Registration No.: | | | | | | | | | | |

Total Number of Pages: 02

Course: B.Tech/IDD
Sub_Code: CSPC3003

5th Semester Regular Examination: 2025-26
SUBJECT: Artificial Intelligence and Machine Learning
BRANCH(S): CE, CSE, CSIT, CST, IT, CSE
Time: 3 Hours
Max Marks: 100
Q.Code: U341

Answer Question No.1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) Mention two advantages of heuristic search over systematic search.
b) Define the concept of rationality in Artificial Intelligence.
c) What are the components of an agent?
d) What are forward chaining and backward chaining?
e) What is propositional logic and how it is different from first-order logic?
f) What is probabilistic reasoning?
g) What is a Bayesian network?
h) Differentiate between statistical learning and rote learning.
i) Differentiate between linear and logistic regression.
j) What is overfitting and underfitting?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Explain the foundations of Artificial Intelligence and describe its major disciplines.
b) What is an intelligent agent? Explain its structure with a neat block diagram.
c) Describe the resolution method for propositional logic with an example.
d) Explain Iterative Deepening Search (IDS) and state why it is preferred over DFS and BFS.
e) State and explain Bayes' rule. How is it used for updating beliefs?
f) What are Markov Models? Explain the basic idea behind Markov assumption.
g) Explain the concept and process of Explanation-Based Learning (EBL).
h) Distinguish between supervised, unsupervised, and reinforcement learning with examples.
i) Explain clustering and describe any one clustering algorithm.
j) Describe the basic structure of an artificial neural network.
k) Explain ensemble learning. Describe any one ensemble method.
l) Describe Decision Tree and Naïve Bayes classification algorithm.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3	**a)**	Explain in detail the concept of rational agents, performance measure, autonomy, and bounded rationality in Artificial Intelligence.	**(8)**
	b)	Explain the various types of environments in which agents operate. Discuss fully observable vs. partially observable, deterministic vs. stochastic environments with examples.	**(8)**
Q4	**a)**	Define Knowledge Representation. Discuss propositional logic and first-order logic. Explain syntax, semantics, inference rules.	**(8)**
	b)	Differentiate between Forward Chaining and Backward Chaining. Explain their algorithms, advantages, limitations, and use cases.	**(8)**
Q5	**a)**	Explain the structure, conditional independence, and inference mechanisms of Bayesian Network. Construct a Bayesian network for a suitable domain of your choice.	**(8)**
	b)	Describe the architecture, knowledge acquisition, explanation facility of an expert system. Provide an example of a real-world expert system	**(8)**
Q6	**a)**	What is Inductive Learning? Explain decision-tree-based induction with examples, including the role of information gain and entropy.	**(8)**
	b)	Describe perceptron learning, activation functions, feedforward networks, and backpropagation with mathematical formulations of Neural Networks.	**(8)**