1711E1310

M.Sc. Sem.-3 Examination

504

A. M. S.

November-2025

Candidate's Seat No : _____

Time : 2-30 Hours] **[Max. Marks : 70**

Instructions: All questions are compulsory. Use of non-programmable scientific calculator is allowed.

Q.1 **(a)** What is Supervised Machine Learning? Explain its types. **(07)**

(b) Give the difference between Supervised and Unsupervised Machine Learning. **(07)**

OR

(a) What is Bias and Variance? Explain the difference Bias and Variance. **(07)**

(b) Explain the seven steps of Machine Learning Algorithms. **(07)**

Q.2 **(a)** What is Logistic Regression? Explain in detail. **(07)**

(b) What is Random Forest? Explain detail. **(07)**

OR

(a) What is Regularization? Explain its types. **(07)**

(b) Consider the following dataset for a binary classification task involving animals: **(07)**

Animal	Color	Size	Endangered
Lion	Yellow	Large	No
Elephant	Grey	Large	Yes
Rabbit	White	Small	No
Tiger	Orange	Large	Yes
Fox	Red	Medium	No
Panda	Black	Medium	Yes
Parrot	Green	Small	No
Giraffe	Yellow	Large	No

Calculate the Gini impurity for the entire dataset. Find the Root Node.

Q.3 **(a)** What are Distance Measuring Methods in clustering? Explain methods with suitable examples. **(07)**

(b) Given the following data points: A = (1, 2), B = (2, 3), C = (5, 8), D = (6, 9), E = (8, 8), F = (9, 10). Perform Hierarchical Clustering using Euclidean distance and Average linkage. Show the step-by-step clustering process and draw the dendrogram. **(07)**

OR

(a) What is Curse of Dimensionality? Explain the concept and importance of Dimensionality Reduction. How does it benefit machine learning models? **(07)**

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(b) Find the Singular Value Decomposition of the matrix $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \\ 1 & 0 \end{bmatrix}$. **(07)**

Q.4 **(a)** What is Neural Network? Explain in detail. **(07)**

(b) Explain the role of different layers in an Artificial Neural Network. Describe the functions of those layers. **(07)**

OR

(a) What is Deep Learning? Give the difference between ML & DL. **(07)**

(b) Explain some common applications of Neural Networks in real-world problems. **(07)**

Q.5 Attempt any **SEVEN** out of **TWELVE:** **(14)**

(1) Explain: Pseudo labelling
(2) What is Confusion Matrix?
(3) Define the relation between AI & ML & DL.
(4) Define : Bagging, Boosting
(5) What is CART & ID3 Decision Tree?
(6) Define: Kernel trick
(7) Define measures to find association between item sets.
(8) Explain types of linkage in hierarchical clustering.
(9) Define : PCA
(10) Define : Propagation Functions and Learning rule
(11) Define : Perceptron
(12) What is Convolutional Neural Network?

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