CBCS SCHEME

USN | | | | | | | | | | |

18CS42

Fourth Semester B.E. Degree Examination, Jan./Feb. 2023
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 the notion of algorithm. Design Euclid's algorithm for computing GCD (m, n). Find GCD (60, 24) using Euclid's algorithm. **(08 Marks)**

b. If $t_1(n) \in O(g_1(n))$ and $t_2(n) \in O(g_2(n))$, then prove that $t_1(n) + t_2(n) \in O(\max(g_1(n), g_2(n)))$. **(08 Marks)**

c. Distinguish between the two common ways to represent a graph. **(04 Marks)**

OR

2 a. Write an algorithm to find maximum of n elements and obtain its time complexity. **(08 Marks)**

b. Explain general plan of mathematical analysis of recursive algorithms with example. **(08 Marks)**

c. Explain the any four important problem types. **(04 Marks)**

Module-2

3 a. Write merge sort algorithm with example also calculate the efficiency. **(12 Marks)**

b. Discuss Strassen's matrix multiplication. **(08 Marks)**

OR

4 a. Write Quick sort algorithm with example. Also calculate the efficiency. **(12 Marks)**

b. Discuss topological sorting. **(08 Marks)**

Module-3

5 a. Explain Greedy Knapsack problem with example. **(06 Marks)**

b. Write an algorithm for minimum spanning tree using Kruskal's. **(08 Marks)**

c. Explain Heap sort technique. **(06 Marks)**

OR

6 a. Explain Coin change problem with example. **(06 Marks)**

b. Write an algorithm for minimum spanning tree using Prim's. **(08 Marks)**

c. Explain Huffman coding concept. **(06 Marks)**

Module-4

7 a. Explain transitive closure of a directed graph and find the transitive closure for the given graph.

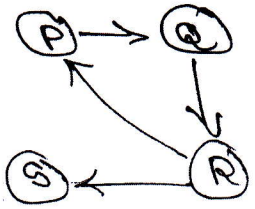

Fig Q7(a) **(10 Marks)**

b. Construct the optimal binary search tree for the following data :

Key	A	B	C	D
Probability	0.1	0.2	0.4	0.3

(10 Marks)

OR

8 a. Solve the following travelling sales person problem using dynamic programming technique.

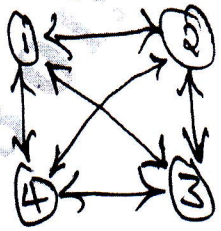

Fig Q8(a) **(10 Marks)**

b. Consider the following instance to solve the Knapsack problem using dynamic programming.

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

W = 5

(10 Marks)

Module-5

9 a. Explain N-Queen problem with example. **(08 Marks)**

b. Solve the following assignment problem using branch and bound technique.

$$C = \begin{array}{c} \begin{matrix} \text{job1} & \text{job2} & \text{job3} & \text{job4} \end{matrix} \\ \begin{bmatrix} 9 & 2 & 7 & 8 \\ 6 & 4 & 3 & 7 \\ 5 & 8 & 1 & 8 \\ 7 & 6 & 9 & 4 \end{bmatrix} \end{array} \begin{matrix} \text{Person a} \\ \text{Person b} \\ \text{Person c} \\ \text{Person d} \end{matrix}$$

(12 Marks)

OR

10 a. Explain Hamiltonian cycles with example. **(08 Marks)**

b. Solve the travelling sales person problem using branch and bound technique.

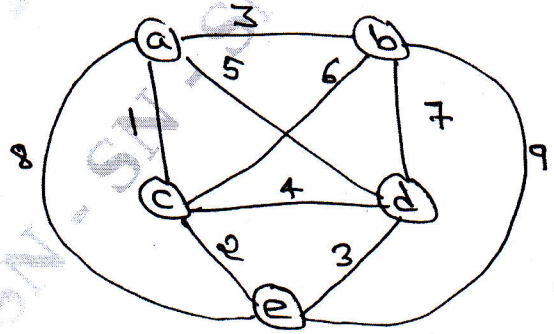

Fig Q10(b) **(12 Marks)**

* * * * *