RAMRAO ADIK INSTITUTE OF TECHNOLOGY, NERUL

(D Y Patil Deemed to be University)

Program: SE (DYPU)
End Semester Examination: B.Tech. Semester IV
Course Code: CEC405 Course Name: Design and Analysis of Algorithm
Time: 2 hours
Max. Marks: 60

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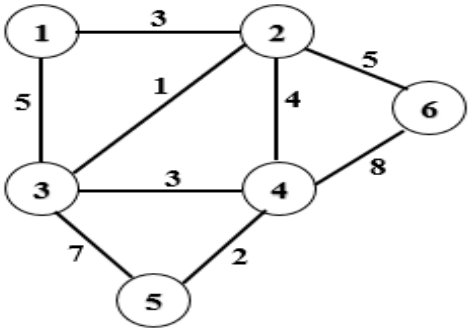
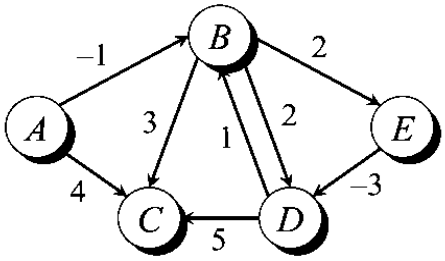
Instructions: 1. All three questions are compulsory

Que. No.	Question	Max. Marks	CO	BT
Q1	Solve any **Four**			
i)	Solve given recurrence relations applying master method. 1) $T(n) = 8T(n/4) + n^{3/2}$ 2) $T(n) = 3T(n/4) + n \log n$	5	**CO1**	**BT3**
ii)	Write binary search algorithm and prove that worst case time complexity is O (log n).	5	**CO2**	**BT4**
iii)	Explain greedy approach in detail and differentiate between Prim's and Kruskal's minimum spanning tree algorithm.	5	**CO3**	**BT4**
iv)	Given two sequences, calculate the length of longest subsequence present in both of them and print LCS. **String 1:**10010 **String 2:**01011	5	**CO4**	**BT3**
v)	Find the given pattern in the text by applying naïve string matching algorithm and specify the position of the pattern. **Text :**baabbab **Pattern :**ab	5	**CO5**	**BT3**
vi)	Compare NP-hard and NP-complete problem.	5	**CO6**	**BT4**

Que. No.	Question	Max. Marks	CO	BT
Q2 A	Solve any **Two**			
i)	Explain why analysis of algorithms is important? Define time and space complexity. Arrange the following growth rate in increasing order of complexity: n^3 , 1, n^2, nlog(n), n^2log(n), log(n), $n^{0.5}$	5	**CO1**	**BT3**
ii)	Consider the following array: 50, 23, 9, 18, 61, 32 Sort this array in the most efficient manner using Quick sort.	5	**CO2**	**BT3**
iii)	Find an optimal solution for following knapsack problem by applying Greedy Approach. Number of objects n=4, Knapsack capacity M=5, Weights (W_1, W_2, W_3, W_4)=(2, 2,4,5) and Profits (P_1, P_2, P_3, P_4)=(3,4,5,6).	5	**CO3**	**BT3**
iv)	Prove Travelling Salesman Problem to NP Complete Problem.	5	**CO6**	**BT4**

Q 2 B	Solve any **One**			
i)	Calculate single source shortest path of the given graph from vertex 1 to vertex 5 using Dijkstra's algorithm. 	10	**CO3**	**BT4**
ii)	Solve the TSP problem to find optimal tour cost using Dynamic programming where the edge lengths are given as,	10	**CO4**	**BT3**

0	9	8	8
12	0	13	6
10	9	0	5
20	15	10	0

Que. No.	Question	Max. Marks	CO	BT
Q3	Solve any **Two**			
i)	Define 15 Puzzle problem. Explain how branch and bound strategy can be used to solve 15-puzzle problem with example.	10	**CO5**	**BT2**
ii)	Apply dynamic programming approach and calculate single source shortest path for the given graph from vertex A. 	10	**CO4**	**BT4**
iii)	Explain Graph coloring problem using backtracking approach. Write an algorithm for same.	10	**CO5**	**BT3**

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Course Outcomes (CO) -Learner will be able to:

CO1 : Analyze the running time and space complexity of algorithms.
CO2 : Describe, apply and analyze the complexity of divide and conquer strategy.
CO3 : Describe, apply and analyze the complexity of greedy strategy.
CO4 : Describe, apply and analyze the complexity of dynamic programming strategy.
CO5 : Explain and apply backtracking, branch and bound and string-matching techniques to deal with some hard problems.
CO6 : Describe the classes P, NP, and NP-Complete and be able to prove that a certain problem is NP-Complete.

BT1- Remembering, BT2- Understanding, BT3- Applying, BT4- Analyzing, BT5- Evaluating, BT6- Creating