DARSHAN INSTITUTE OF ENGINEERING AND TECHNOLOGY, RAJKOT

GTU Mid-Sem - 1 Examination, August, 2017

B.E. Sem.- V (Computer Engineering)

Enroll. No.:_____

Subject: Analysis and Design of Algorithms (2150703) **Date: 08/08/2017**

Time : 08:00 a.m. to 10:00 a.m. **Total Marks : 50**

Instructions: 1. Attempt all questions
2. Assume suitable data if necessary
3. Figure to the right indicate full marks

Q – 1 Answer Following Questions. **06**

(a) Define algorithm. Enlist different types of algorithm.

(b) Write Principal of invariance.

(c) Time complexity of _____ is in linear time.
(a) Bubble sort (b) Radix sort (c) Shell sort (d) Selection sort

(d) What is amortized analysis. List out the methods of amortized analysis.

(e) Solve following recurrence using master method $T(n) = 4T(n/2) + n^3$

(f) Define Feasible Solution.

Q – 2 Answer any four questions out of five. **16**

(a) Why do we use asymptotic notations in the study of algorithms? Briefly describe the commonly used asymptotic notations.

(b) Explain multiplying large integer problem for multiplying 789 X 3124.

(C) Solve the given recurrence using recurrence tree $T(n)= T(n/4) + T(n/2) + n^2$

(d) Apply counting sort the following numbers to sort in ascending order. **5, 2, 0, 5, 4, 1, 3, 1, 3**.

(e) Explain the use of Divide and Conquer Technique for Binary Search Method. What is the complexity of Binary Search Method?

Q-3 Answer any four questions out of five. **28**

(a) Write an algorithm of Quick Sort Method and sort given numbers using the algorithm. **2, 8, 7, 1, 3, 5, 6, 4**. Derive its best, average and worst case time complexity.

(b) Sort the given elements with Heap Sort Method: **20, 50, 30, 75, 90, 60, 25, 10, 40**.

(c) Let T[1.. n] be a sorted array of distinct integers, some of which may be negative. Give an algorithm that can find an index i such that $1 < i < n$ and $T[i]= i$, provided such an index exists. Your algorithm should take a time in O(log n) in the worst case.

(d) Explain Selection Sort Algorithm. Derive its best case, worst case and average case time complexity.

(e) Discuss insertion sort algorithm with its time complexity. Support your answer with suitable example.