

(2½ 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) Multiple Choice Questions.**

- i)environment gives access to agent's sensor to the complete set.
 a) Fully Observable b) partially observable
 c) deterministic d) Episodic
- ii) The set of all leaf nodes available for expansion at any given point is called.....
 a) Frontier b) Backtier
 c) Depth d) Width
- iii)expands the shallowest unexpanded node first.
 a) Breadth First Search b) Depth First Search
 c) IDA d) A*
- iv) A..... has connections only in one direction.
 a) feed forward network b) feed back network
 c) recurrent network d) loopy path
- v) Automated Vehicle is an example of.....
 a) Supervised Learning b) Unsupervised Learning
 c) Active Learning d) Reinforcement Learning

(b) Fill in the blanks.

(Hidden Markov Model, $O(b^{d/2})$, $O(bm)$, Depth-First search, Uninformed Search, Informed Search, A* , Supervised Learning , Unsupervised Learning)

- i) _____ strategy is called as blind search.
 ii) _____ algorithm is used for solving temporal probabilistic reasoning.
 iii) _____ expands node with minimal $f(n) = g(n) + h(n)$
 iv) _____ is time complexity of Bidirectional Search.
 v) Classification is _____ task.

(c) Short Answers.

- i) Define deterministic task environment.
- ii) List the parameters used to evaluate performance of Search algorithms.
- iii) What is supervised learning?
- iv) What are the examples of nonparametric model?
- v) What is maximum-likelihood learning?

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

- (a) Write states, Initial States, Actions, Transition Model and Goal test to formulate 8 Queens problem.
- (b) Describe Utility based agent.
- (c) Describe general Graph-search algorithm.
- (d) Explain Thinking rationally and Acting rationally approaches of AI.
- (e) What is PEAS? Describe it for Satellite image analysis system and Interactive English tutor.
- (f) Explain following task environment-
 - i) Single Agent vs. Multiagent
 - ii) Episodic vs. Sequential

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

- (a) Describe Linear classifiers with hard threshold.
- (b) Explain Single-layer feed forward neural networks.
- (c) Explain the Restaurant wait problem with respect to decision trees representation.
- (d) Describe K-fold cross validation and LOOCV.
- (e) Describe Univariate linear regression.
- (f) Write a short note on Support Vector Machines.

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

- (a) Write a short note on Passive Reinforcement Learning.
- (b) Explain EM algorithm in detail.
- (c) Write a note on Naive Bayes models.
- (d) What are beta distributions? Elaborate with example.
- (e) Write a short note on Hidden Markov Model.
- (f) Write a note on Statistical Learning.

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

- (a) Explain Uniform Cost Search with suitable example.
- (b) Write a short note on Learning agent.
- (c) What is entropy? How do we calculate it?
- (d) What is an artificial neuron network?
- (e) Explain applications of Reinforcement Learning.