about the two stage networks? 6M
- (OR)**
4. a) Illustrate the operation of Time division space switching? 6M
b) Distinguish between time division time switching and time multiplexed time switching? 6M

UNIT-III

5. a) Summarise in detail about DTMF dialling? 6M
b) Explain about charging plan for telecommunication services? 6M
- (OR)**
6. a) Interpret in detail about in channel signalling techniques? 6M
b) Discuss briefly about various network traffic load parameters? 6M

UNIT-IV

7. a) Elaborate in detail about layered network architecture? 6M
b) Discuss about various data communication circuit arrangements? 6M
- (OR)**
8. a) Tabulate the differences between connection oriented and connectionless protocols? 6M
b) Analyse various topologies and transmission modes of a data communication network? 6M

UNIT-V

9. a) Analyse about different types of public switched data networks? 6M
b) Discuss in detail about bridges, routers, gateways and repeaters? 6M
- (OR)**
10. a) Describe the operation of broadband ISDN configuration with neat diagrams? 6M
b) Write about connections and interfacing units of ISDN? 6M