B.TECH DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Second Semester

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

U18AII2205: Introduction to AI and ML

COURSE OUTCOMES

CO1: Understand the basic concepts of machine learning and some typical applications.

CO2: Understanding how to build and validate models and improve them iteratively.

CO3: Understand the core concepts of Artificial Intelligence and Applications.

CO4: Apply knowledge representation with artificial intelligence using FOL and Predicate logic.

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1.	Explain the concept of supervised learning with an example.	CO1	[K]
2.	List the steps involved in implementing polynomial regression for a dataset.	CO1	[K_2]
3.	Define a decision boundary in the context of classification models.	CO2	[K_1]
4.	Differentiate between training error and test error with suitable examples.	CO2	[K_2]
5.	Define control strategy in artificial intelligence.	CO3	[K_1]
6.	Compare and contrast depth-first search (DFS) and breadth-first search (BFS) strategies in AI problem-solving.	CO3	[K_4]
7.	Apply predicate calculus to express a relationship in a knowledge-based system.	CO4	[K_3]
8.	Describe the use of predicate logic in knowledge representation for AI systems.	CO4	[K_4]
9.	Analyze the purpose of feature engineering in machine learning and its impact on model accuracy.	CO1	[K_4]
10.	Explain parameters may be tuned for a support vector machine (SVM) model.	CO2	[K_3]

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

11.	a)	Explain the steps involved in the machine learning process with suitable examples.	8	CO1	[K_3]
	b)	Discuss the differences between supervised and unsupervised learning techniques. Illustrate with examples.	8	CO1	[K_4]

12.	a)	Explain the gradient descent algorithm and its role in training machine learning models.	8	CO2	[K₃]

12. a) Explain the gradient descent algorithm and its role in training machine learning models. — 8 — CO2 — [K3]

b) Analyze the trade-offs between bias and variance in model evaluation. How does this impact model selection? — 8 — CO2 — [K4]

13. a) A robot needs to climb to the highest point on a hill in a simulated 2D grid environment. Each cell in the grid represents an elevation value, and the robot can move in four directions: up, down, left, or right. The robot starts at a random position and uses the hill-climbing algorithm to reach the peak. Describe the hill-climbing algorithm and explain how it can be used in this scenario to guide the robot to the highest elevation. — 8 — CO3 — [K3]

b) Apply the hill-climbing algorithm to the following elevation grid, where the numbers represent elevations. The robot starts at position (2, 2) (elevation = 5). Show the steps taken by the algorithm to reach the peak. — 8 — CO3 — [K4]

14. a) Explain the concept of predicate logic in knowledge representation with examples. — 10 — CO4 — [K3]

b) Describe the syntax and semantics of first-order logic. — 6 — CO4 — [K4]

15. a) Discuss structured representation of knowledge and its importance in Artificial Intelligence. — 10 — CO4 — [K3]

b) Analyze the role of resolution in predicate calculus for inference. — 6 — CO4 — [K4]

16. a) A logistics company uses AI to optimize route planning for its delivery fleet. Design a heuristic function for this problem and explain how it can improve efficiency in problem-solving. — 10 — CO3 — [K3]

b) The company wants to incorporate game-playing AI for simulating competition from rival logistics companies. Discuss how knowledge engineering in first-order logic can aid in developing such simulations. — 6 — CO4 — [K4]

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