April 2025
B.A./B.Sc.
Fourth Semester
CORE – 8
COMPUTER SCIENCE
Course Code: CSC 4.11
(Design & Analysis of Algorithm)

Total Mark: 70 *Pass Mark: 28*
Time: 3 hours

Answer five questions, taking one from each unit.

UNIT–I

1. (a) Write down some characteristics of algorithm. 4
   (b) Write down differences between posteriori and priori analysis. 4
   (c) Write down differences between time complexity and space complexity analysis of algorithms. 6

2. What is asymptotic notation? Explain the different types of asymptotic notations. 2+12=14

UNIT–II

3. (a) Explain the basic methodology of divide and conquer method. 3
   (b) Write down three advantages and three disadvantages of divide and conquer method. 6
   (c) Explain the time complexity analysis of iterative algorithms. 5

4. (a) Explain the working of Dijkstra's algorithm with an example. 7
   (b) Find the optimal solution of the knapsack instance $n = 7$, $W = 15, (p1, p2, \ldots, p7) = (5,10,15,7,8,9,4)$ and $(w1, w2, ..., w7) = (1,3,5,4,1,3,2)$ using fractional knapsack algorithm. 7

UNIT–III

5. (a) Write algorithm for binary search method. 6

(b) Write down the best case time complexity of the following sort operations: 8

(i) Merge sort (ii) Heap sort
(iii) Bucket sort (iv) Radix sort
(v) Count sort (vi) Quick sort
(vii) Bubble sort (viii) Insertion sort

6. (a) Sort the following array of numbers in ascending order using insertion sort method. 3

6	3	1	7	8	9

(b) Write the algorithm for bucket sort. 3

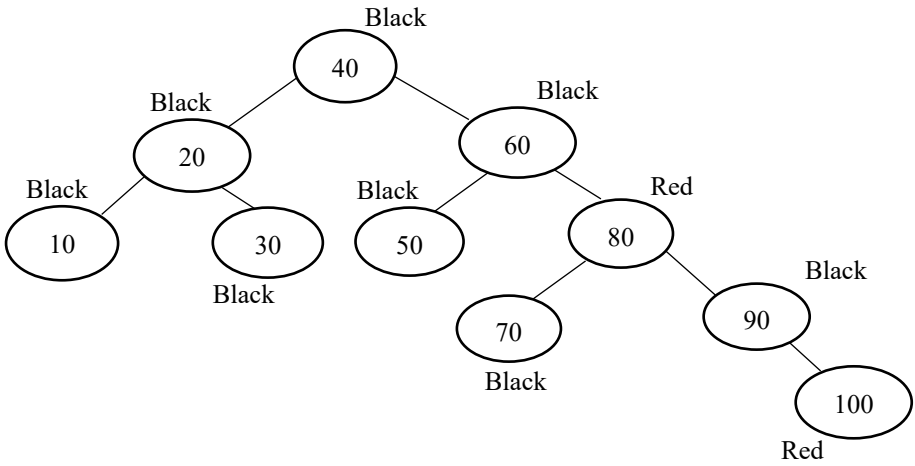
(c) Write the algorithm for radix sort. 8

UNIT–IV

7. (a) Write down the properties of red-black tree. 5

(b) Perform deletion on the following red-black tree as per the nodes given: 9

50	20	100	90	40	60	30	10	70



8. (a) Write the algorithm to perform deletion in red-black tree. 7

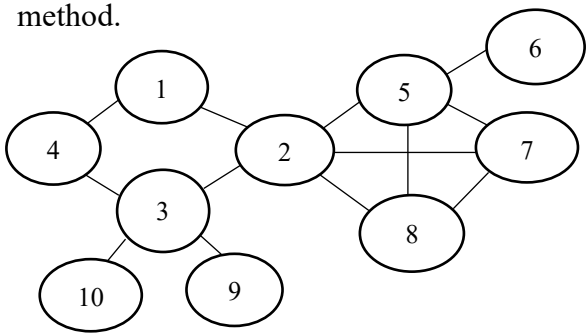
(b) Construct a red-black tree by inserting the following nodes: 7

12	20	9	17	18	32	27	42

UNIT–V

9. (a) Write down properties of a spanning tree. 6

   (b) Traverse the following graph using breadth first search BFS method. 8



10. (a) Write down differences between breadth first search (BFS) and depth first search (DFS) in graph traversal. 7

    (b) Construct a minimum spanning tree (MST) of the following graph using Kruskal's algorithm. 7