Register Number:……..

KUMARAGURU
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B.E/B.TECH DEGREE EXAMINATIONS: APRIL /MAY 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.	What is supervised learning? Provide an example.	CO1	[K_1]
2.	Define overfitting in the context of machine learning.	CO2	[K_1]
3.	Explain the concept of gradient descent.	CO2	[K_2]
4.	What is a confusion matrix? How is it used?	CO2	[K_1]
5.	Define clustering in unsupervised learning.	CO1	[K_1]
6.	Describe the purpose of feature engineering.	CO1	[K_2]
7.	What are heuristic functions in AI?	CO3	[K_1]
8.	Explain the concept of knowledge representation.	CO4	[K_2]
9.	What is the role of predicate logic in AI?	CO4	[K_1]
10.	Define the term "search strategy" in AI.	CO3	[K_1]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11. **Scenario:**
You are working on a house price prediction project using machine learning. You have a dataset with features such as the number of bedrooms, location, size, and age of the house.

	a)	Explain how you would preprocess the data for this regression problem. Include steps like handling missing values, feature scaling, and encoding categorical variables.	7	CO1	[K_4]
	b)	Describe how you would apply linear regression to this dataset and evaluate its performance.	7	CO2	[K_3]
	c)	Why is regularization important in regression models?	2	CO2	[K_2]
12.	**Scenario:** A company wants to implement a recommendation system for its e-commerce website. The system should suggest products to users based on their past behavior and preferences.				
	a)	Design a basic recommendation system using collaborative filtering. Explain the steps and algorithms involved.	7	CO1	[K_4]
	b)	How would you evaluate the performance of this recommendation system? Discuss metrics such as precision, recall, and ROC curve.	7	CO2	[K_2]
	c)	What are the challenges of implementing a recommendation system?	2	CO1	[K_1]
13.	a)	Explain the difference between supervised and unsupervised learning with examples.	7	CO1	[K_2]
	b)	Describe the k-means clustering algorithm and its applications.	7	CO1	[K_2]
	c)	What are the limitations of k-means clustering?	2	CO1	[K_1]
14.	a)	Write a Python program to implement logistic regression for a binary classification problem.	7	CO2	[K_3]
	b)	Discuss the concept of decision boundaries in logistic regression.	7	CO2	[K_2]
	c)	How does logistic regression handle non-linear relationships?	2	CO2	[K_2]
15.	a)	Describe the various search strategies in AI, such as depth-first search and breadth-first search.	7	CO3	[K_2]
	b)	Explain how the A* search algorithm works with an example.	7	CO3	[K_2]
	c)	What are the advantages of using heuristic search strategies?	2	CO3	[K_1]
16.	a)	Explain the concept of knowledge representation using first-order logic (FOL).	7	CO4	[K_2]
	b)	Discuss the process of inference in first-order logic with an example.	7	CO4	[K_2]
	c)	What is the importance of syntax and semantics in FOL?	2	CO4	[K_1]

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