Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – MAY 2025

Date: 31-05-2025 **Time:** 09:30 am – 12:30 pm

School: SOE	**Program:** B.Tech-ECE	
Course Code:ECE3025	**Course Name:** ARTIFICIAL INTELLIGENCE USING PYTHON	
Semester: VI	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**
Marks	**24**	**24**	**26**	**26**

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1.	Deep learning and machine learning fall under the umbrella of artificial intelligence. In what ways does deep learning differ from machine learning?	**2 Marks**	**L2**	**CO1**
2.	What are the key differences between NumPy and SciPy, two popular Python libraries for data manipulation?	**2 Marks**	**L2**	**CO1**
3.	Grouping data is a fundamental aspect of unsupervised clustering algorithms. How is the similarity between data points measured to effectively group them?	**2 Marks**	**L2**	**CO2**
4.	What is the role of model parameters and hyperparameters in finding the best-fit line in a machine learning model?	**2 Marks**	**L2**	**CO2**
5.	What are the various similarity metrics used in K-Nearest Neighbors (KNN) classification	**2 Marks**	**L2**	**CO3**
6.	How do different techniques such as collaborative filtering, content-based filtering, and hybrid methods work together to build an effective recommender system, and what challenges arise in ensuring personalized and accurate recommendations?	**2 Marks**	**L2**	**CO3**
7.	How would you classify the different types of collaborative filtering methods, and what are the key differences between user-based and item-based collaborative filtering?	**2 Marks**	**L2**	**CO3**

8.	How do 'value' and 'Q-value' differ in reinforcement learning, and in what ways do they contribute to an agent's ability to make optimal decisions over time in dynamic environments?	**2 Marks**	**L2**	**CO4**
9.	How does the Bellman equation form the backbone of value-based reinforcement learning, and in what ways does it enable an agent to evaluate and optimize its decision-making over time?	**2 Marks**	**L2**	**CO4**
10.	How can reinforcement learning be classified into different types, and what distinguishes positive reinforcement learning from negative reinforcement learning in terms of their impact on an agent's behavior and learning process?	**2 Marks**	**L2**	**CO4**

Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	How to draw Hyperplane in given data points. Points (4,1), (4,-1) and (6,0) belong to class positive and points (1,0) (0,1) and (0,-1) belong to negative class. Draw the optimal hyperplane to classify the points.	**20 Marks**	**L2**	**CO1**
		Or			
12.	**a.**	Consider the following training set table for predicting the sales of the items x_i**(Items)** Item-1 Item-2 Item-3 Item-4 Item-5 y_j**(Sales)** 80 90 100 110 120 Consider the two fresh items ***Item-6*** and ***Item-7.***Whose actual values are 80 and 75 respectively.	**20 Marks**	**L2**	**CO1**
13.	**a.**	Suppose that the data mining task is to cluster points into three clusters, where the points are A1(2,10),A2(2,5),A3(8,4),B1(5,8),B2(7,5),B3(6,4),C1(1,2),C2(4,9).The distance function is Euclidian distance. Assume A1 B1 and C1 are centroid of each cluster.	**20 Marks**	**L**	**CO2**
		Or			
14.	**a.**	How can Affinity Propagation (AP) help to identify **a)** The natural groupings of stocks based on their behaviors, and how might the choice of similarity measures (e.g., price movements, volatility) influence the resulting clusters? What insights can these clusters provide about sectors or investment opportunities in the stock market? **b)** The distinct customer segments in a retail store based on their purchasing behavior, and what factors should be considered when selecting features such as frequency, recency, and monetary value to accurately capture these segments?	**20 Marks**	**L2**	**CO2**
15.	**a.**	KNN is a supervised learning algorithm that is used to classify the new data. The table represents two columns: 'Height' and	**20 Marks**	**L3**	**CO3**

		'Weight. Find the class of new data. **Height(CM)** / **Weight(KG)** / **Class** 167 / 51 / Underweight 182 / 62 / Normal 176 / 69 / Normal 173 / 64 / Normal 172 / 65 / Normal 174 / 56 / Underweight 169 / 58 / Normal 173 / 57 / Normal 170 / 55 / Normal **170** / **57** / **?**			
		Or			
16.	**a.**	Consider a matrix that shows four users, Ashok, X, Y, and Z, ratings on different news apps.The rating range is from 1 to 5 on the basis of users' likability of the news app.The '?' indicates that the user has not rated the app.Calculate the ratings of Sekar for BBC(I5). Name / Inshorts(I1) / HT(I2) / NYT(I3) / TOI(I4) / BBC(I5) Ashok / 4 / 5 / 2 / - / 4 X / 3 / 1 / 3 / 4 / 4 Y / 5 / 3 / 5 / 4 / 5 Z / 3 / 3 / 1 / 5 / 4	**20 Marks**	**L3**	**CO3**
17.	**a.**	Imagine you are developing an autonomous vehicle system using reinforcement learning. The vehicle needs to navigate through a busy city, avoiding obstacles, and reaching its destination. How would you define the states, actions, and rewards in this scenario? What type of reinforcement learning algorithm would you choose for this problem, and how would the vehicle learn the optimal driving policy?	**20 Marks**	**L3**	**CO4**
		Or			
18.	**a.**	You are designing a reinforcement learning agent to play a complex video game, where the agent needs to make decisions in real-time to achieve a high score. The game environment provides a sequence of frames as observations, and the agent can take actions such as moving or shooting. How would you use reinforcement learning to train the agent to improve its performance over time?	**20 Marks**	**L3**	**CO4**