(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**
(a) Multiple Choice Questions (10M)
i. What is Artificial intelligence?
  a. Putting your intelligence into Computer
  b. Programming with your own intelligence
  c. Making a Machine intelligent
  d. Playing a Game
ii. Who coined the trem Artificial Intelligence ?
  a. Arthur Samule
  b. James Slagle
  c. Jhon McCarthy
  d. E. F. Codd
iii. Utility based agent are the extension of _____ agent.
  a. Manager
  b. Goal Based Agent
  c. Simple Reflex Agent
  d. Smart Agent
iv. Evaluation function for A* is f(n) = _____ + _____ .
  a. $h(n)+h(m)$
  b. $h(n)+g(n)$
  c. $h(n)+c(n)$
  d. $g(n)+h(m)$
v. Blind search is also called as _____ .
  a. Uninformed search
  b. Informed search
  c. Simple reflex search
  d. initial Search
vi. AND/OR is implemented in the _____ problem
  a. Deterministic
  b. Non-Deterministic
  c. Optimal
  d. Hill Climbing
vii. Which of the following is NOT supervised learning?
  a. PCA
  b. Decision Tree
  c. Linear Regression
  d. Naive Bayesian

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viii.   What is perceptron?
- a. a single layer feed-forward neural network with pre-processing
- b. an auto-associative neural network
- c. a double layer auto-associative neural network
- d. a neural network that contains feedback

ix.   High entropy means that the partitions in decision tree classification are

_____.
- a. pure
- b. not pure
- c. useful
- d. limited

x.   You trained a binary classifier model which gives very high accuracy on the training data, but much lower accuracy on validation data. The following may be true:
- a. This is an instance of overfitting.
- b. This is an instance of underfitting.
- c. The training was well regularized.
- d. The training and testing examples are sampled from same distributions.

(b)   Fill in the blanks   (5M)

Options : FIFO, LIFO, Max, O(bm), O(d), Probabilistic, Percept.

i.   _____ is the information that the agent receives

ii.   In BFS the frontier is implemented as a _____ queue.

iii.   The space complexity of minimax algorithm is _____.

iv.   Bayes rule can be used to answer _____ quires.

v.   In alpha beta pruning alpha stands for_____.

Q. 2   Attempt the following (Any THREE)   (15M)
(a)   Explain the components of a learning agent.
(b)   For Playing soccer activity, give a PEAS description of the task environment and characterize it in terms of the properties.
(c)   Describe the Model-based agent in detail.
(d)   Write the States, Initial State, Actions, Transition Model, Goal State and Path cost to formulate the 8-Queen problem.
(e)   Describe general Tree-Search algorithm
(f)   Explain Best First Search algorithm.

Q. 3   Attempt the following (Any THREE)   (15M)
(a)   Distinguish between Supervised and Unsupervised Learning.
(b)   Give one line description for the following with reference to supervised learning:
- i) Training set
- ii) Test set
- iii) Hypothesis
- iv) Classification
- v) Regression

(c)   Explain the Decision-Tree-Learning algorithm.

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

(e)   What is an artificial neuron? How it is used in ANN?

(f)   Explain support vector machine classifier algorithm?

Q. 4   Attempt the following (Any THREE)   (15)

(a)   Write note on Maximum-likelihood function.

(b)   Explain Expectation Maximization function?

(c)   Briefly describe Adaptive Dynamic Programming.

(d)   Describe Q-learning in detail.

(e)   Write note on Passive Reinforcement learning.

(f)   Explain Temporal Difference learning.

Q. 5   Attempt the following (Any FIVE)   (15)

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

(b)   Explain steps for A* search algorithm.

(c)   Describe a mathematical model for a neuron.

(d)   Write short note on univariate linear regression.

(e)   Explain Artificial Intelligence with Turing Test approach.

(f)   Write note on Active reinforcement learning.

(g)   Explain how generalization is achieved in Reinforcement learning.

(h)   Write a note on Naive Bayes models.

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