(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. Left, right, Top, Down are the actions of _____
a) 8 puzzle b) 8 queens problem
c) vacuum world d) All of the above

2. To pass the total Turing Test, the computer will need_____
a) Computer Vision b) Robotics
c) both, (a) and (b) d) (a) or (b)

3. SARSA stands for
a)State-Action-Reaction-State-Action b) Set-Action-Reward-State-Reaction
c) Set-Action-Reward-State-Action d) State-Action-Reward-State-Action

4. Locally weighted regression gives us
a)with discontinuities b) neighbours with discontinuities
c) without discontinuities d) neighbours without discontinuities

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

(Percept, omniscient, reinforcement learning, error rate, Abstraction)
1.The term _____ to refer to the agent's perceptual inputs at any given instant.
2 An _____agent knows the *actual* outcome of its actions and can act accordingly.
3. The process of removing detail from a representation is_____
4._____ of a hypothesis as the proportion of mistakes it makes.
5. In _____the agent learns from a series of rewards.

(c) Short Answers

1.Define Turing Test.
2.Define rational agent.
3. Define null hypothesis.
4. Define classification.
5. What are the parameters of linear Gaussian model?

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

(a) Explain the contribution of Mathematics, Psychology,Linguistics to AI.

(b) What is PEAS? Explain with two suitable examples.

(c) Define heuristic function. Give an example heuristic function for solving 8-puzzle problem.

(d) Explain following task environments.
1. Discrete Vs Continuous
2. Known Vs Unknown

(e) Explain A* search Algorithm.

(f) Describe working of Utility based agent.

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

(a) Write a short note on support vector machines and its properties.

(b) What are the similarities and differences between Reinforcement learning and supervised learning?

(c) List and explain the issues involved in applicability of decision trees.

(d) Describe K-fold cross validation and LOOCV.

(e) What is an artificial neuron? Explain its structures.

(f) Write the pseudo-code for the Decision-Tree-Learning algorithm.

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

(a) Explain Bayesian Learning with an example.

(b) What is EM algorithm? What are its steps?

(c) Explain Maximum-likelihood parameter learning for Continuous models.

(d) What are beta distributions? Elaborate with example.

(e) Write a short note on temporal difference learning.

(f) Explain any one application of Reinforcement Learning.

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

(a) What is Widrow–Hoff rule?

(b) Explain recursive best-first search algorithm.

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

(d) Explain single-layer feed forward neural networks.

(e) What is Adaptive dynamic programming?
