



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal-500043, Hyderabad

B.Tech V SEMESTER END EXAMINATIONS (REGULAR/ SUPPLEMENTARY) - FEBRUARY 2024

Regulation: UG20

ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

Time: 3 Hours

CSE (AI&ML)

Max Marks: 70

Answer ALL questions in Module I and II

Answer ONE out of two questions in Modules III, IV and V

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

## MODULE – I

1. (a) Enumerate classical “Water jug Problem”. Describe the state space for this problem and also give the solution. [BL: Understand| CO: 4|Marks: 7]
- (b) Demonstrate with necessary diagrams, a suitable state space representation for 8 puzzle problem and explain how the problem can be solved by state space search? Show how heuristic can improve the efficiency of search? [BL: Apply| CO: 1|Marks: 7]

## MODULE – II

2. (a) Distinguish between
  - i) Procedural and declarative knowledge
  - ii) Forward and backward reasoning [BL: Understand| CO: 2|Marks: 7]
- (b) Three boxes are presented to you. One contains gold, the other two are empty. Each box has imprinted on it a clue as to its contents; the clues are:
  - i) Box 1 “The gold is not here”
  - ii) Box 2 “The gold is not here”
  - iii) Box 3 “The gold is in Box 2”Only one message is true; the other two are false. Which box has the gold? Formalize the puzzle in predicate logic find the solution using a truth table. [BL: Apply| CO: 2|Marks: 7]

## MODULE – III

3. (a) Write short note on the following
  - i) Best-first search.
  - ii) A\* search [BL: Understand| CO: 3|Marks: 7]
- (b) Develop a game tree with the steps involved for the depth 3 and branching factor 3 using Alpha-Beta Pruning algorithm [BL: Apply| CO: 3|Marks: 7]
4. (a) Discuss the heuristic function. Illustrate how the heuristic function helps during search procedure with a suitable example. [BL: Understand| CO: 4|Marks: 7]
- (b) Construct a tree to explain how iterative deepening technique is a combination of depth first search and breadth first search. [BL: Apply| CO: 4|Marks: 7]

## MODULE – IV

5. (a) Discuss Bayesian networks and explain how it reduces the complexity of a bayesian reasoning system ? [BL: Understand| CO: 5|Marks: 7]
- (b) Use one or more nonmonotonic reasoning systems that can answer the following questions:
- i) Does Tweety fly?
  - ii) Does Chirpy fly?
  - iii) Does Feathers fly?
  - iv) Does Paul fly? [BL: Apply| CO: 5|Marks: 7].
6. (a) What is non-monotonic reasoning? Explain the logics used for non-monotonic reasoning. [BL: Understand| CO: 5|Marks: 7]
- (b) Show how a JTMS could be used in medical diagnosis. Consider the rules such as, "If you have a runny nose, assume you have a cold unless it is allergy season.?" [BL: Apply| CO: 5|Marks: 7]

## MODULE – V

7. (a) Contrast the features of non-linear planning strategies. Illustrate with an example the working of goal set method [BL: Understand| CO: 6|Marks: 7]
- (b) Implement the candidate elimination algorithm for version spaces. Choose a concept space with several features like space of books, computers, animals etc.,. Pick the concept and demonstrate learning by presenting positive and negative examples of the concept. [BL: Apply| CO: 6|Marks: 7]
8. (a) What is the need for expert system tool while building expert system? List down and explain the difficulties involved in developing an expert system [BL: Understand| CO: 6|Marks: 7]
- (b) Contrast expert systems and neural networks in terms of knowledge representation, knowledge acquisition, and explanation. [BL: Understand| CO: 6|Marks: 7]

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