

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VIII (NEW) EXAMINATION – WINTER 2024****Subject Code:2180703****Date:21-11-2024****Subject Name: Artificial Intelligence****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

- Q.1**
- (a) Define the term “Artificial Intelligence”. Explain how AI techniques can be used to solve real world problems. **03**
- (b) Explain the following terms with respect to natural language processing: (i) Semantic analysis (ii) Pragmatic processing **04**
- (c) Explain the seven characteristics to analyze a problem. Analyze the game of ‘8-puzzle’ based on these characteristics. **07**

- Q.2**
- (a) What is a Production system? Explain its components. **03**
- (b) Write the algorithm for ‘Steepest Ascent Hill Climbing’ and explain its steps using a suitable example. **04**
- (c) Solve the following cryptarithmic problem. Every letter must be assigned a unique digit between 0 and 9, so that the answer to the problem is correct: **07**

$$\begin{array}{rcccccc}
 & & & H & O & W & \\
 + & & M & U & C & H & \\
 \hline
 = & P & O & W & E & R &
 \end{array}$$

OR

- (c) Explain Semantic Nets and Frames using a suitable example. **07**

- Q.3**
- (a) Define the term “Iterative Deepening” in the context of game trees. **03**
- (b) Briefly explain Forward and Backward reasoning. Also explain the factors that affect our choice of Forward versus Backward reasoning during problem solving. **04**
- (c) Enlist and explain the limitations of ‘Hill Climbing’ technique. Also explain how these limitations can be overcome. **07**

OR

- Q.3**
- (a) Explain the purpose of the ‘Turing Test’. How is it conducted? **03**
- (b) Give differences between ‘Breadth First Search’ and ‘Best First Search’. **04**
- (c) Explain the Minimax Algorithm with alpha-beta cutoffs using a suitable example. **07**

- Q.4**
- (a) Define the term “heuristic”. **03**
- (b) Translate the following statements to formulas in Predicate Logic: **04**
- i) All integers are numbers
 - ii) Some integers are even and some integers are odd
 - iii) 4 is even
 - iv) If an integer is not even then it is odd
- (c) State the Bayes’ theorem of probability. Explain inference in Bayesian Networks with the help of a suitable example. **07**

OR

- Q.4** (a) What is ‘understanding’? Enlist the major factors that making understanding hard. **03**
(b) Explain the difference between fuzzy and crisp set membership using a suitable example. **04**
(c) Discuss the following issues in knowledge representation: **07**
i) Representing hierarchical relation among attributes
ii) Choosing the granularity of a representation

- Q.5** (a) Discuss important features of Prolog programming language. **03**
(b) Write a Prolog program to reverse a List of integers. **04**
(c) What is ‘monotonicity’? Discuss the key issues addressed by non-monotonic reasoning. **07**

OR

- Q.5** (a) Explain the use of ‘cut’ predicate in Prolog. **03**
(b) Write a Prolog program to find the factorial of a number. **04**
(c) Write a short note on Recurrent Networks. **07**
