Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058, India

(Autonomous College Affiliated to University of Mumbai)

Mid Semester Examination

March 2019

Max. Marks: 20 Duration: 60Mins

Class: S.E COMP/IT Semester: IV

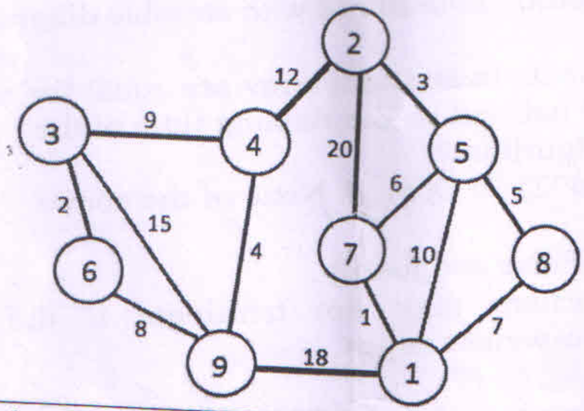
Course Code:CE41/IT41 Branch:Computer/IT

Name of the Course: Design and Analysis of algorithms

Instruction:

(1) All questions are compulsory.
(2) Draw neat diagrams.
(3) Assume suitable data if necessary.

Q No.		Max. Marks	CO
Q.1	1.Define Asymptotic notation **Ω** with suitable diagram.	1	CO1
	2.If all the elements in an input array are equal for example {5,5,5,5,5,5}, What will be the running time of the Insertion sort algorithm? a. $O(2^n)$ b. O(n^2) c. O(n) d. None of the above	1	CO1
	3. State True or False and justify. Dijkstra's algorithm may not terminate if the graph contains negative-weight edges.	1	CO4
	4. What is the time complexity of Huffman Coding? a O(n) b. O(n log n) c.$O(n (\log n)^2)$ d.$O(n^2)$	1	CO4
	5. Strassen's algorithm needs _____ number of multiplications to multiply two 2×2 matrices. a. 8 b.9 c.7 d.3	1	CO2
Q.2	Solve the following recurrence equation using recursion tree method. $T(n) = T(n/3) + T(2n/3) + O(n)$. OR State all the cases of master theorem and solve the following recurrence using master method and justify. i. $T(n) = 2T(n/2) + n2$ ii. $T(n) = T(n/2) + n(2 - \cos n)$	5 5	CO1 CO1

Q.3	Apply suitable algorithmic strategy to solve given problem. A thief enters a house for robbing it. He can carry a maximal weight of 60 kg into his bag. There are 5 items in the house with the following weights and values. What items should thief take if he can even take the fraction of any item with him, to maximize profit. (w1, w2, w3, w4, w5) = (5, 10, 15, 22, 25) (p1, p2, p3, p4, p5) = (30, 40, 45, 77, 90).	5	
	OR		
	Solve the following problem to obtain minimum spanning tree using Prim's algorithm. Show all intermediate steps. And state the time complexity of prims algorithm. **Consider node number 1 as start vertex.** 	5	CO4
Q.4	Analyze the time complexity of Quicksort for all cases by specifying recurrence equations and justify it.	5	CO2