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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

SUMMER TERM END TERM EXAMINATION -AUGUST 2024

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| **Semester :VII** | **Date :06-08-2024** |
| **Course Code :ECE3025** | **Time :09:30 AM to 12:30 PM** |
| **Course Name :Artificial Intelligence with Python** | **Max Marks :100** |
| **Program :B.Tech** | **Weightage :50%** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

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| **PART A** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 2M=10M** | | | |
| 1 | A confusion matrix is used in evaluating the performance of a classification model. Describe "precision" and "recall" with an example. | (CO 1) | [Knowledge] |
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| 2 | Labeled data and unlabeled data are used in machine learning. Describe both and where they will be used to perform any task. | (CO 1) | [Knowledge] |
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| 3 | Random forest algorithm is extension of decision tree algorithm. How does a random forest model work as a classifier and regressor? | (CO 2) | [Knowledge] |
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| 4 | Metrics are used to evaluate the performance of any system. Mention the metrics for evaluating unsupervised learning algorithms for optimal distance between clusters and data points. | (CO 2) | [Knowledge] |
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| 5 | Collaborative filtering is a popular technique used in recommendation systems to make predictions about the preferences. Give some applications of collaborative filtering. | (CO 3) | [Knowledge] |
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| 6 | You are working on an image classification task using the K-nearest neighbor algorithm. How KNN can be applied to classify an image based on its features. | (CO 3) | [Knowledge] |
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| 7 | Reinforcement learning is a sort of machine learning in which an agent learns to make decisions in an environment through trial and error. Distinguish between reinforcement learning and unsupervised learning. | (CO 4) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 8 | Data preprocessing plays a crucial role in machine learning. Let us assume that this is the data set we are working with ([-1.9, 2.3, 2.1, 0.8], [-2.9, 1.5,-0.8, 2.0], [3.2,-2.5, 2.7, 0.9]). This data set needs to be binarized with a threshold of 2.5 for preprocessing. Then what is binarized data for the given data set? | (CO 1) | [Apply] |
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| 9 | Label encoding refers to the process of transforming the word labels into numerical form. How does label encoding perform if the input labels i) input\_labels = ['red', 'black','red', 'green', 'black', 'yellow', 'white'] and ii) input\_labels = (1, 2, 0, 3). | (CO 1) | [Apply] |
|  | | | |
| 10 | Cluster the following eight points (with (x, y) representing locations) into three clusters A1(2, 10) A2(2, 5) A3(8, 4) A4(5, 8) A5(7, 5) A6(6, 4) A7(1, 2) 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: ρ(a, b) = |x2 – x1| + |y2 – y1| .  Use k-means algorithm to find the three cluster centers after the second iteration. | (CO 2) | [Apply] |
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| 11 | Collaborative filtering plays a crucial role in building the recommended system. Explain in detail for various collaborative filtering with real-life examples*.* | (CO 3) | [Apply] |
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| 12 | KNN is a supervised learning algorithm that is used to classify the new data. The table represents two columns: 'Height' and '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** | **?** | | (CO 3) | [Apply] |
|  | | | |
| 13 | Reinforcement learning involves breaking down complex tasks into smaller blocks, known as blocks of reinforcement learning. Each block focuses on a specific aspect of the task, allowing the agent to gradually improve its performance through trial and error. Explain the blocks of reinforcement learning. | (CO 4) | [Apply] |
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| 14 | You are implementing reinforcement learning for an agent to play a video game, how the agent learns through reinforcement? Provide a brief example. | (CO 4) | [Apply] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 20M=40M** | | | |
| 14 | 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.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **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 | | (CO 3) | [Apply] |
|  | | | |
| 15 | Given below is a set table that contains some items and the user who have rated those items.  The rating is explicit and is on a scale of 1 to 5. Each entry in the table denotes the rating given by a ‘i’th User to a ‘j’th Item.  In most cases majority of cells are empty as a user rates only for few items.  We need to find the missing ratings for the respective user.   |  |  |  |  | | --- | --- | --- | --- | | **User/Item** | **Item\_1** | **Item\_2** | **Item\_3** | | **User\_1** | 2 | ? | 3 | | **User\_2** | 5 | 2 | ? | | **User\_3** | 3 | 3 | 1 | | **User\_4** | ? | 2 | 2 | | (CO 3) | [Apply] |
|  | | | |
| 16 | Assume that the environment is a maze and that the agents are AI robots. The AI robot's path to the diamond. Describe it  How does Reinforcement Learning Works | (CO 4) | [Apply] |
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