

**B.Tech/ M.Tech (Integrated) DEGREE EXAMINATION, MAY 2023**  
Fourth Semester

**21CSC206T – ARTIFICIAL INTELLIGENCE**

*(For the candidates admitted from the academic year 2022-2023 onwards)*

**Note:**

- (i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40<sup>th</sup> minute.
- (ii) **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours

Max. Marks: 75

**PART – A (20 × 1 = 20Marks)**

Marks BL CO PO

Answer ALL Questions

- |   |   |   |   |   |
|---|---|---|---|---|
| 1. If a problem does not yield a particular answer, then it is called as _____.<br>(A) Cross-domain problem (B) Independent problem<br>(C) Well-structured problem (D) Ill-structured problem                                       | 1 | 2 | 1 | 1 |
| 2. The field that investigates the mechanics of human intelligence is<br>(A) History (B) Cognitive science<br>(C) Psychology (D) Sociology  | 1 | 2 | 1 | 1 |
| 3. A state space form (or map) in which, the nodes are _____ and the arcs between nodes are _____.<br>(A) States, actions (B) Actions, states<br>(C) Path, method (D) Method, path  | 1 | 2 | 1 | 1 |
| 4. What kind of environment is crossword puzzle?<br>(A) Static (B) Dynamic<br>(C) Semi-dynamic (D) Stochastic   | 1 | 2 | 1 | 1 |
| 5. If any search algorithm is able to generate a solution, then the search is called _____.<br>(A) Efficient (B) Informed<br>(C) Uninformed (D) Complete  | 1 | 2 | 2 | 2 |
| 6. In a search technique a node/ state is marked to be visited when _____.<br>(A) It is pruned (B) It is successors are traversed<br>(C) It is explained (D) The successors are traversed and explained                             | 1 | 2 | 2 | 1 |
| 7. Your friend is in a building that has 15 floors. And you want to locate him. Which search technique would you use?<br>(A) Depth limited search (B) Iterative deepening search<br>(C) Depth-first search (D) Breadth first search | 1 | 2 | 2 | 1 |
| 8. Which of the following search technique uses a priority queue?<br>(A) Breadth first search (B) Depth first search<br>(C) Iterative deepening search (D) Depth limited search   | 1 | 2 | 2 | 1 |

9. Which of the following mentioned problems are not constraint satisfaction problems? 1 2 3 2  
 (A) N-queens problem (B) Crypt-arithmetic problem  
 (C) Map-colouring problem (D) Mirrionaries and cannibals problem
10. Constraints are the one that restrict 1 2 3 2  
 (i) Movement (ii) Arrangement (iii) Possibilities (iv) Solutions  
 (A) (i) and (iii) (B) (i), (ii), (iii) and (iv)  
 (C) (ii) and (iv) (D) (i), (iii) and (iv)
11. Select the appropriate technique that can be used for map coloring problem. 1 2 3 2  
 (A)  $Ao^*$  (B)  $A^*$   
 (C) Best first search (D) Constraint satisfaction
12. What is  $TO + GO = OUT$ ? Find  $T =$ ;  $G =$ ;  $O =$ ;  $U =$ ; 1 2 3 2  
 (A)  $T = 2$ ;  $O = 1$ ;  $G = 8$ ;  $U = 0$  (B)  $T = 1$ ;  $O = 1$ ;  $G = 2$ ;  $U = 2$   
 (C)  $T = 1$ ;  $O = 1$ ;  $G = 0$ ;  $U = 8$  (D)  $T = 2$ ;  $O = 2$ ;  $G = 0$ ;  $U = 1$
13. Assume that the knowledge base contains axiom: 1 2 4 1  
 "All students who did hard work got passed"  
 Pick the correct FOL;  
 (A)  $\forall x \text{ student } (x) \wedge \text{hardwork } (x) \rightarrow \text{pass } (x)$  (B)  $\forall x \text{ student } (x) \vee \text{hardwork } (x) \rightarrow \text{pass } (x)$   
 (C)  $\forall x \neg \text{student } (x) \vee \text{hardwork } (x) \vee \text{pass } (x)$  (D)  $\forall x \neg \text{student } (x) \wedge \neg \text{hardwork } (x) \vee \text{pass } (x)$
14. Match the terms with correct options 1 2 4 1  
 i) Disjunction 1)  $a \rightarrow b$   
 ii) Implication 2)  $a \wedge b$   
 iii) Biconditional 3)  $a \vee b$   
 iv) Conjunction 4)  $a \rightarrow b \wedge b \rightarrow a$   
 (A) 1), 2), 3) and 4) (B) 3), 1), 2) and 4)  
 (C) 2), 1), 3) and 4) (D) 3), 4), 2) and 1)
15. Process of reasoning that operate on \_\_\_\_\_ representation of knowledge. 1 1 4 1  
 (A) Internal (B) External  
 (C) Example (D) Sample
16. In propositional logic  $\alpha$  is valid iff  $\vdash \alpha$  is \_\_\_\_\_. 1 2 4 1  
 (A) Satisfiable (B) Unsatisfiable  
 (C) Complete (D) Incomplete
17. Which of the following statements is true regarding partial order planning (POP) algorithms? 1 2 5 1  
 (A) Always choose to add a plan step in particularly place in sequence (B) They work back from the goal, adding actions to the plan to achieve  
 (C) Not to explore the space of plans (D) Not particularly effective on problems.

