(2 ½ Hours) **[Total Marks: 75]**

N.B. 1) All questions are compulsory.
2) Figures to the right indicate marks.
3) Illustrations, in-depth answers and diagrams will be appreciated.
4) Mixing of sub-questions is not allowed.

Q. 1 **Attempt All (Each of 5Marks)** **(15)**

(a) 1. _____ is not a component of node structure

a) state b)Parent
c) child d) Action

2. _____ is also called as Heuristic search

a)Uninformed search b) informed search
c) Depth Limited Search d) uniform cost search

3. _____ agent does not maintain internal state.

a)Model based b) Goal -based
c) Simple reflex d) Utility-based

4. If a hypothesis agrees with all the data, it is called as……..

a) consistent hypothesis b) Integral hypothesis
c) best hypothesis d) Regular hypothesis

5. . The most widely used ensemble method is called _____

a) Bayesian Learning b) Online learning
c) Boosting d) Support Vector Machine.

(b) **Fill in the blanks.**

(Decision List, omniscient, Single, Regularization, Parameter Learning)

1. A decision tree returns a _____ output value.
2. _____is finding the numerical parameters for a probability model whose structure is fixed.
3. This process of explicitly penalizing complex hypothesis is called_____.
4. _____agent knows the actual outcome of its actions and can act accordingly.
5._____ consists of series of tests, each of which is a conjunction of literals.

(c) **Short Answers(Unit-I, II and III)**

1. What is early stopping?
2. Define Error Rate.
3. How denote learning rate?
4. Define decision boundary.
5. What is triangle inequality?

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Q. 2 Attempt the following (Any THREE)(Each of 5Marks) (15)

(a) Describe Model-based agent.

(b) What is PEAS? Mention it for Part picking robot and Medical Diagnosis system.

(c) Explain Artificial Intelligence with Turing Test approach.

(d) Describe problem formulation of vacuum world problem.

(e) Explain these properties of task environment.

1. Deterministic vs. Stochastic
2. Fully observable vs. partially observable

(f) List and explain the categories of definition of AI.

Q. 3 Attempt the following (Any THREE) (Each of 5Marks) (15)

(a) Explain the concept of Locality Sensitive Hashing.

(b) Write a note on Artificial Neural Network.

(c) Explain K-fold cross validation and LOOCV.

(d) Write a note on Supervised Learning.

(e) What is entropy? How do we calculate it?

(f) Write a note on Nearest Neighbor model.

Q. 4 Attempt the following (Any THREE) (Each of 5Marks) (15)

(a) Explain the concept of Passive Reinforcement Learning.

(b) Write a note on Statistical Learning.

(c) Explain Hidden Markov Model.

(d) Briefly explain the concept of direct utility estimation.

(e) What are the applications of Reinforcement Learning?

(f) Explain the concept of EM algorithm.

Q. 5 Attempt the following (Any THREE) (Each of 5Marks) (15)

(a) Explain Breadth First Search strategy along with its pseudocode.

(b) Write a note on Decision Tree. Also describe its pruning technique.

(c) Explain Naïve Bayes Model.

(d) Explain the concept of Goal Based Agent.

(e) Write a note on overfitting in decision tree.

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