Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – VIII.EXAMINATION – WINTER 2016

Subject Code: 181604 Date: 22/10/2016

Subject Name: Design and Analysis of Algorithm (Department Elective - II)

Time: 02:30 PM to 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)**	What do you mean by performance analysis of an algorithm? Explain average case and worst case analysis with the help of suitable example.	**07**
	(b)	Define Time Complexity and Space Complexity. Why we are generally concerned with Time Complexities than Space Complexities? What is a major contributor for inefficiency of a loop? What will be theta notation for: $4n^3+5n+6$?	**07**
Q.2	**(a)**	Define an amortized analysis. Briefly explain its different techniques. Carry out aggregate analysis for the problem of implementing a k-bit binary counter that counts upward from 0.	**07**
	(b)	Sort the letters of word "DESIGN" in alphabetical order using Insertion sort algorithm.	**07**
		OR	
	(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**
Q.3	**(a)**	Explain Dijkstra's algorithm to find minimum distance of all nodes from a given node. (Greedy algorithm)	**07**
	(b)	Solve following knapsack problem using dynamic programming algorithm with given capacity W=5,Weight and Value are as follows : (2, 12), (1, 10), (3, 20), (2, 15).	**07**
		OR	
Q.3	**(a)**	What is a fractional knapsack problem? Design and analyze greedy algorithm to solve it.	**07**
	(b)	Solve Making Change problem using Dynamic Programming. (denominations: d1=1, d2=4, d3=6). Give your answer for making change of Rs. 8.	**07**
Q.4	**(a)**	Using greedy algorithm find an optimal schedule for following jobs with n=5 profits: (P1,P2,P3,P4,P5) = (3,5,18,20,38) and deadline :(d1,d2,d3,d4,d5) = (1,3,3,4,1)	**07**
	(b)	Compute Matrix chain order for the following matrices, A1 (5 X 4) , A2 (4 X 6) , A3 (6 X 2), A4 (2 X 7)	**07**
		OR	
Q.4	**(a)**	Develop an algorithm and program (recursive function) to calculate the GCD of two integers using Top-Down Design. Analyze the algorithm.	**07**
	(b)	Using algorithm determine an Longest Common Sequence of S1="abbacdcba" S2="bcdbbcaac" (use dynamic programming).	**07**
Q.5	**(a)**	Give the important properties of relation and also solve 8 – queen's problem for a feasible sequence (6, 4,7, 1)	**07**
	(b)	With an example, explain how the branch and bound technique is used to solve 0/1 knapsack problem.	**07**

OR

Q.5	**(a)**	What is polynomially Turing reducible problem? Explain with example how problem A can be polynomially Turing reduced to problem B.	**07**
	(b)	Explain with example how backtracking algorithm is useful in solving Hamilton cycle problem.	**07**

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