(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.