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Question Paper Code	13864
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B.E./ B.Tech / M.Tech - DEGREE EXAMINATIONS, NOV / DEC 2025

Seventh Semester

Computer Science and Engineering

(Common to M.Tech. - Computer Science and Engineering (5 Years Integrated))

20CSPC702 - MACHINE LEARNING TECHNIQUES

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

	<i>Marks</i>	<i>K- Level</i>	<i>CO</i>
1. Which of the following algorithm is used for concept learning? (a) K-means clustering (b) Find-S algorithm (c) Principal Component Analysis (PCA) (d) Gradient Descent	1	K1	CO1
2. What is the main limitation of the Find-S algorithm? (a) It finds the most general hypothesis (b) It only finds one of the many possible consistent hypotheses (c) It requires a very large dataset to work (d) It cannot handle noise in the data	1	K1	CO1
3. One of the main challenges faced when training deep networks like MLPs is (a) Lack of data (b) vanishing Gradient problem (c) High memory usage (d) Inefficient algorithms	1	K1	CO2
4. In a genetic algorithm, one method to create a new generation is by selecting parents and performing _____. (a) Cross Over (b)Reversal (c) Division (d) Induction	1	K1	CO2
5. In Maximum Likelihood Estimation, what do we seek to optimize? (a) The mean of the data (b) The likelihood function with respect to the model parameters (c) The variance of the data (d)The prior probabilities	1	K1	CO3
6. In the context of Gibbs sampling, "burn-in" period means (a) The initial period where samples are discarded to allow the chain to reach its stationary distribution (b) The final period where samples are analyzed (c) The period where the sampling rate is increased (d) The period where the learning rate is adjusted	1	K1	CO3
7. What is the effect of increasing the value of k in KNN? (a) It increases the variance and reduces the bias (b) It decreases the variance and increases the bias (c) It does not affect the model's performance (d) It makes the algorithm less computationally expensive	1	K1	CO4
8. What is the primary approach that case-based reasoning uses to solve new problems? (a) Conducting blind experiments (b) Utilizing past experiences (c) Applying statistical models (d) Building new rules from scratch	1	K1	CO4
9. Induction on inverted deduction involves _____ (a) Using rules to generate data (b) Reversing deductive processes to create rules (c) Minimizing hypothesis space (d) Creating complex rules	1	K1	CO5

10. In Q-learning, exploration vs. exploitation refers to 1 K1 CO6
- Choosing between known rewards and exploring new actions
 - Selecting between supervised and unsupervised learning
 - Choosing between clustering and classification tasks
 - Deciding between supervised and reinforcement learning methods

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

- State the various issues in machine learning. 2 K1 CO1
- Differentiate supervised and unsupervised learning with an example. 2 K2 CO1
- List the advantages of genetic algorithms. 2 K1 CO2
- State the concept of ANN. 2 K1 CO2
- Recall the Gibbs Algorithm. 2 K1 CO3
- Show the key differences between Maximum Likelihood Estimation (MLE) and Least Squares Error in terms of their objectives. 2 K2 CO3
- Outline how eager learning differs from lazy learning. 2 K2 CO4
- Illustrate how the Radial Basis Function Network (RBFN) works for function approximation. 2 K2 CO4
- How is first-order rules represented in machine learning? 2 K1 CO5
- Outline the primary task of analytical learning in machine learning. 2 K2 CO5
- Show how the Bellman equation is related to Q-learning. 2 K1 CO6
- Summarize how temporal difference learning improves the learning process. 2 K2 CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23. a) Explain the perspectives and issues of machine learning in detail. 11 K2 CO1

OR

- b) How does the candidate elimination algorithm ensure all possible hypotheses are considered? Illustrate it for the following example. 11 K2 CO1

Example	Sky	AirTemp	Humidity	Wind	Water	Forecast	EnjoySport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

24. a) Develop a neat diagram representing the multi-layer perceptron model. 11 K3 CO2

OR

- Identify and explain the common operators for Genetic algorithms. 6 K3 CO2
- Make use of appropriate diagrams to explain the various types of crossovers. 5 K3 CO2

25. a) Apply EM algorithm and examine the details of probability learning. 11 K3 CO3

OR

b) Does the patient have cancer, or does he not? A patient takes a lab test and the result comes back positive. The test returns a correct positive result in only 98% of the cases in which the disease is actually present, and a correct negative result in only 97% of the cases in which the disease is not present. Furthermore, 0.008 of the entire population have this cancer. 11 K3 CO3

26. a) Explain the inductive bias of k-Nearest Neighbor algorithm with an example. 11 K2 CO4

OR

b) Illustrate Radial Basis function architecture in detail. 11 K2 CO4

27. a) (i) Examine first order learning sets with an example Ancestor(x,y). 5 K4 CO5

(ii) Inspect the result of Sequential Covering Algorithm for the given example. 6 K4 CO5

	Sky	Humid	Temp	wind	Water	Forecast	Label
1	Sunny	Warm	Normal	Strong	Warm	Same	Y
2	Sunny	Warm	High	Strong	Warm	Same	Y
3	Rainy	Cold	High	Strong	Warm	Change	N
4	Sunny	Warm	High	Strong	Cold	Change	Y

OR

b) Analyze the technique of inverting resolution in analytical learning. 11 K4 CO5

28. a) Inspect FOCL algorithm with a suitable example. 11 K4 CO6

OR

b) Examine Reinforcement learning with an example. 11 K4 CO6