



**WEST BENGAL STATE UNIVERSITY**  
B.Sc. Honours 6th Semester Examination, 2023

**CMSACOR13T-COMPUTER SCIENCE (CC13)**  
**ARTIFICIAL INTELLIGENCE**

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.  
Candidates should answer in their own words and adhere to the word limit as practicable.  
All symbols are of usual significance.*

**Answer Question No. 1 and any *four* from the rest**

**GROUP-A**

1. Answer any *four* questions from the following 2×4 = 8
- (a) What do you understand by an optimization problem?
  - ☒ (b) State the basic difference between local maxima and global maxima of a problem.
  - (c) Differentiate between Episodic and Sequential environment with example.
  - ☒ (d) What is unification?
  - ☒ (e) What is an autonomous agent?
  - ☒ (f) What is the difference between semantic net and frame?
  - ☒ (g) How do you evaluate a search algorithm?

**GROUP-B**

**Answer any *four* questions from the following**

8×4 = 32

2. (a) What are the differences between Database and knowledgebase? 2+3+3
- (b) Compare the space complexity and time complexity of BFS and DFS procedure.
- (c) What are the levels of knowledge used in NLP?
- ☒ 3. (a) What are the features of intelligence? 2+2+2+2
- ☒ (b) What are the limitations of human intelligence?
- ☒ (c) What is a rational agent?
- ☒ (d) What is the Turing test?

4. Consider the 3-Puzzle problem shown in Figure-1.

4+4

2	3
1	

initial

1	2
3	

Goal

Possible operators are : top, down, left, right;  
Assume that repeated states are not detected.

- (a) Draw the search tree using breadth first search.  
(b) Would depth first search find the goal? Explain.

5. (a) When is a heuristic called admissible?

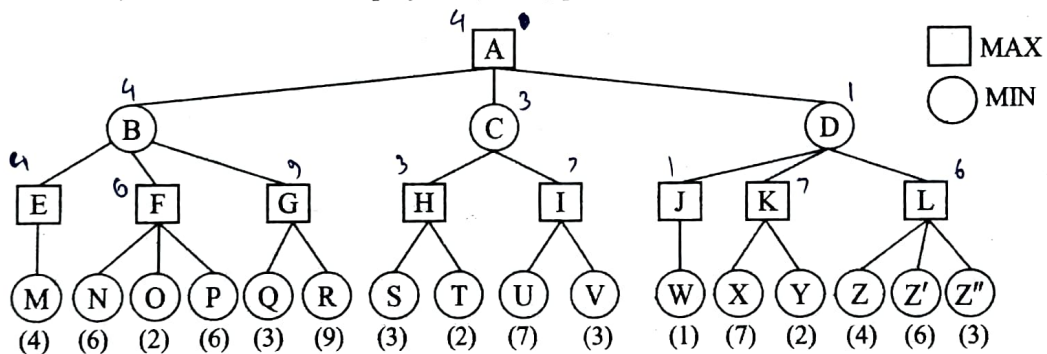
1+3+2+2

- (b) If  $h(n)$  is admissible and  $A^*$  is optimal for a heuristic search algorithm.

- (c) When does  $A^*$  search behave like breadth first search?

- (d) What are two major drawbacks of hill climbing?

6. Consider the following game tree in which the heuristic evaluation scores (in brackets) are all from the first player's (MAX) point of view.



Answer the following with explanation:

4+4

- (i) Using MINIMAX procedure, determine what moves should be chosen by the max player in his first turn.

- (ii) Execute  $\alpha - \beta$  pruning on the above game tree. How many terminal nodes are examined? For each cutoff specify whether it is an  $\alpha$ -cutoff or  $\beta$ -cutoff.

7. Write short notes on the following (any two):

4+4

- (a) RTN

- (b) Means End Analysis

- (c) Truth Maintenance Systems.

8. (a) What is an intelligent agent?

2+2+2+2

- (b) What are the main parts of an Intelligent Agent?

- (c) Differentiate between Simple Reflex Agents and Model based Agents.

- (d) What are the major characteristics of an Intelligent Agent?

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