Sardar Patel Institute of Technology

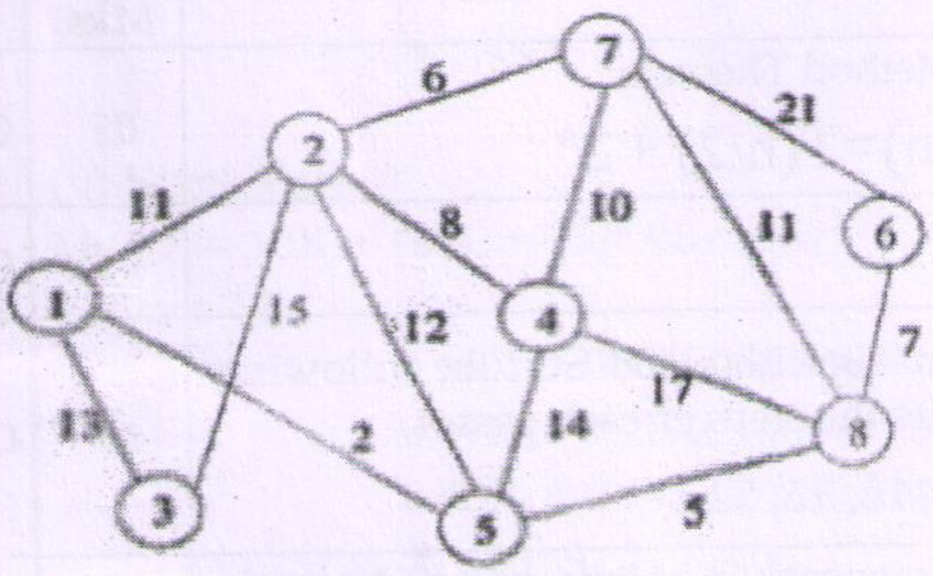
Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous College Affiliated to University of Mumbai)

RE-Examination
July 2019

Max. Marks: 100 | **Duration: 3 Hrs**
Class: S.E. | **Semester: IV**
Course Code: CE41 | **Branch: COMP**
Name of the Course: Design And Analysis of Algorithm

Instructions:
(1) All Questions are Compulsory
(2) Draw neat diagrams
(3) Assume suitable data if necessary

Question No.	Question	Max. Mks	CO
Q1 a)	Solve the given recurrence using Master Method Theorem: i) $T(n)= 3T(n/2) + n^2$ ii) $T(n)=T(n/2) + 2^n$	*05*	**CO1**
Q1 b)	Write a short note on Growth Function.	*05*	**CO1**
Q1 c)	Derive the time complexity of Merge Sort algorithm and Sort the following elements using Merge Sort Algorithm. Show the steps of each passes. 85, 36, 87, 10, 91, 18, 15, 52	*10*	**CO2**
Q2 a)	A Knapsack Capacity is 5. Solve the knapsack problem using Dynamic Programming approach and find the maximum profit that can be obtained. The weights and values of five objects are as follows: Item No. 1 2 3 4 Weight 3 2 4 1 Value 100 20 66 40 **OR** Apply Dynamic programming approach to solve Traveling Sales Persons problem for the given instance of cost matrix 0 11 10 9 8 0 7 3 8 4 0 4 11 10 5 0	*10*	**CO3**
Q2 b)	Find Longest Common Subsequence using Dynamic Programming Approach of the following two strings: Y="ABBCCDB" X="ABCDBCA"	*10*	**CO3**

Q3 a)	Write a backtracking algorithm for N Queen Problem. Draw portion of state space tree that is generated to find all possible solution for 4 Queen.	***10***	**CO5**
Q3 b)	Explain Huffman code algorithm. Derive the Huffman code for the following set of frequencies based on the first 8 fibonacci numbers a=1 b=1 c=2 d=3 e=5 f=8 g=13 h=21 **OR** Compute Minimum Cost spanning tree using Prim's Algorithm for the given graph, show each step graphically and also derive its time complexity.  	***10***	**CO4**
Q4 a)	Write a backtracking algorithm for sum of subset problem. Draw portion of state space tree that is generated to find all possible subsets of w that sum to m using the algorithm for the given problem. n=7, w= {5, 7, 10, 12, 15, 18, 20}, m=35 **OR** State how to check whether the given instance of 15-puzzle is solvable or not? If the puzzle is solvable then use Least Cost Branch and Bound to solve the given instance and draw the portion of state space tree for 15 puzzle. Show cost function calculation of each node generated 1 2 3 4 5 6 8 9 10 7 11 13 14 15 12	***10***	**CO5**

Q4 b)	Consider working module q=11, how many spurious hits does the Rabin-Karp Matcher counter in the text T=31415926535 when looking for the pattern P=26. Show each step of solution.	***10***	**CO5**
Q5a)	Solve the following linear program using SIMPLEX: maximize $z=12x_1 + 16x_2$ subject to $10x_1+ 20x_2 \leq 120$ $8x_1+ 8x_2 \leq 80$ x_1 and $x_2 \geq 0$.	***10***	**CO6**
Q5 b)	Logo-motion is a sports apparel firm that manufactures jackets, hats, sweat outfits, and T-shirts for college and professional athletic teams. It has contracted with the State University Bookstore for two types of logo jackets, a deluxe jacket and a regular jacket. The deluxe jacket is heavier, with more pockets, a nicer lining, and an embroidered school name and logo. The regular jacket has sewn-on prefabricated logos and lettering. The major steps in the manufacture of these jackets are cutting the material, sewing, and decorating with embroidery or sewn-on items. The following table shows the resource requirements for each type of jacket and total weekly availability of resources.		

School Jacket	Cutting (hr.)	Sewing (hr.)	Decoration (hr.)	Profit($)
Deluxe	0.16	0.47	0.40	18
Regular	0.15	0.28	0.14	12
Resource Availability	40.00	80.00	55.00	

i) Formulate a linear programming (LP) model to determine how many deluxe and regular jackets the company should produce in order to maximize profit.	***05***	**CO6**
ii) Write the LP model derived in (i) into slack form.	***02***	
iii) Convert the given LP Primal Problem into Dual Problem	***03***	
OR		
Explain how to convert Linear Primal problem into Dual Problem. Give one example and convert it into Dual form	***10***	