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Question Paper Code : 12315

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2026.

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Sixth Semester

Electronics and Communication Engineering

CS3491 — ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

(Common to : Biomedical Engineering/Electronics and Telecommunication Engineering/Medical Electronics)

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Brief heuristics in search algorithms.
2. Define Artificial Intelligence. List two AI applications.
3. State Bayes' theorem.
4. Distinguish between exact inference and approximate inference in Bayesian Networks.
5. Define logistic regression.
6. List any two differences between generative and discriminative models.
7. Brief about ensemble learning.
8. List any two applications of K-means clustering.
9. Define the role of activation functions in neural networks.
10. State dropout in deep learning.

PART B — (5 × 13 = 65 marks)

11. (a) Explain uninformed and heuristic search strategies with examples.

Or

- (b) Describe constraint satisfaction problems with suitable examples.

12. (a) Elucidate naïve Bayes models and their applications

Or

- (b) Designate Bayesian networks and inference methods.

13. (a) Explicate Support Vector Machines and maximum margin classifiers.

Or

- (b) Describe decision trees and random forests with examples.

14. (a) Explain ensemble techniques : bagging, boosting and stacking.

Or

- (b) Discuss Gaussian Mixture Models and Expectation Maximization.

15. (a) Explain the multilayer perceptron architecture and the error backpropagation algorithm.

Or

- (b) Discuss the vanishing gradient problem and techniques such as ReLU, batch normalization, and dropout to address it.

PART C — (1 × 15 = 15 marks)

16. (a) Design an AI-based recommendation system for an e-commerce platform. Discuss the role of search algorithms, supervised learning and ensemble methods in improving system accuracy.

Or

- (b) A healthcare startup aims to utilize deep learning to identify diseases from medical images. Analyze the challenges and propose a neural network-based solution with suitable training strategies.