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**PRESIDENCY UNIVERSITY
BENGALURU**

G9H'B

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2024**

Semester : Semester VII - 2020

Course Code : ECE3025

Course Name : Artificial Intelligence With Python

Program : B.Tech.

Date : 03-JAN-2024

Time : 9:30AM - 12:30 PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS

5 X 2M = 10M

1. Plotting in Python is a powerful tool for visualizing data. It allows users to create various types of plots, such as line plots, scatter plots, bar plots, and histograms. What are the plot commands used in Python?
(CO1) [Knowledge]
2. Entropy and information gain play a crucial role in decision tree algorithms. Describe both and how the decision tree works upon them.
(CO2) [Knowledge]
3. Predictive logic is used in artificial intelligence to make predictions based on existing data and patterns. It involves using algorithms and statistical models to analyze the relationships between variables and make informed guesses about future outcomes. Assume that there is a scenario like "1. **Everyman respect his parent** 2. **Not all students like both mathematics and science**". Then, how do you make sense of the logic of the above statements? Using predictive logic.
(CO3) [Knowledge]
4. Collaborative filtering models are based on the assumption that people like things similar to other things they like and things that are liked by other people with similar tastes. How do you categorize collaborative filtering?
(CO3) [Knowledge]
5. You are implementing reinforcement learning for an agent to play a video game, how the agent learns through reinforcement? Provide a brief example.
(CO4) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

5 X 10M = 50M

6. A Naïve Bays classifier is a machine learning algorithm that is based on Bayes' theorem. It is a probabilistic classifier that assumes independence between features. The Naïve Bayes classifier is commonly used for text classification tasks such as spam detection and sentiment analysis. Apply the Naïve Bays classifier, Consider the hypothesis: whether the person plays tennis under the observation of a sunny

Outlook	Sunny	Sunny	Overcast	Rain	Rain	Rain	Overcast	Sunny	Sunny	Rain	Sunny	Overcast	Overcast	Rain
Play Tennis	No	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No

(CO1) [Comprehension]

7. The aim of the K-means algorithm is to partition a given dataset into K clusters, where each data point belongs to the cluster with the nearest mean. This algorithm aims to minimize the within-cluster variance and maximize the between-cluster variance. Additionally, it iteratively assigns data points to clusters and updates the cluster means until convergence is achieved. Find the optimized centroid points for the cluster having 8-points (with (x,y) representing locations) in three clusters: A1 (2, 10), A2 (2, 5), and A3 (8, 4). A4(5,8),A5(7,5),A6(6,4),A7(1,2), and A8(4,9).Initial cluster centers are A1 (2, 10), A4 (5, 8), and A7 (1, 2). The distance function between two points a=(x1, y1) and b=(x2, y2) is defined as: $\rho(a, b) = |x2 - x1| + |y2 - y1|$.

(CO2) [Comprehension]

8. Collaborative filtering is essential in the development of a recommender system. Assume I recommend "Artificial Intelligence with Python" to my social network. Could you suggest an algorithm for completing the task? Also, describe how to carry out the procedures.

(CO3) [Comprehension]

9. Online streaming platforms, e-commerce websites, and recommendation engines use KNN to suggest items that are liked by users with similar tastes. What is the underlying principle behind the K-Nearest Neighbors algorithm? How does KNN make predictions for a new data point? And what are the steps required to complete any task using this algorithm?

(CO3) [Comprehension]

10. The Markov property is used in reinforcement learning to represent the assumption that the future state of an environment depends solely on the current state and action taken rather than on the entire history of states and actions. How is this model adapted to this property? Explain the elements of this model.

(CO4) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

2 X 20M = 40M

11. Consider a matrix that shows four users, Alice, U1, U2, and U3, 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 **Alice for BBC(I5)**.

Name	Inshorts(I1)	HT(I2)	NYT(I3)	TOI(I4)	BBC(I5)
Alice	5	4	1	4	?
U1	3	1	2	3	3
U2	4	3	4	3	5
U3	3	3	1	5	4

(CO3) [Application]

12. Assume that the environment is a maze and that the agents are AI robots. The AI robot's path to the diamond. Describe it

S1 (AI ROBOT)	S2	S3	S4(DIAMOND)
S5	S6	S7	S8(FIRE CELL)
S9	S10	S11	S12

(CO4) [Application]