

**GUJARAT TECHNOLOGICAL UNIVERSITY****MCA - SEMESTER– I EXAMINATION – WINTER 2019****Subject Code: 3610003****Date: 23/12/2019****Subject Name: Program Design techniques****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 following terms. **07**
- 1) Algorithm
  - 2) Data structure
  - 3) Program
  - 4) Array referencing
  - 5) Linear search
  - 6) Order notation
  - 7) Dynamic programming
- (b)** What are the qualities and capabilities of good algorithm? Define efficient algorithm. **07**
- Q.2 (a)** Explain Top-Down design strategy. **07**
- (b)** Given some integer X, compute the value of  $X^n$  where n is a positive integer considerably greater than 1. **07**
- OR**
- (b)** Define recursion. Explain the types of recursive algorithms. **07**
- Q.3 (a)** Write and explain algorithm to exchange the values of given two variables a and b. **07**
- (b)** Design an algorithm to rearrange the elements in an array so that they appear in reverse order. **07**
- OR**
- Q.3 (a)** Design an algorithm that reads n numbers and makes a count of the number of positives and number of negatives and number of zeros in the list. **07**
- (b)** Given a number n, devise an algorithm to compute its square root. **07**
- Q.4 (a)** For a given n, design an algorithm to compute n factorial (n!). **07**
- (b)** Design an algorithm to convert octal numbers to decimal. **07**
- OR**
- Q.4 (a)** Which points should be considered for constructing loops? **07**
- (b)** Write an algorithm to generate and print the first n terms of the following sequence 1 2 4 8 16 32 64 .... (without using multiplication) **07**
- Q.5 (a)** Design and implement hash search algorithm. **07**
- (b)** Design an algorithm to find the minimum number in a set and the position where it first occurs. **07**
- OR**
- Q.5 (a)** Design and implement binary search algorithm. **07**
- (b)** Design an algorithm to establish all the primes in the first n positive integers. The first few primes are: 2 3 5 7 11 13 17 19 23 29 ... **07**

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