25. a. Summarize the key aspects of inference process in first order logic using suitable example.   8   2   5   3

(OR)

b. Identify the steps involved in genetic algorithm to find the optimal solution.   8   2   5   3

PART – C (1 × 15 = 15 Marks)
Answer **ANY ONE** Question   Marks   BL   CO   PO

26. Consider a message "Send More Money". Using crypt-arithmetic method, find the solution in numeric form. Explain the constraints adopted.   15   4   1   4

27. Consider the following facts and represent them in predicate form   15   4   4   4
      F1: There are 500 employees in ABC company
      F2: Employees earning more than ₹ 5000
      F3: John is a manager in ABC company
      F4: Manager earns ₹ 10,000
Convert the facts in predicate form to clauses and then prove by resolution "John Pays Tax".

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

21AIS201J – FOUNDATION OF 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 40th 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. Which of the following algorithm is generally used constraint satisfaction search algorithm?   1   2   1   2
   (A) Breadth-first search algorithm   (B) Depth-first search algorithm
   (C) Hill-climbing search algorithm   (D) Simulated annealing algorithm

2. Which action is a rational agent expected to prioritize?   1   2   1   2
   (A) The morally correct action   (B) Action which leads to the greatest reward
   (C) Action which leads to less loss   (D) Socially acceptable action

3. Which game was alphago built for, and which company was responsible for its development?   1   1   1   1
   (A) Chess, Facebook   (B) Chess, deep mind
   (C) Go, Facebook   (D) Go, deep mind

4. Which data structure is used in the breadth-first search of a graph to store nodes?   1   2   1   1
   (A) Array   (B) Stack
   (C) Queue   (D) Tree

5. Which algorithm is used in the game three to make decisions of win/lose?   1   2   2   1
   (A) Heuristic search algorithm   (B) DFS/BFS algorithm
   (C) Greedy search algorithm   (D) Min/max algorithm

6. The available ways to solve a problem of state-space search   1   1   2   1
   (A) 1   (B) 2
   (C) 3   (D) 4

7. Identify the goal of backward chaining algorithm from following   1   1   2   1
   (A) Queue   (B) List
   (C) Vector   (D) Stack

8. How the logic programming can be constructed?   1   2   2   1
   (A) Variables   (B) Expressing knowledge in a formal language
   (C) Graph   (D) Rule based expression

9. Which is omitted in prolog unification algorithm? | 1 2 3 1
   (A) Occur check
   (B) Variable check
   (C) Proposition check
   (D) Both occur and proposition check

10. Which of the following is a study of construction of words from primitive meaningful units? | 1 1 3 1
    (A) Phonology
    (B) Morphology
    (C) Morpheme
    (D) Shonology

11. Which model gives the probability of each word following each other word? | 1 1 3 1
    (A) Bigram model
    (B) Diagram model
    (C) Gram model
    (D) Speech model

12. Agents behaviour can be best described by _____. | 1 1 3 1
    (A) Perception sequence
    (B) Sensors and actuators
    (C) Agent function
    (D) Environment in which agent is performing

13. What are the limitations of the semantic networks? | 1 2 4 2
    (A) Intractability
    (B) Lack in expression some of the properties
    (C) Incomplete
    (D) Has memory constraints

14. Which graph is used to represent semantic network? | 1 2 4 2
    (A) Undirected graph
    (B) Directed graph
    (C) Directed acyclic graph
    (D) Directed complete graph

15. Which of the following is helpful to compute the truth of any sentence? | 1 2 4 2
    (A) Semantics of propositional logic
    (B) Alpha-beta pruning
    (C) First-order logic
    (D) Minimax strategy

16. Wumps world is a classic problem, best example of | 1 2 4 1
    (A) Single player game
    (B) Two player game
    (C) Reasoning with knowledge
    (D) Knowledge based game

17. What is a auto-associative network? | 1 2 5 2
    (A) A neural network that contains no loops
    (B) A neural network that contains feedback
    (C) A neural network that has only one loop
    (D) A single layer feed-forward neural network with preprocessing

18. The genetic algorithm is suitable for parallel computing is | 1 2 5 2
    (A) It has operators like reproduction, crossover and mutation
    (B) It is a population based approach
    (C) It does not require gradient information of the objective function
    (D) It is a robust optimization tool

19. What is the role of an individual and plays in the ant colony algorithm? | 1 2 5 1
    (A) It conveys the messages from queen to soldiers
    (B) It constructs a candidate solution using divide and conquer approach
    (C) It constructs a candidate solution using a greedy stochastic search approach
    (D) It guards the entrance of the ant colony

20. Genetic algorithm are said to jump from one hill to another which of the following is responsible for such behavior? | 1 1 5 1
    (A) Mutation
    (B) Crossover
    (C) Fitness function
    (D) Natural selection

PART – B (5 × 8 = 40 Marks)
Answer ALL Questions

| | | Marks | BL | CO | PO |

21. a. Explain how the A^* algorithm minimizes the total estimated solution cost. | 8 2 1 2

(OR)

b. Compare the uniformed search strategies in terms of optimality, completeness, space complexity and time complexity. Based on these criteria, explain which search strategy is better. | 8 3 1 2

22. a. Illustrate an example of two-player search tree to analyze the working of alpha-beta pruning. | 8 3 2 3

(OR)

b. Demonstrate the backward chaining algorithm in logic programming with an example. | 8 3 2 3

23. a. Consider a web user can type a query as "AI book" into a search engine and can see a list of relevant pages. Explain how such information retrieval systems are built. | 8 3 3 4

(OR)

b. Illustrate the dynamic Bayes network for the temporal inference from sequences of actions and measurements of a mobile robot. | 8 2 3 2

24. a. Write down logical representations for the following sentences suitable for use with generalized modus ponens. | 8 3 4 4
    (i) Cow, horses and pigs are mammals
    (ii) An off spring of a horse is a horse
    (iii) Bluebeard is a horse
    (iv) Bluebeard is Charles parent
    (v) Offspring and parent are inverse relations
    (vi) Every mammal has a parent

(OR)

b. Elaborate on acoustic and language models adopted in speech recognition system. | 8 2 4 2