

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VIII • EXAMINATION – WINTER • 2014****Subject Code: 181604****Date: 25-11-2014****Subject Name: Design and Analysis of Algorithm****Time: 02:30 pm - 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.

- Q.1** (a) Explain all asymptotic notations used in algorithm analysis. **07**
 (b) Using step count method analyze the time complexity when two $m \times n$ matrices are added. **07**

- Q.2** (a) What is divide and conquer technique? Apply this method to find multiplication of integers 2101 and 1130. **07**
 (b) Sort the letter of the word “EXAMPLE” in alphabetical order using insertion sort. **07**

OR

- (b) Explain merge sort problem using divide and conquer technique. Give an example. **07**
- Q.3** (a) Devise an algorithm to make a change for 1655 using the greedy strategy. The coins available are {1000, 500, 100, 50, 20, 10, 5}. **07**
 (b) What is an amortized analysis? Explain potential method of amortized analysis using suitable example. **07**

OR

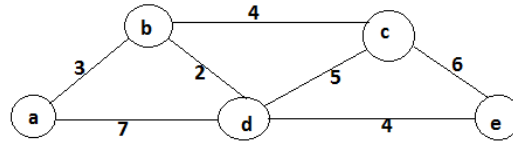
- Q.3** (a) Give the algorithm for Depth First Search of a Graph. Also define “Articulation Point” of the graph and explain how to find it. **07**
 (b) Write the Quick sort algorithm. Trace the same on data set: 5, 3, 1, 9, 8, 2, 4, 7. **07**
- Q.4** (a) Solve the following knapsack problem with the given capacity $W=5$ using dynamic programming. **07**

Item	Weight	Value
1	2	\$12
2	1	\$10
3	3	\$20
4	2	\$15

- (b) Using greedy algorithm find an optimal schedule for following jobs with $n=5$ profits: $(P_1, P_2, P_3, P_4, P_5) = (3, 5, 18, 20, 38)$ and deadline $:(d_1, d_2, d_3, d_4, d_5) = (1, 3, 3, 4, 1)$ **07**

OR

- Q.4** (a) Write Dijkstra's algorithm and apply the same to find single source shortest path problem for the following graph taking vertex 'a' as a source. **07**



- (b) Using algorithm determine an Longest Common Sequence of S1="abbacdcb" S2="bcdbbcaac" (use dynamic programming). **07**
- Q.5** (a) What is the central principle of back tracking? Taking n-queens problem as an example, explain the solution process. **07**
- (b) What is polynomially Turing reducible problem? Explain with example how problem A can be polynomially Turing reduced to problem B. **07**

OR

- Q.5** (a) Explain with example how backtracking algorithm is useful in solving Hamilton cycle problem. **07**
- (b) With an example, explain how the branch and bound technique is used to solve 0/1 knapsack problem. **07**
