CBCS SCHEME

USN | | | | | | | | | | | **17CS43**

Fourth Semester B.E. Degree Examination, Feb./Mar. 2022
Design and Analysis of Algorithms

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain orders of growth for large input size and write values of following functions for analysis of algorithms:
$\text{Log}_2\, n$, n, n^2, n^3, 2^n, n! **(10 Marks)**

b. Explain asymptotic notations of algorithms with graph. **(06 Marks)**

c. Define space complexity of algorithms with example. **(04 Marks)**

OR

2 a. Write general plan for analyzing time efficiency of non-recursive algorithms and find the running time of matrix multiplication algorithm. **(10 Marks)**

b. Write short note on stacks, queues, graphs trees and sets. **(10 Marks)**

Module-2

3 a. Define divide and conquer technique and write steps to search the number 14 in the following sequence using binary search algorithm:
74, 32, 18, 12, 76, 14, 23, 28, 10 **(10 Marks)**

b. Sort the following numbers using Quick sort algorithm:
54, 26, 93, 17, 77, 31, 44, 55, 20 **(10 Marks)**

OR

4 a. Solve the following matrix multiplication using Strassen's matrix multiplication method:

$$A = \begin{bmatrix} 3 & 2 \\ 5 & 6 \end{bmatrix} \quad B = \begin{bmatrix} 5 & 6 \\ 1 & 3 \end{bmatrix} \quad C = A \times B$$
(10 Marks)

b. Solve the following topological sorting problem using source removal algorithm. **(05 Marks)**

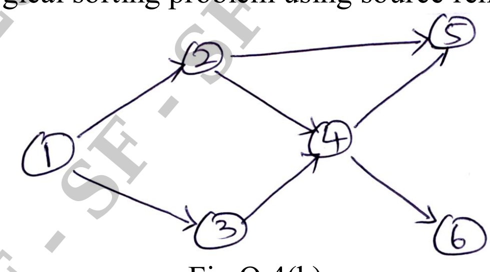

Fig.Q.4(b)

c. Write the MaxMin divide and conquer algorithm. **(05 Marks)**

Module-3

5 a. Solve the following Job sequencing with deadline problem and find the maximum profit:

Jobs	J1	J2	J3	J4	J5	J6	J7	J8	J9
Profit	85	25	16	40	55	19	92	80	15
Deadline	5	4	3	3	4	5	2	3	7

(10 Marks)

b. Construct a Huffman Tree for the following data and obtain its Huffman code:

Character	a	b	c	d	e	f
Frequency	5	9	12	13	16	45

(10 Marks)

OR

6 a. Define minimum cost spanning tree and find the minimum cost spanning tree for the following group using Kruskal's algorithms. **(10 Marks)**

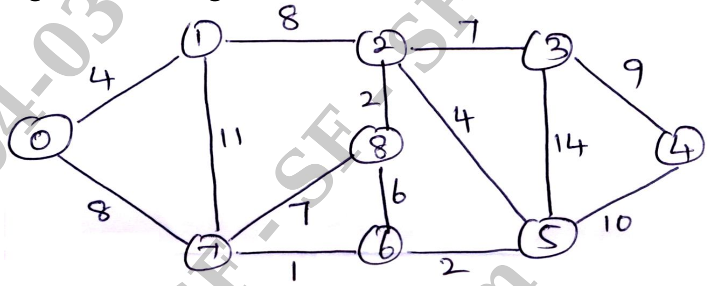

Fig.Q.6(a)

b. Sort the following sequence using Heapsort algorithm:
15, 19, 10, 7, 17, 16 **(10 Marks)**

Module-4

7 a. Find a minimum cost path from s to t in the multistage graph of Fig.Q.7(a), using Dynamic Programming Forward approach. **(10 Marks)**

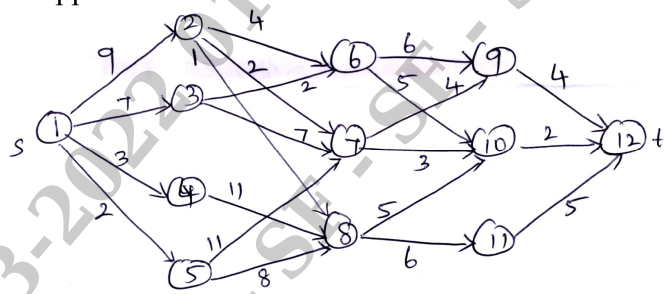

Fig.Q.7(a)

b. Solve the following Knapsack problem using Dynamic programming:
Knapsack capacity W = 5

Item	Weight	Value
1	2	12
2	1	10
3	3	20
4	2	15

(10 Marks)

OR

8 a. Find all pairs shortest path for the following graph using Floyd's algorithm:

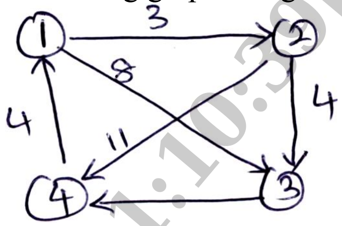

Fig.Q.8(a)

(10 Marks)

b. Find the single source shortest path in the following graph using Bellman Ford algorithm.

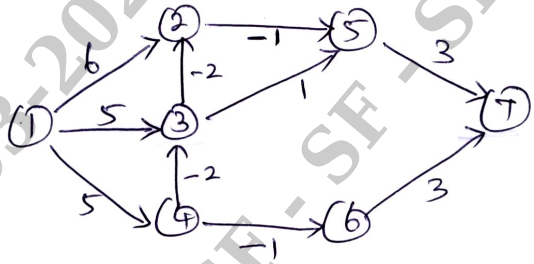

Fig.Q.8(b)

(10 Marks)

Module-5

9 a. Let W = {5, 7, 10, 12, 15, 18, 20} and M = 35 find all the possible subsets of W that sum to M. Apply sum of subset algorithm. **(08 Marks)**

b. Define Backtracking technique. **(02 Marks)**

c. Explain NP-Hard and NP-complete problems. **(10 Marks)**

OR

10 a. Solve the following assignment problem using Branch and Bound technique:

	Job1	Job2	Job3	Job4
Person A	9	2	7	8
Person B	6	4	3	7
Person C	5	8	1	8
Person D	7	6	9	4

(10 Marks)

b. Draw the state-space tree of solving the four queen using Backtracking. **(05 Marks)**

c. Write short note on LC Branch and Bound solutions. **(05 Marks)**

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