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| **DIT UNIVERSITY, DEHRADUN**   |  |  | | --- | --- | | **B.TECH (CSE)** | **: END TERM EXAMINATION, ODD SEM 2023-24 (SEM V)** | | | | | | | | | | | | | |
| **Roll No.** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Subject Name: Machine Learning** | | | | | | | | | | | | |

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| **Time: 3 Hours** | **Total Marks: 100** |
| **Note: All questions are compulsory. No student is allowed to leave the examination hall before the completion of the exam.**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**   |  |  |  | | --- | --- | --- | | **Q.1)** | **Attempt all Parts :** | | |  | (a) | Describe any five applications of machine learning giving suitable example to each. | |  | (b) | Difference between Overfitting and Underfitting giving suitable example to each in machine Learning. | |  | (c) | Describe the difference among supervised learning, unsupervised learning and reinforcement learning giving suitable example to each. | |  | (d) | List out the primary objective of dimensionality reduction techniques. Describe how does Principal Component Analysis (PCA) reduces the dimension in machine learning? | |  |  | **[4 x 5= 20]** | |  |  |  | | **Q.2)** | **Attempt all Parts :** | | |  | (a) | What do you understand by ANN? Describe the history of the Perceptron and its significance in the development of artificial neural networks. | |  | (b) | Describe the impact of “Curse of dimensionality”, on various machine learning algorithms? | |  | (c) | Compare and contrast hierarchical clustering with other clustering methods, such as K-means and DBSCAN. Highlight their strengths and weaknesses. | |  | (d) | Solve the given problem using linear regression having one independent variable.   |  |  | | --- | --- | | X1 | Y | | 1 | 1 | | 2 | 4 | | 3 | 9 | | 4 | 16 | | |  |  | **[4 x 5= 20]** | |  |  |  | | **Q.3)** | **Attempt any two parts :** | | |  | (a) | Describe the significance of regression algorithms in machine learning. Explain any three regression techniques mentioning their advantages and disadvantages. When should each be used in practice? | |  | (b) | List out the fundamental difference between LDA and Principal Component Analysis (PCA) in terms of dimensionality reduction and data separation? | |  | (c) | Write down the steps for k mean clustering? Consider the following Points A1(2,11), A2(2,5), A3(2,3), A4(2,8), B1(5,8),B2(7,5),C1(1,2),C2(4,9). Assume initial centroid as A1, B1 and C1. Calculate Euclidean distance and find out the new centroid of each cluster. | |  |  | **[2 x 10= 20]** | |  |  |  | | **Q.4)** | **Attempt any two parts :** | | |  | (a) | Write a short note on the following  a) Recurrent Neural Networks  b) Density-based clustering | |  | (b) | Solve the question using multiple linear regressions using two independent variable.   |  |  |  | | --- | --- | --- | | X1 | X2 | Y | | 1 | 4 | 1 | | 2 | 5 | 6 | | 3 | 8 | 8 | | 4 | 2 | 12 | | |  | (c) | i) Mention the major steps of support vector machine (SVM)? Describe the significance of support vectors and margin.  ii) Explain the decision tree algorithm with the help of suitable example. | |  |  | **[2 x 10= 20]** | |  | | | | **Q.5)** | **Attempt any two parts :** | | |  | (a) | Given the data in the table reduce the dimension 2 to1 using PCA and calculate the Eigen vector.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Features | Example1 | Example2 | Example3 | Example4 | | Z1 | 4 | 8 | 13 | 7 | | Z2 | 11 | 4 | 5 | 14 | | |  | (b) | What is the role of neural networks in deep learning? Describe the architecture of a typical neural network with neat and clean diagram? | |  | (c) | How does k-NN classify the new data points? Describe all the steps involved and the decision-making criteria. | |  |  | **[2 x 10= 20]** | | -----END OF PAPER ---- | | | | |