

# CBCS SCHEME

USN

1DT211S

21CS42

Fourth Semester B.E. Degree Examination, June/July 2023

## Design & 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 algorithm design and analysis process in detail. (10 Marks)
- b. Explain the asymptotic narrations with example. (10 Marks)

OR

- 2 a. Explain the general plan of mathematical analysis of recursive algorithm with example. (10 Marks)
- b. Design an algorithm to search an element in an array using sequential search. Discuss the Best-case, worst-case and average-case efficiency of this algorithm. (10 Marks)

### Module-2

- 3 a. Explain the concept of Divide and Conquer. Write the recursive algorithm to perform Binary search on the list of elements. (10 Marks)
  - b. Apply Quick sort algorithm to sort the list of characters : P, R, O, G, R, A, M, M, I, N, G. Draw the tree of recursive calls made while tracing. (10 Marks)
- OR
- 4 a. Develop a recursive algorithm to find the minimum and maximum element from the list. Illustrate with an example. (10 Marks)
  - b. Define Topological sorting. Illustrate the topological sorting for the following graph:

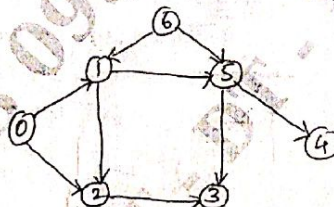


Fig. Q4 (b)

(10 Marks)

### Module-3

- 5 a. Solve the following instance of greedy knapsack problem where  $n = 4$ ,  $m = 10$ ,  $p = \{40, 42, 25, 12\}$  and  $w = \{4, 7, 5, 3\}$ . (10 Marks)
- b. Apply Dijkstra's algorithm to find single source shortest path for the given graph by considering 'S' as the source vertex. (10 Marks)

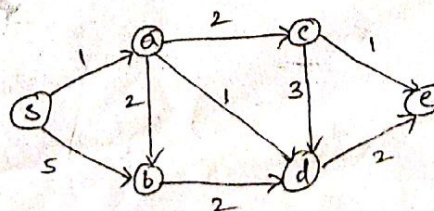


Fig. Q5 (b)

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.