Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)
END SEMESTER EXAMINATIONS, NOVEMBER 2022

DATA STRUCTURES AND ALGORITHMS [ELE 4078]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 21 November 2022** **Max. Marks: 50**

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A. Analyze the following expressions and obtain equivalent postfix expression.

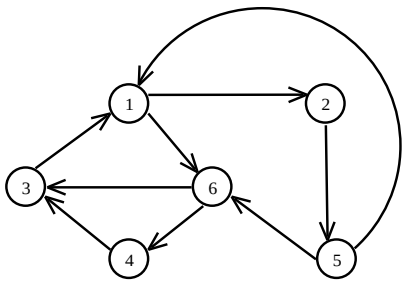
i. (8+7)/6 + 5*(4-2)

ii. *++ABC--DEF

iii. v+w-x/y*z

(03)

1B. For the given graph, deduce the sequence for DFS(1) and BFS(3). Show the reached arrays and queue after each iteration.



(03)

1C. Calculate the savings made in bits using Huffmann's technique for the following data.

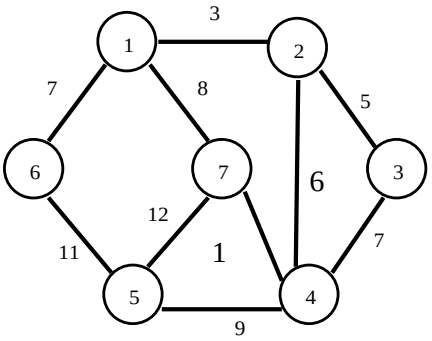
c	!	>	#	.	,	%	&
f	3	7	2	10	15	4	9

(04)

2A. Solve using Dynamic programming and calculate the maximum profit. Show the steps clearly.

C= 100; W=[25,35,40,60]; P= [10,12,24,23] ***(04)***

2B. Analyze the given weighted graph and estimate the minimum spanning tree using Kruskal's algorithm. Verify the same using prim's algorithm. Write the pseudo codes for both techniques and show the steps clearly. ***(04)***



2C. List the basic differences between iteration and recursion with suitable example. ***(02)***

3A. Solve the recurrence equation using master's theorem and substitution method to determine the time complexity.

$T(n) = 2\,T(n1/2) + \log n \qquad n > 2$

$= 2 \qquad\qquad 0 < n \le 2$ ***(03)***

3B. Evaluate the following expression using Stack. Show the contents of stack at each step.

(8+7)/6 + 5*(4-2) ***(02)***

3C. Using hash function f(x)= x mod 7, insert the following elements in the hash table; N=10

55,71,84,8,97,62,53,3,34,13

To handle the collision make use of

i. Open hashing
ii. Linear Probing
iii. Quadratic Probing
iv. Double Hashing ***(05)***

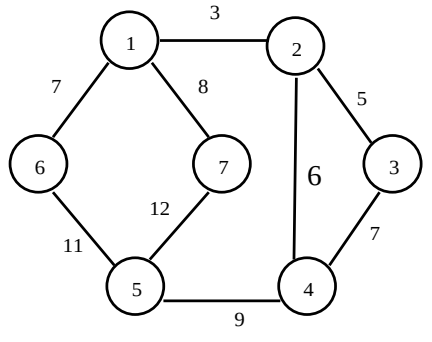
4A. Write a suitable pseudocode to insert a node at the rear end of a linked list. ***(03)***

4B. Given weights and profits of 5 items, put these items in a knapsack of capacity 55 to get the maximum profit. Use profit by density method to solve.

N=5; W=[20, 15, 25, 10, 10]

P=[40, 20, 50, 15, 20] ***(03)***

4C. Analyze the given Graph and estimate the shortest path from node 6 to all other nodes in the given graph using Dijkstra's algorithm. Write the pseudo code and show all the steps clearly.



(04)

5A. Write a pseudocode to search an element in a tree. ***(03)***

5B. Develop a binary tree using the following details.

In-order traversal: HFBAGDICEK

Preorder traversal: ABFHCDGIEK ***(04)***

5C. What is articulation point in a bi-connected graph? Mention the real time application of this theory. ***(03)***