Semester:7th	Department of Electronics and Computer Engineering	AY: 2026-27
Course Code: BUE701	Course Name: Principal of Artificial and Machine Learning	

Question Bank

Q.	Module-01	M	L	C
1.	Explain the concept of Artificial Intelligence (AI). Discuss the strong and weak methods of AI, highlighting their applications and limitations.	10	L2	CO1
2.	Explain semantic networks and frames as knowledge representation techniques. Illustrate how they represent knowledge and discuss the need for good knowledge representation in AI systems.	10	L2	CO1
3.	Differentiate between strong methods and weak methods in Artificial Intelligence with suitable examples.	10	L2	CO1
4.	Explain the need for good knowledge representation in AI. Discuss the characteristics of an effective knowledge representation scheme.	10	L2	CO1
5.	Explain frame-based knowledge representation and illustrate its structure with a suitable example.	10	L2	CO1
6.	Explain the concept of search spaces and search trees in Artificial Intelligence with suitable examples.	10	L2	CO1
7.	Describe semantic trees and explain their role in representing knowledge and solving AI problems.	10	L2	CO1
8.	Explain the concept of combinatorial explosion in AI. Discuss how it affects the efficiency of problem-solving techniques.	10	L2	CO1
9.	Explain the concept of problem reduction in Artificial Intelligence with a suitable example.	10	L2	CO1
10.	Describe goal trees and explain how they represent the decomposition of a complex problem into smaller sub problems. Illustrate with a suitable example.	10	L2	CO1
	Module-02			
11.	Explain problem-solving as a search process in Artificial Intelligence. Differentiate between data-driven search and goal-driven search with suitable examples.	10	L2	CO2
12.	Explain the Generate-and-Test method. Describe its working procedure, advantages, and limitations with a suitable example.	10	L2	CO2
13.	Describe the properties of search methods in Artificial Intelligence. Explain how these properties help in evaluating the effectiveness of a search algorithm.	10	L2	CO2
14.	Describe the properties of search methods in Artificial Intelligence. Explain how these properties help in evaluating the effectiveness of a search algorithm.	10	L2	CO2
15.	Explain the role of heuristics in Artificial Intelligence search. Describe the Hill Climbing algorithm and discuss its limitations.	10	L2	CO2
16.	Explain the Best-First Search algorithm with a suitable example. Describe how heuristic information guides the selection of the next node for	10	L2	CO2

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	exploration.			
17.	Explain the concept of optimal paths in search algorithms. Describe the factors that influence the identification of an optimal solution path.	10	L2	CO2
18.	Explain Constraint Satisfaction Problems (CSPs) and the role of forward checking in solving them. Illustrate your answer with a suitable example.	10	L2	CO2
19.	Explain local search and metaheuristic techniques in Artificial Intelligence. Describe the working principle of Simulated Annealing and its role in avoiding local optima.	10	L2	CO2
20.	Explain Genetic Algorithms as a search technique. Describe the roles of selection, crossover, and mutation in finding solutions to complex optimization problems.	10	L2	CO2
Module-03				
21.	Explain the concept of game trees in Artificial Intelligence. Describe their structure and role in decision-making during game playing with a suitable example.	10	L2	CO3
22.	Explain the Minimax algorithm used in game playing. Describe how it determines the optimal move for a maximizing player and a minimizing player.	10	L2	CO3
23.	Explain the Alpha-Beta Pruning technique. Discuss how it improves the efficiency of the Minimax algorithm with a suitable example.	10	L2	CO3
24.	Explain propositional logic and predicate logic. Differentiate between them with suitable examples and discuss their importance in Artificial Intelligence.	10	L2	CO3
25.	Translate suitable English statements into propositional and predicate logic notation using appropriate logical operators and quantifiers.	10	L3	CO3
26.	Explain the deduction theorem, soundness, completeness, decidability and monotonicity in logic. Discuss their significance in AI reasoning systems.	10	L2	CO3
27.	Apply logical inference to distinguish between deductive, adductive and inductive reasoning. Illustrate each type with a suitable example.	10	L3	CO3
28.	Explain resolution in propositional logic. Demonstrate the resolution method using a suitable set of logical statements to derive a conclusion.	10	L3	CO3
29.	Convert a suitable set of predicate logic statements into clause form. Explain the steps involved in normal-form conversion and Skolemization.	10	L3	CO3
30.	Apply the resolution algorithm in predicate logic to prove a given conclusion. Explain the role of unification and clause resolution in the proof process.	10	L3	CO3
Module-04				
31.	Explain the concept of machine learning and describe rote learning and concept learning with suitable examples.	10	L2	CO4
32.	Explain the general-to-specific ordering of hypotheses and describe the role of version spaces in concept learning.	10	L2	CO4
33.	Apply the Candidate Elimination algorithm to a given training dataset and demonstrate how the version space is updated.	10	L3	CO4
34.	Explain the concept of inductive bias and describe its importance in machine learning with suitable examples.	10	L2	CO4
35.	Apply decision tree induction to a simple classification dataset and	10	L3	CO4

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	demonstrate how a decision tree is constructed.			
36.	Explain overfitting in machine learning and describe how it affects the performance of a decision tree model.	10	L2	CO4
37.	Apply the nearest-neighbor learning method to classify a new instance using a suitable example dataset.	10	L3	CO4
38.	Explain the backpropagation algorithm and describe how it updates weights in a neural network during training.	10	L2	CO4
39.	Explain the structure and working principles of perceptron's, multilayer neural networks, and recurrent neural networks.	10	L2	CO4
40.	Demonstrate the working of reinforcement learning using an agent, environment, actions, rewards, and a learning process. Also explain the basic concepts of unsupervised learning networks and evolving neural networks.	10	L3	CO4
	Module-05			
41.	Explain the concept of probabilistic reasoning in Artificial Intelligence and describe its importance in handling uncertainty.	10	L2	CO5
42.	Explain joint probability distributions and describe their role in representing relationships among multiple random variables.	10	L2	CO5
43.	Apply Bayes' theorem to solve a probability problem involving prior probability, likelihood, and posterior probability.	10	L3	CO5
44.	Explain Bayesian concept learning and describe how prior knowledge and observed data are used to learn a concept.	10	L2	CO5
45.	Explain the structure and working of Bayesian belief networks with a suitable example.	10	L2	CO5
46.	Apply a Bayesian belief network to calculate a conditional probability using the given network structure and probability values.	10	L3	CO5
47.	Explain the Noisy-V function and describe its role in probabilistic reasoning and decision-making.	10	L2	CO5
48.	Explain the Bayes' optimal classifier and describe how it uses probabilities to classify an unknown instance.	10	L2	CO5
49.	Apply the Naïve Bayes classifier to classify a given instance using training data and conditional probabilities.	10	L3	CO5
50.	Apply Bayes' theorem and the principles of probabilistic reasoning to solve a real-world classification problem, showing the calculation of the relevant probabilities.	10	L3	CO5

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***Note:**

1. All modules should contain a minimum of **10** questions each and the total number of questions must be **50**.
2. Questions can carry marks of 06, 07, 08, 09, 10 and for problems: 04 or 05.
3. Follow the RBTL as per the keywords used to frame the questions.
4. Maintain the Course Outcomes (COs) as per the syllabus.
5. M: Marks, L: RBTL, C:COs.

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