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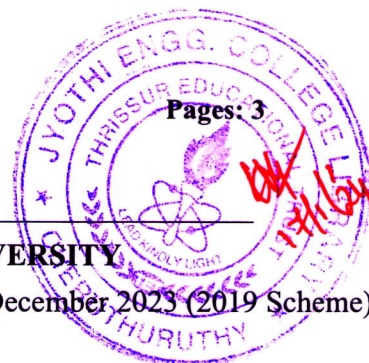
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Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree Regular and Supplementary Examination December 2023 (2019 Scheme)



Course Code: AIT 307

Course Name: INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Max. Marks: 100

Duration: 3 Hours

**PART A**

*(Answer all questions; each question carries 3 marks)*

Marks

- |    |   |   |
|----|---|---|
| 1  | Define the term 'Artificial Intelligence'. List a few applications.   | 3 |
| 2  | Define Rational agent. Explain the same with the Vacuum cleaner problem   | 3 |
| 3  | Write a note on the transition Model with respect to 15 puzzle problem  | 3 |
| 4  | Differentiate between uninformed and informed search strategies in intelligent systems  | 3 |
| 5  | Formulate the following problem as a CSP. Class scheduling: There is a fixed number of professors and classrooms, a list of classes to be offered, and a list of possible time slots for classes. Each professor has a set of classes that he or she can teach. | 3 |
| 6  | List the components of a Constraint Satisfaction Problem. Illustrate with an example.   | 3 |
| 7  | Find the MGU of (knows(Richard, x), knows(Richard, John))   | 3 |
| 8  | Differentiate between propositional logic and First-order logic representation in KB  | 3 |
| 9  | What is entropy? What is its significance in decision tree learning?  | 3 |
| 10 | What is meant by reinforcement learning? Give an example  | 3 |

**PART B**

*(Answer one full question from each module, each question carries 14 marks)*

**Module -1**

- 11 a) For the following activities, give a PEAS description of the task environment and characterize it in terms of the task environment properties. 7.
- Medical diagnosis system
  - Interactive English Tutor
  - Playing Soccer

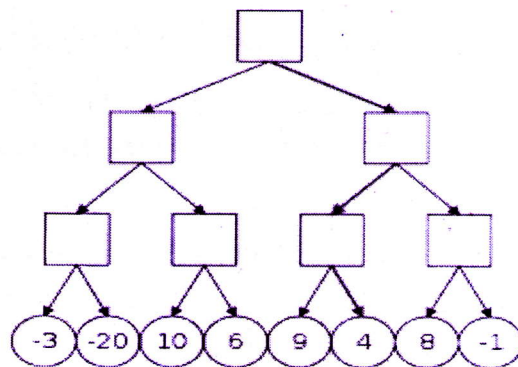
- b) Sketch and explain the structure of Model-based agents and Utility-based agents with the help of suitable examples. 7
- 12 a) Explain in detail how agents interact with the task environment. 7
- b) Write a short note on the history of artificial intelligence. 7

**Module -2**

- 13 a) Illustrate A\* Search algorithm. How does it implement heuristic search? 7
- b) State and explain the 5 components of a well-defined AI problem. Write the standard formulation for the 8-queens problem. 7
- 14 a) With suitable examples explain any 3 uninformed search strategy also analyze the performance. 10
- b) Define heuristic function? Give two examples 4

**Module -3**

- 15 a) Apply Minimax search technique to the tree given below, starting with Max player 7



- b) How and when is heuristic used in Minimax search technique? Illustrate the usage of heuristic in Minimax procedure. 7
- 16 a) Solve the following crypt arithmetic problem by hand, using the strategy of backtracking with forward checking and the MRV (Minimum Remaining Value) & least-constraining-value heuristics. 10

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 \text{E A T} \\
 + \text{ T H A T} \\
 \hline
 \text{A P P L E}
 \end{array}$$

- b) Formulate the algorithm for Arc-Consistency. Explain with suitable examples 4

**Module -4**

- 17 a) What are the steps involved in the Knowledge representation of a FOL? Explain with an example. 7
- b) Convert the following sentences into FOL. 7
- All students are smart.
  - There exists a student
  - There exists a smart student.
  - Every student loves some student
- 18 a) Consider the following sentences: 10
1. John likes all kinds of food.
  2. Apples are food.
  3. Chicken is food.
  4. Anything anyone eats and isn't killed by is food.
  5. Bill eats peanuts and is still alive.
  6. Sue eats everything Bill eats.
- Prove by forward chaining that "John likes peanuts "
- b) Write down the unification algorithm. 4

**Module -5**

- 19 a) How is best hypothesis selected from alternatives. 7
- b) Differentiate between classification and regression. Give three different scenarios each, where these can be used. 7
- 20 a) Explain learning in Decision Tree algorithm with an example 7
- b) How do we evaluate and choose the best hypotheses that fits the future data? 7
- Explain with a suitable method.

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