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Question Paper Code : 90070

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2025.

Fourth Semester

Artificial Intelligence and Data Science

AL 3451 — MACHINE LEARNING

(Common to : Computer Science and Engineering (Artificial Intelligence and Machine Learning) Computer Science and Business Systems)

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List different forms of learning.
2. What are the major components involved in each machine algorithm?
3. Compare the linear regression model and logistic regression model.
4. How does CART solve the regression problems?
5. List out the applications of the clustering algorithm.
6. Distinguish between boosting and stacking.
7. Draw the structure of an artificial single neuron based on a biological neuron.
8. Why could the XOR problem not be solved by a simple perceptron?
9. Represent Randomization, Replication, and Blocking.
10. What is meant by cross-validation and resampling?

PART B — (5 × 13 = 65 marks)

11. (a) Examine the machine learning process in detail with an example.

Or

- (b) Explicate the Vapnik-Chervonenkis (VC) dimension with suitable examples.

12. (a) (i) Compare Instance-based learning and Model-based learning. (7)
(ii) List examples of Instance-based learning algorithms. (6)

Or

- (b) Explain the SVM classifier with a suitable example.

13. (a) Elucidate the EM algorithm with suitable examples.

Or

- (b) Consider the training dataset given in the following table. Use Weighted k-NN and determine the class. Test instance (7.6, 60, 8) and K=3.

S.No.	CGPA	Assessment	Project Submitted	Result
1	9.2	85	8	Pass
2	8	80	7	Pass
3	8.5	81	8	Pass
4	6	45	5	Fail
5	6.5	50	4	Fail
6	8.2	72	7	Pass
7	5.8	38	5	Fail
8	8.9	91	9	Pass

14. (a) (i) Explain the application of ANN and list its challenges. (7)
(ii) List Advantages and disadvantages of ANN. (6)

Or

- (b) Discuss the steps involved in the Backpropagation algorithm with a suitable sketch.

15. (a) List and illuminate the Machine Learning process's life cycle with a suitable sketch.

Or

- (b) Represent and discuss the steps involved in k-fold cross-validation with suitable examples.

PART C — (1 × 15 = 15 marks)

16. (a) Consider a boy who has a Cricket tournament the next day but feels sick today. Unusually, there is only a 35% chance he would fall sick since he is a healthy boy. Now, Find the probability of the boy participating in the tournament. The boy is very interested in cricket, so there is an 85% probability that he will participate in tournaments and 15% fall sick, given that he participates in the tournament.

Or

- (b) The following table gives data on individuals' responses to human characteristics such as height, hair, and eyes. Using Naive Bayesian Model to predict the class of the individual for the given data

$X = \{\text{Height} = \text{Short}, \text{Hair} = \text{Blond}, \text{Eyes} = \text{Blue}\}$

Class	Height	Hair	E
-	Short	Blond	B
-	Tall	Dark	B
+	Tall	Blond	B
-	Tall	Dark	B
-	Short	Dark	B
+	Tall	Red	B
-	Tall	Blond	B
