23P416 (Pages: 2) Name: …………………...

Reg. No: ..…………………..

FOURTH SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2025
(CBCSS - PG)
(Regular/Supplementary/Improvement)
CC22P MST4 E20 – ADVANCED STATISTICAL MACHINE LEARNING TECHNIQUES
(Statistics)
(2022 Admission onwards)

Time: Three Hours   Maximum: 30 Weightage

Part A
Answer any *four* questions. Each question carries 2 weightage.

1. How does the Lasso method perform subset selection?

2. How does forward stepwise selection handle correlated predictors?

3. What is the role of regularization in subset selection?

4. How does BART differ from traditional regression trees?

5. Explain the key differences between perceptron and neuron.

6. How does a convolutional neural network work and what are its main components?

7. Explain the association rule with examples where it could be applied.

(4 × 2 = 8 Weightage)

Part B
Answer any *four* questions. Each question carries 3 weightage.

8. Explain the role of cross-validation in high-dimensional regression and why it is particularly important.

9. Explain step functions. What is the need of using step functions in polynomial regression?

10. Explain the algorithm of boosting for regression trees.

11. Consider a set of input variables $X_0 = 1.0, X_1 = 0.45, X_2 = 0.20, X_3 = 0.50, X_4 = 0.40$. Construct a single layer neural network with three nodes in hidden layer and by assigning equal weights as one for all connections and taking sigmoid as activation function.

12. Explain the component convolutional layer of a convolutional neural network.

13. Summarize on the commonly used types of linkage in Hierarchical Clustering.

14. Describe the iterative algorithm for matrix completion in Principal Component Analysis.

(4 × 3 = 12 Weightage)

Part C

Answer any *two* questions. Each question carries 5 weightage.

15. Explain Ridge Regression and its applications in machine learning.

16. Explain the role and significance of Support Vector Classifiers (SVC) in machine learning. Discuss their strengths, limitations, and applications.

17. Explain with an example the application of apriori property to identify frequent item sets and generating association rules.

18. Discuss different methods used in unsupervised machine learning.

(2 × 5 = 10 Weightage)

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