CBCS SCHEME

USN

BCS755B

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026

Introduction to Algorithms

Time: 3 hrs.

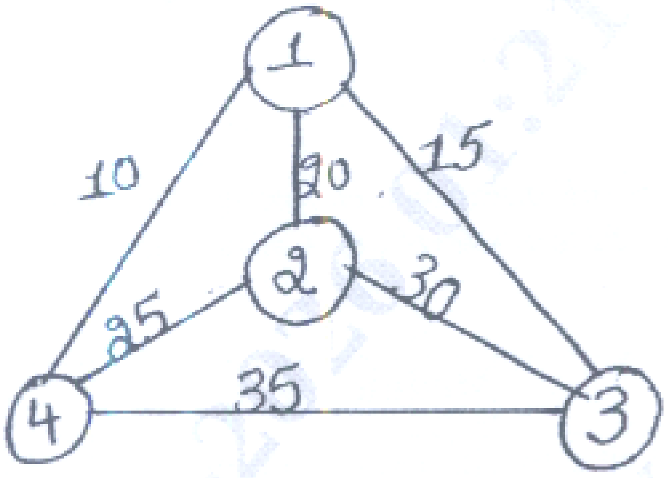
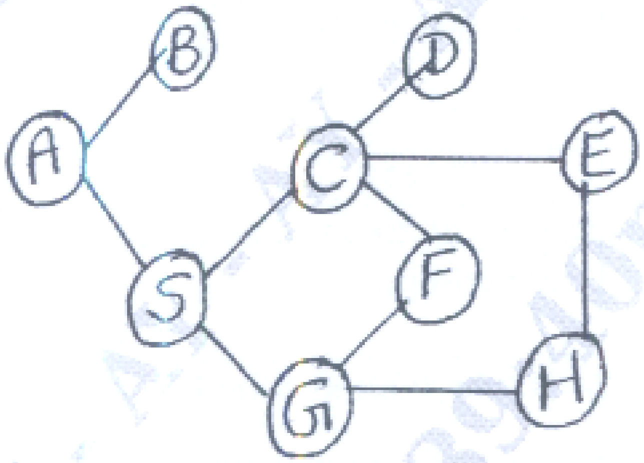
Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

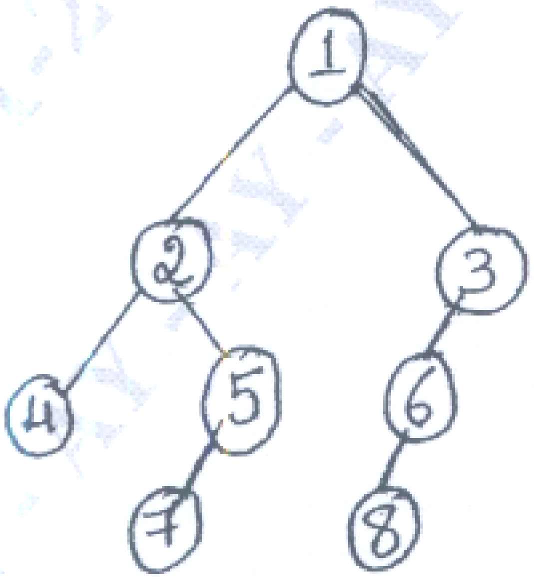
		Module – 1	M	L	C
Q.1	a.	Define an algorithm. Write an algorithm to compute GCD of two numbers using Euclid.	4	L3	CO1
	b.	Describe the fundamentals of algorithm problem solving with a neat diagram.	10	L2	CO1
	c.	List and explain any four important problem types.	6	L2	CO1
		OR			
Q.2	a.	Develop on algorithm to find an element in an array using sequential search with an example and find time complexity.	10	L3	CO1
	b.	Describe the asymptotic notations with a suitable example.	10	L2	CO1

		Module – 2			
Q.3	a.	Give the general plan for analyzing the efficiency on non-recursive algorithm. Develop a non-recursive algorithm to check whether all elements in a given array of n elements are distinct. Calculate the efficiency in terms of order of growth.	10	L3	CO2
	b.	Define Brute force. Design an algorithm for selection sort. Apply selection sort to sort the list of numbers : 89, 45, 68. 90, 29.	10	L3	CO2
		OR			
Q.4	a.	Illustrate Bubble sort technique with a suitable example. Obtain the efficiency for bubble sort.	10	L3	CO2
	b.	Develop an algorithm for Brute force string matching. Demonstrate brute force problem for the following text and pattern : Text : THE CAT SAT ON THE MAT Pattern: CAT	10	L3	CO2

Module – 3

Q.5	a.	Define exhaustive search. Find the optimal solution for the graph given Fig.Q5(a) using travelling salesman problem.  Fig.Q5(a)	10	L3	CO3
	b.	Design an algorithm for depth first search. Illustrate the traversal order of DFS for the given graph Fig.Q5(b).  Fig.Q5(b)	10	L3	CO3

OR

Q.6	a.	With a suitable example, illustrate two approaches of topological sorting.	10	L3	CO3
	b.	Define Binary tree. Given the following binary tree in Fig.Q6(b), write its pre-order, post-order and in-order.  Fig.Q6(b)	5	L3	CO3
	c.	Apply the merge sort algorithm to sort the following list of numbers : 37, 28, 42, 4, 10, 92, 8.	5	L3	CO3

Module – 4

Q.7	a.	Illustrate AVL tree with its four rotation types.	10	L3	CO4
	b.	Define Heap. Design an algorithm for button-up heap construction. Apply heap sort to sort the list of numbers 2, 8, 7, 6, 5, 9 in ascending order using array representation.	10	L3	CO4

OR

Q.8	a.	Design an algorithm for comparison counting sort. Demonstrate the process of sorting with a suitable example.	10	L3	CO4
	b.	Develop Horsepool algorithm for the string matching. Apply Horsepool algorithm to find the pattern BARBER in the text : JIM_SAW_ME_IN_A_BARBERSHOP.	10	L3	CO4

Module – 5

Q.9	a.	With a suitable example, demonstrate coin row problem by using dynamic programming.	10	L3	CO5
	b.	Illustrate the Knapsack problem by considering the following data :	10	L3	CO5

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

Given capacity W = 5.

OR

Q.10	a.	Define minimum spanning tree. Illustrate the Kruskal algorithm to find minimum spanning tree for the graph given in Fig.Q10(a).	10	L3	CO5

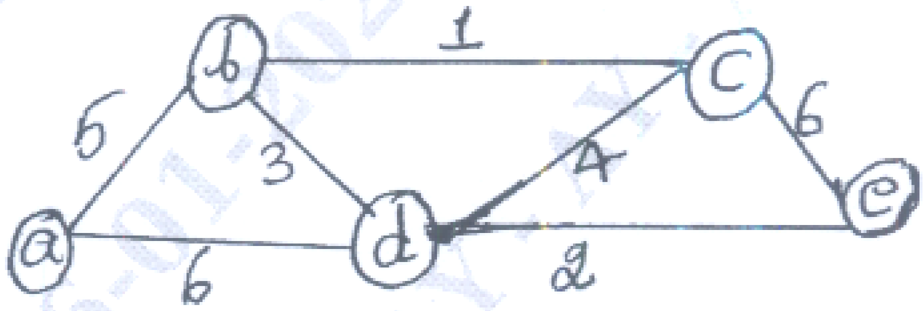


Fig.Q10(a)

	b.	Design a Huffman's algorithm, construct Huffman Tree for the following data :	10	L3	CO5

Symbol	A	B	C	D	–
Frequency	0.35	0.1	0.2	0.2	0.15

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