BACHELOR OF TECHNOLOGY (C.B.C.S.) (2014 COURSE)
B.Tech.Sem - VI COMPUTER :SUMMER- 2022
SUBJECT : DESIGN & ANALYSIS OF ALGORITHMS

Day : Wednesday
Date : 15-06-2022

S-13658-2022

Time : 02:30 PM-05:30 PM
Max. Marks : 60

N.B.:
1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Answer suitable data if necessary.

Q.1 **a)** Use step count method to analyze the time complexity when two n x n order matrices are added. **(05)**

b) Describe the role of space complexity and time complexity in algorithm analysis. **(05)**

OR

Q.1 **a)** State the features of an efficient algorithm with an example. **(05)**

b) Design an algorithm to find the sum of individual digits for any given number. **(05)**

Q.2 What you meant by 'Heapify'? Sort the following list using heap sort 23, 1, 92, 6, 12, 14, 40, 44, 20, 21. **(10)**

OR

Q.2 **a)** Compute the time complexity for a non-recursive post-order traversal of Binary Search Tree (BST). **(05)**

b) Write an algorithm to implement stack using linked list **(05)**

Q.3 **a)** Design an algorithm for finding minimum and maximum among the list of 'n' natural numbers and compute time complexity. **(05)**

b) Show the steps in merge sort to arrange following data in non-decreasing order 12, 24, 8, 71, 4, 2, 14, 40, 44, 20, 21. **(05)**

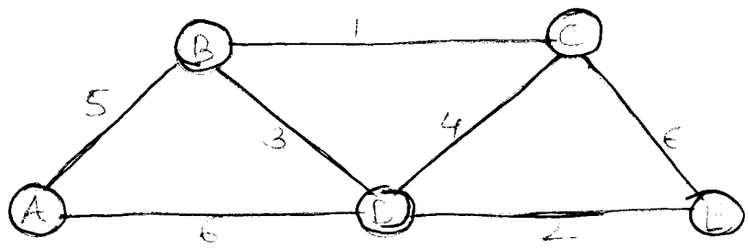
OR

Q.3 **a)** Justify that divide and conquer strategy is used to search an element from the list of 'N' numbers using binary search? **(05)**

b) Write Strassen's matrix multiplication algorithm and apply it on any two matrices. **(05)**

P.T.O.

Q.4 What is minimum cost spanning tree? Apply Kruskal's algorithm to find minimum cost spanning tree for following the graph. **(10)**



OR

Q.4 a) Discuss the greedy strategy and Solve the following instance of 0/1 Knapsack problem. **(10)**

Item	Weight	Profit	
1	5	40	
2	7	35	
3	2	18	W=15
4	4	4	
5	5	10	
6	1	2	

OR

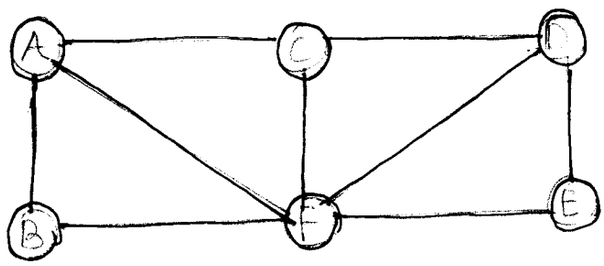
Q.5 a) Explain how 15-puzzle is solved by Branch and Bound strategy. **(05)**

b) Give all possible solutions for 8-Queens problem using backtracking. **(05)**

OR

Q.5 a) Given n=4 and m=3, solve the graph coloring problem and represent solution using state space tree. **(05)**

b) What is Hamiltonian cycle? Find out Hamiltonian cycles in following graph: **(05)**



Q.6 a) Illustrate how NP-Hard problems are different from NP-Complete. **(05)**

b) Elaborate Cook's theorem. **(05)**

OR

Q.6 a) Enlist the NP-Hard class problems and explain one in detail **(05)**

b) Write a short note on approximation problems. **(05)**

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