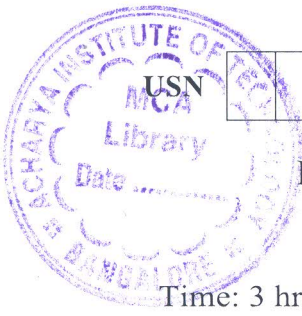


# CBCS SCHEME



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.

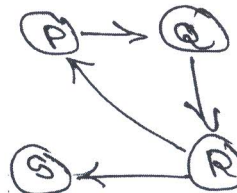


Fig Q7(a)

(10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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.

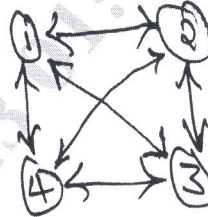


Fig Q8(a)

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

(08 Marks)

	job1	job2	job3	job4	
C =	9	2	7	8	Person a
	6	4	3	7	Person b
	5	8	1	8	Person c
	7	6	9	4	Person d

(12 Marks)

OR

10 a. Explain Hamiltonian cycles with example.  
 b. Solve the travelling sales person problem using branch and bound technique.

(08 Marks)

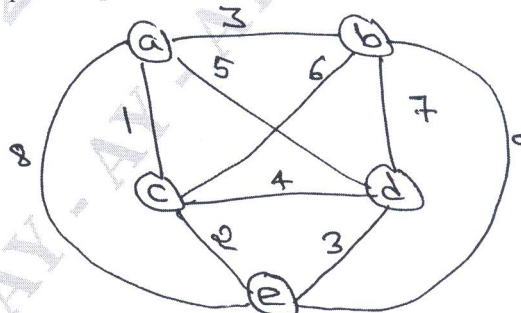


Fig Q10(b)

(12 Marks)

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