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# MCA
## (SEM IV) THEORY EXAMINATION 2017-18
## ARTIFICIAL INTELLIGENCE

*Time: 3 Hours* | *Total Marks: 70*

**Note:** Attempt all Sections. If require any missing data; then choose suitably.

### SECTION A

**1. Attempt *all* questions in brief.** **2 x 7 = 14**

a. What is meant by the term Artificial Intelligence? How it is different from natural intelligence?

b. Discuss Branch-and-bound search algorithm.

c. Differentiate between local search and global search.

d. Transform the following formula to Prenex Normal form—

$$\forall x: \forall y: \left(\exists z: P(x,z) \cap P(y,z)\right) \rightarrow \exists u: Q(x,y,u)$$

e. Define forward chaining and backward chaining with example.

f. Explain in brief the concept of reinforcement learning.

g. Write a short note on Support Vector Machine.

### SECTION B

**2. Attempt any *three* of the following:** **7 x 3 = 21**

a. What is an intelligent agent? Discuss any two types of intelligent agents.

b. Explain Steepest-ascent hill climbing algorithm. What are the problems with hill climbing algorithm?

c. Describe Hidden Markov model with suitable example. Also discuss its role in probabilistic reasoning.

d. Discuss Maximum-likelihood parameter learning for complete data with discrete models.

e. What do you mean by classification? Discuss the process of classification with the help of a diagram.

### SECTION C

**3. Attempt any *one* part of the following:** **7 x 1 = 7**

(a) Discuss the historical development of artificial intelligence.

(b) For each of the following agents, develop a PEAS description of the task environment-

(i) Mathematician's theorem proving assistant

(ii) Satellite image analysis system

(iii) Internet book shopping agent

(iv) Medical diagnosis system

**4. Attempt any *one* part of the following:** **7 x 1 = 7**

(a) Discuss Simulated Annealing search algorithm with its advantages and disadvantages.

(b) What are the steps to define a problem? Explain. Also discuss various components of a problem.

**5. Attempt any *one* part of the following:** **7 x 1 = 7**

(a) Discuss algorithm of conversion to clause form. Convert the following to clause form using algorithm-

$$\forall x[\boldsymbol{Brick}(x) \rightarrow (\exists y\{\boldsymbol{On}(x,y) \cap \neg \boldsymbol{Pyramid}(y)\} \cap \neg \exists y\,\{\boldsymbol{On}(x,y) \cap \boldsymbol{On}(y,x)\} \cap \forall y\{\neg \boldsymbol{Brick}(y) \rightarrow \neg \boldsymbol{Equal}(x,y)\})]$$

(b) Explain the concept of Alpha-beta pruning. Write Alpha-beta search algorithm.

**6. Attempt any *one* part of the following:** **7 x 1 = 7**

(a) Discuss various application domains of machine learning.

(b) Describe major steps involved in a learning process. Also discuss how learning systems are classified.

**7. Attempt any *one* part of the following:** **7 x 1 = 7**

(a) What is pattern recognition? Explain various steps involved in the designing of a pattern recognition system with the help of a diagram.

(b) Explain Nearest Neighbor rule used for classification.