Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII EXAMINATION – WINTER 2015

Subject Code:181604 **Date:12/12/2015**

Subject Name: Design and Analysis of Algorithm

Time: 2:30pm to 5:00pm **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 Insertion sort algorithm. Derive the algorithmic complexity in Best case, worst case and Average case analysis. **07**

(b) **Define:** **07**
(1) Algorithm (2) Principle of Optimality (3) Articulation Point (4) Optimal Substructure property (5) Directed Acyclic Graph (6) P and NP Problems (7) "minimax" principle

Q.2 **(a)** Explain master theorem and solve the following recurrence equation with master method **07**

1. $T(n)= 8T(n/2) + n$
2. $T(n)= 6T(n/4) + n^2 \log n$

(b) What is divide and conquer technique? Apply this method to find multiplication of integers 3945 and 1224. **07**

OR

(b) Sort the following list using quick sort algorithm: <80, 55, 43, 25, 65, 98, 59, 77, 15, 31, 48, 94> Also discuss worst and best case of quick sort algorithm. **07**

Q.3 **(a)** Explain Binary search algorithm with divide and conquer strategy and use the recurrence tree to show that the solution to the binary search recurrence relation is $\Theta(\log n)$. **07**

(b) Give the properties of Heap Tree. Sort the following data with Heap Sort Method: 65, 75, 5, 55, 25, 30, 90, 45, 80. **07**

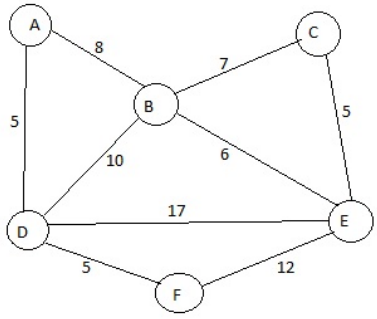
OR

Q.3 **(a)** Solve the following Knapsack Problem using Greedy Algorithm The capacity of knapsack is W=18 **07**

Items	1	2	3	4	5	6	7	8
Weights	5	2	3	6	4	2	3	2
Value	20	6	14	18	16	6	3	4

(b) Using greedy algorithm find an optimal schedule for following jobs with n=6 profits: (P1,P2,P3,P4,P5,P6) = (4,6,20,25,8,18) and deadline :(d1,d2,d3,d4,d5,d6) = (1,3,3,4,1,2) **07**

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 dynamic programming find an optimal parenthesization of a matrix chain product whose sequence of dimension is ⟨13,5,89,3,34⟩	**07**

OR

Q.4	**(a)**	Using dynamic programming algorithm determine an Longest Common Sequence of S1=”wxxwyzyx” and S2=”xyzxxywwz”.	**07**
	(b)	Describe an assembly line scheduling problem and give dynamic programming algorithm to solve it.	**07**
Q.5	**(a)**	Discuss how 8-queen problem can be solved using backtracking.	**07**
	(b)	Explain finite automata for string matching.	**07**

OR

Q.5	**(a)**	Explain Backtracking with Knapsack problem.	**07**
	(b)	Explain use of Branch & Bound Technique for solving Assignment Problem.	**07**

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