

(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)**

- Explain the contribution of Mathematics, Psychology, Linguistics to AI.
- What is PEAS? Explain with two suitable examples.
- Define heuristic function. Give an example heuristic function for solving 8-puzzle problem.
- Explain following task environments.
  - Discrete Vs Continuous
  - Known Vs Unknown
- Explain A\* search Algorithm.
- Describe working of Utility based agent.

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

**(15)**

- Write a short note on support vector machines and its properties.
- What are the similarities and differences between Reinforcement learning and supervised learning?
- List and explain the issues involved in applicability of decision trees.
- Describe K-fold cross validation and LOOCV.
- What is an artificial neuron? Explain its structures.
- Write the pseudo-code for the Decision-Tree-Learning algorithm.

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

**(15)**

- Explain Bayesian Learning with an example.
- What is EM algorithm? What are its steps?
- Explain Maximum-likelihood parameter learning for Continuous models.
- What are beta distributions? Elaborate with example.
- Write a short note on temporal difference learning.
- Explain any one application of Reinforcement Learning.

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

**(15)**

- What is Widrow–Hoff rule?
- Explain recursive best-first search algorithm.
- What is entropy? How do we calculate it?
- Explain single-layer feed forward neural networks.
- What is Adaptive dynamic programming?

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