18. The domain that makes use of blocks world domain is \_\_\_\_\_.  
 (A) Non static, finite, completely, (B) Dynamic completely observable inobservable  
 (C) Static, finite, completely (D) Multi-agent with dynamic observable property
19. The popular voice assistants like Google assistant, Alexa, Siri implement the concept of \_\_\_\_\_.  
 (A) Machine learning (B) Deep learning  
 (C) Data learning (D) Human learning
20. Which of the following is not a component of an expert system?  
 (A) Inference engine (B) User interface  
 (C) Knowledge base (D) Domain knowledge

**PART – B (5 × 8 = 40 Marks)**

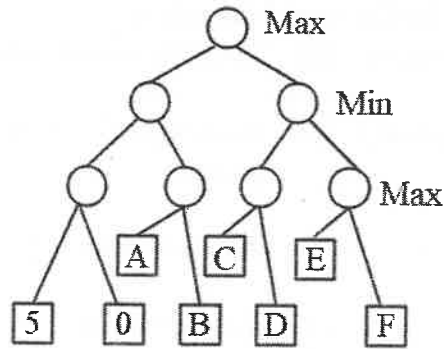
Answer **ALL** Questions

Marks BL CO PO

21. a. Discuss all 7 problem characteristics with suitable examples. 8 2 1 1
- (OR)**
- b.i. Discuss various environments available in AI. 4 2 1 1
- ii. Write about various AI models. 4 1 1 1
22. a. Write about uninformed search strategies with comparative analysis. 8 2 2 2
- (OR)**
- b. Find the shortest path using  $A^*$  algorithm and list the order of the obstacles, the initial state (DOG) has to pass, through in order to reach the goal state (Bone). 8 2 2 2

Pole G = 3.5 H = 6	Rope G = 3.8 H = 5	Bone H = 0 G = 3
Stand G = 6 H = 5	Pebbles G = 4 H = 8	Horn G = 3 H = 5.5
Stick G = 2 H = 6	Lane G = 1 H = 6	Hurdles G = 1 H = 6.5
DOG	Blocked	Garden G = 5 H = 9

23. a. Explain the different types of agents with suitable illustrations. 8 2 3 1
- (OR)**
- b. Consider the game tree picture below where A-F represents, some real values. Assume the nodes are explored from left to right and standard alpha beta pruning is used. 8 3 3 2



- (i) Give a value of A such that B is pruned
- (ii) Give a value of A such that B is not pruned
- (iii) Assume B = 5; A = 5 give value of C and D, such that subtree containing E and C is pruned.

24. a.i. Explain semantic network?

4 2 4 1

ii. Use the below facts and using semantic network conclude "Tom is a Mammal".

4 2 4 1

- Tom is an instance of dog
- Tom caught a cat
- Tom is owned by Roshan
- Tom is brown in colour
- Dogs likes bones
- The dog sat on the mat
- The dog is a mamma
- A cat is an instance animal
- All mammals are animals
- Mammals have fur

(OR)

b.i. Give the syntax, semantic and interfacing mechanisms in frames with example.

4 2 4 1

ii. How inference rules are used to represent knowledge?

4 2 4 1

25. a. Explain in detail about expert system architecture.

8 2 5 1

(OR)

b. Explain

2 5 1

- (i) Simple planning agent
- (ii) Means-end analysis

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4

**PART – C (1 × 15 = 15 Marks)**

Marks BL CO PO

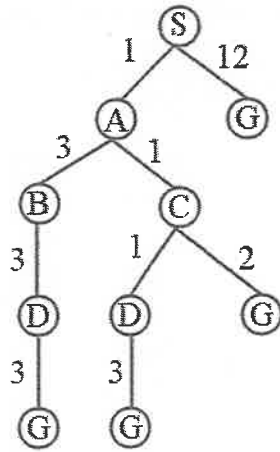
Answer ANY ONE Question

26.i. Comparatively analyze  $A^*$  and best first search algorithm.

5 2 2 1

ii. Apply UCS in the following graph and find the path from S to G.

10 2 2 1



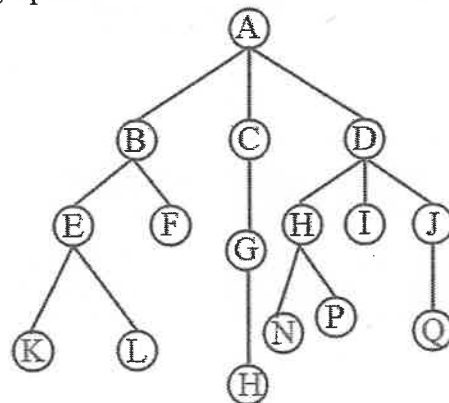
Analyze the above example with its complexity.

27.i. Comparatively analyze BFS and DFS uninformed algorithm.

5    2    2    1

ii. Consider the given graph.

10    3    2    1



'A' is the root node

'F' is the goal node

Explain the searching process using IDS. Explain IDS with all its features.

\* \* \* \* \*

