Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) - EXAMINATION – SUMMER 2018

Subject Code:2150703 Date:04/05/2018

Subject Name:Analysis and Design of Algorithms

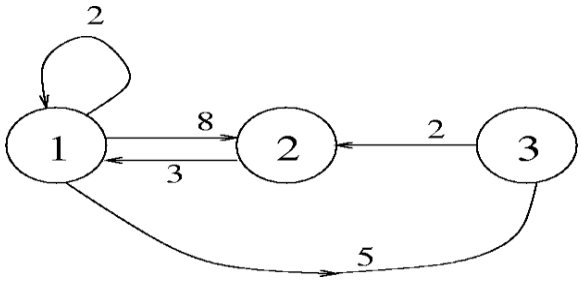
Time:02:30 PM to 05:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

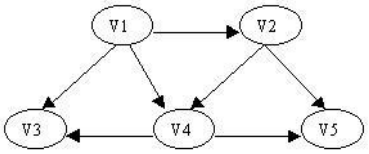
Q.1	**(a)**	Define Algorithm. Discuss key characteristics of algorithm.	**03**
	(b)	Prove or disprove that f(n) = 1 + 2 + 3 + ... + n ∈ Θ(n^2).	**04**
	(c)	Which are the basic steps of counting sort? Write counting sort algorithm. Derive its time complexity in worst case.	**07**
Q.2	**(a)**	What are the advantages of dynamic programming method over devide-&-conquer method?	**03**
	(b)	Solve following recurrence using recursion tree method: T(n) = 3T(n/3) + n^3.	**04**
	(c)	Write standard(conventional) algorithm and Strassen's algorithm for matrix multiplication problem. What is the recurrence for Strassen's algorithm? Solve it using master method to derive time complexity of Strassen's algorithm.	**07**
		OR	
	(c)	Discuss best case, average case and worst case time complexity of quick sort.	**07**
Q.3	**(a)**	Justify with example that shortest path problem satisfies the principle of optimality.	**03**
	(b)	Which are the three basic steps of the development of the dynamic programming algorithm? Mention any two examples of dynamic programming that we are using in real life.	**04**
	(c)	Solve the following making change problem using dynamic programming method: Amount = Rs. 7 and Denominations: (Rs. 1, Rs. 2 and Rs. 4)	**07**
		OR	
Q.3	**(a)**	Justify with example that longest path problem does not satisfy the principle of optimality.	**03**
	(b)	Discuss general characteristics of greedy method. Mention any two examples of greedy method that we are using in real life.	**04**

(c) Solve all pair shortest path problem for the following graph using Floyd's algorithm. **07**



Q.4 **(a)** What are the disadvantages of greedy method over dynamic programming method? **03**

(b) What is DFS? Explain with example. Show the ordering of vertices produced by Topological-sort for the following graph. **04**



(c) Solve the following Knapsack Problem using greedy method. Number of items = 5, knapsack capacity W = 100, weight vector = {50, 40, 30, 20, 10} and profit vector = {1, 2, 3, 4, 5}. **07**

OR

Q.4 **(a)** Write an algorithm for Huffman code. **03**

(b) What is an approximation algorithm? Explain performance ratio for approximation algorithm. **04**

(c) Explain use of branch and bound technique for solving assignment problem. **07**

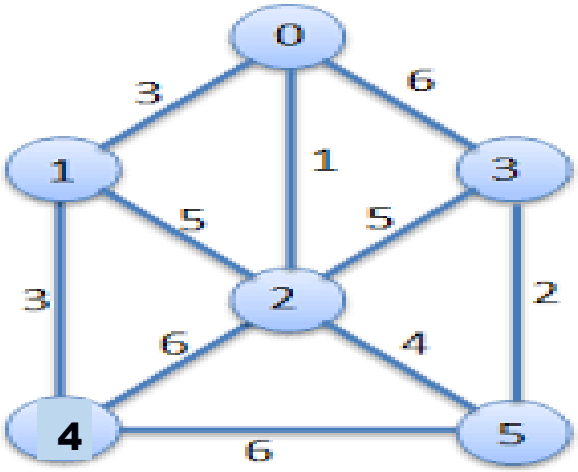
Q.5 **(a)** Write Naive string-matching algorithm. Explain notations used in the algorithm. **03**

(b) Explain polynomial-time reduction algorithm. **04**

(c) Working modulo q = 11. How many spurious hits does the Rabin-Karp matcher encounter in the text T = 3141592653589793 when looking for the pattern P =26? **07**

OR

Q.5	**(a)**	Which are the three major concepts used to show that a problem is an NP-Complete problem?	**03**
	(b)	Explain breadth first search with example.	**04**
	(c)	Find minimum spanning tree for the following undirected weighted graph using Kruskal's algorithm.	**07**



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