

**ARTIFICIAL INTELLIGENCE  
(CBS3103)**

**Time Allotted : 2½ hrs**

**Full Marks : 60**

*Figures out of the right margin indicate full marks.*

*Candidates are required to answer Group A and  
any 4 (four) from Group B to E, taking one from each group.*

*Candidates are required to give answer in their own words as far as practicable.*

**Group – A**

1. Answer any twelve:

**12 × 1 = 12**

*Choose the correct alternative for the following*

- (i) Which search strategy is also called as blind search?  
(a) Uninformed search (b) informed search  
(c) Simple reflex search (d) None of the above
- (ii) Which search implements stack operation for searching the states?  
(a) BFS (b) DFS  
(c) Depth limited search (d) None of the above
- (iii) Local maximum plateau, Ridge are the difficulties in which searching algorithms?  
(a) A\* (b) Hill Climbing  
(c) Stimulated Annealing (d) AO\*
- (iv) If  $h_1$  and  $h_2$  are two admissible heuristic functions then which of the following may not be admissible?  
(a)  $\min(h_1, h_2)$  (b)  $\max(h_1, h_2)$   
(c)  $h_1 * h_2$  (d)  $h_1 + h_2$
- (v) Greedy search strategy chooses the node for expansion in \_\_\_\_\_.  
(a) Shallowest (b) Deepest  
(c) The one closest to the goal node (d) Minimum heuristic cost
- (vi) The process of finding a substitution that makes two logical statements look same is known as  
(a) Unification (b) NLP  
(c) Heuristic Process (d) None of the above
- (vii) Which process makes two different logical expressions look identical?  
(a) Unification (b) Substitution  
(c) Inference (d) Lifting

- (viii) What is the total number of quantification available in artificial intelligence?  
 (a) 1 (b) 2  
 (c) 3 (d) 4
- (ix) A Bayesian network is a  
 (a) Directed Graph (b) Undirected Graph  
 (c) Tree (d) None of the above
- (x) Solving problems related to text analysis, and language translation processes are which technique in AI  
 (a) Machine Learning (ML)  
 (b) Natural Language Processing (NLP)  
 (c) Constraint Satisfaction Problems (CSP)  
 (d) Search Algorithms

*Fill in the blanks with the correct word*

- (xi) In artificial Intelligence, knowledge can be represented as\_\_\_\_\_.
- (xii) Decision Nodes are represented by \_\_\_\_\_.
- (xiii) A perceptron is a \_\_\_\_\_.
- (xiv) An AI agent perceives and acts upon the environment using \_\_\_\_\_.
- (xv) A \_\_\_\_\_ is a tree-like structure that represents a set of decisions and their possible consequences.

### **Group - B**

2. (a) Three missionary and three cannibals are standing in a left bank of a river. There is a boat having a capacity of taking two people and it can be driven by a missionary or cannibal. If the number of missionaries is less than the number of cannibals at any bank then cannibal will eat missionary. How is it possible for all the missionaries and cannibals to cross the river such that no missionary is getting eaten. Give state space diagram. [[CO1](Analyze/IOCQ)]
- (b) Briefly explain how simple reflex agent works with a suitable diagram. [[CO1](Understand/LOCQ)]  
**6 + 6 = 12**
3. (a) Differentiate among following:  
 (i) Fully observable and Partially Observable Environment. [[CO1](Analyze/IOCQ)]  
 (ii) Discrete and Continuous Environment [[CO2](Analyze/IOCQ)]
- (b) Give the comparative study of BFS and DFS. [[CO2](Understand/LOCQ)]
- (c) Discuss the complexity of bidirectional search. [[CO2](Understand/LOCQ)]  
**6 + 3 + 3 = 12**

### **Group - C**

4. (a) What is heuristic function? When an algorithm is said to be admissible? [[CO2](Understand/LOCQ)]

- (b) Apply A\* algorithm to find out the shortest path from start node, a to goal node, z for the following graph given in Fig.1:

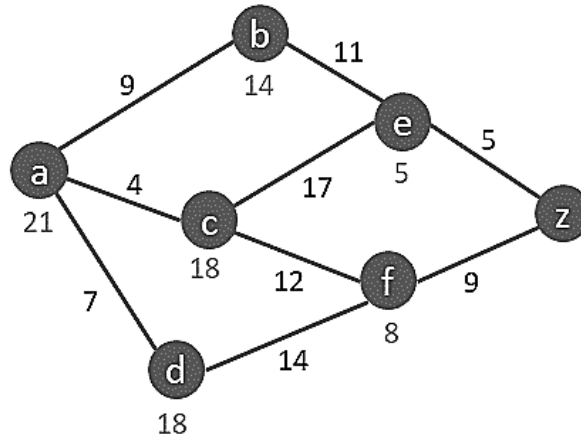


Fig. 1

[[CO2](Apply/IOCQ)]

**(3 + 3) + 6 = 12**

5. (a) Describe the process of simulated annealing with an example. [[CO2](Remember/LOCQ)]  
 (b) Compare Informed & Uninformed search with an example. [[CO2](Analyze/IOCQ)]  
 (c) Formulate the ways to overcome hill climbing problem. [[CO2](Analyze/IOCQ)]
- 5 + 4 + 3 = 12**

### Group - D

6. (a) Write the predicate logic representations for the following sentences:  
 (i) Anything anyone eats and not killed is food. (ii) Anil eats peanuts and still alive  
 (iii) Harry eats everything that Anil eats (iv) Every person in the party loves every child.  
 [[CO5](Remember/LOCQ)]  
 (b) Construct a truth table for the formula  $\neg P \wedge (P \rightarrow Q)$ . [[CO4](Remember/LOCQ)]
- 8 + 4 = 12**
7. Write short notes on the following topic: **(Any Two)**  
 (i) Resolution Algorithm (ii) Unification Algorithm  
 (iii) Forward Chaining. [[CO5](Understand/LOCQ)]
- (6 + 6) = 12**

### Group - E

8. (a) Explain the Decision tree algorithm. [[CO6](Remember/LOCQ)]  
 (b) Explain the Information Gain and Entropy, and their importance in the decision tree. [[CO6](Remember/LOCQ)]
- 6 + (3 + 3) = 12**
9. (a) Write all the steps of problem-solving in artificial intelligence. Explain the various components of problem formulation in AI. [[CO6](Remember/LOCQ)]

- (b) Explain the techniques used for problem-solving in AI. Write the difference between problem-solving and planning.

*[(CO6)(Remember/LOCQ)]*

**(3 + 3) + (3 + 3) = 12**

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Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	87.5	12.5	0