

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VIII (OLD) - EXAMINATION – SUMMER 2017****Subject Code:180703****Date:04/05/2017****Subject Name: Artificial Intelligence (Department Elective - II)****Time:10:30 AM to 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain the “Turing test”. Discuss its significance as a criteria for success of an intelligent machine. **07**
- (b) Define “Heuristic Search”. Explain the steps in “Best First Search” and illustrate it using a suitable example. **07**
- Q.2** (a) Consider the Water Jug problem as stated here: “You are given two jugs, a 4-gallon one and a 3-gallon one. Neither has any measuring markers on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 gallons of water into the 4-gallon jug?”  
Represent this as a problem in State Space Search and state its Production Rules. Show at least one solution to this problem. **07**
- (b) Write a Prolog program that verifies whether an input list is a palindrome. **07**  
Hint: Goal: palindrome([r,a,c,e,c,a,r])  
Output: Yes  
Goal: palindrome([a,b,c])  
Output: No
- OR**
- (b) Write a Prolog program to find: the last element and the  $n^{\text{th}}$  element (where ‘n’ indicates position), of an input integer list. **07**  
Hint: Goal: last\_element([1, 2, 3, 8, 9], X)  
Output: X = 9  
Goal: nth\_element([1, 2, 3, 8, 9], 4, X) (Here, n = 4)  
Output: X = 8
- Q.3** (a) Consider the following sentences:
- Tennis is a game. Chess is a game.
  - John and Steve are students.
  - John plays Tennis.
  - Steve plays everything that John plays.
  - Students who play Tennis, do not play Chess.
- (i) Translate the above sentences into formulas in Predicate logic **03**
- (ii) Prove using resolution that “Steve does not play Chess” **04**
- (b) Explain the situations under which Hill Climbing may fail to find a solution. What can be done to overcome these situations? **07**
- OR**
- Q.3** (a) What are the limitations of Propositional Logic? Explain how they can be overcome using Predicate logic. **07**
- (b) Compare Forward versus Backward Reasoning. Explain how Prolog uses backward reasoning to reach a solution. **07**

- Q.4** (a) What features of natural language make it difficult to process using computing systems? Enlist and briefly explain the steps in Natural Language Processing. **07**  
(b) Explain the properties that a good knowledge representation system should possess. **07**
- OR**
- Q.4** (a) Explain the procedure to develop an Expert System. **07**  
(b) Use a suitable example to depict the property of “Inheritance” in both Semantic Networks and Frames. **07**
- Q.5** (a) Write a short note on “Applications of Artificial Neural Networks”. **07**  
(b) Explain Game Playing using the Minimax Procedure. **07**
- OR**
- Q.5** (a) State the Bayes’ theorem. Illustrate how a Bayesian Network can be used to represent causality relationship among attributes. **07**  
(b) What is non-monotonic reasoning? Briefly explain the key issues addressed by non-monotonic reasoning systems. **07**

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