University of Mumbai Program: Computer Engineering
Curriculum Scheme: Rev2019
Examination: Second Year Semester: III
Course Code: CSC303 Course Name: Data Structure

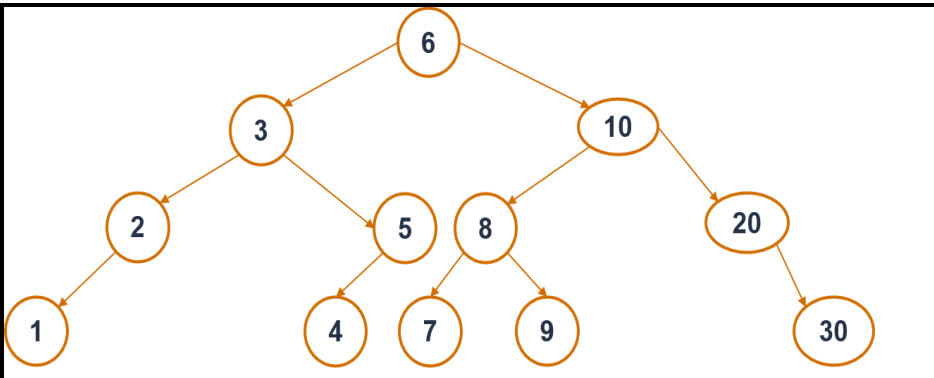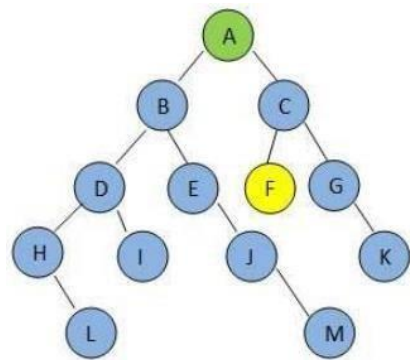Time: 2 hours 30 mins   Max. Marks: 80

Q1. All questions compulsory 2 marks each (20 Marks)

Q1.	To represent hierarchical relationships between elements, which data structure is suitable?
Option A:	Stack
Option B:	Queue
Option C:	Graph
Option D:	Tree
Q2.	What is the outcome after the following steps, starting with an empty stack of size 5? push (3), push (5), pop (), push (10), push (11), push (100), push (9), push (10)
Option A:	Stack overflow error
Option B:	The top element is 3
Option C:	Stack underflow error
Option D:	The top element is 10
Q3.	Consider the linear queue given below which has FRONT = 1 and REAR = 5. Now perform the following operations on the queue: (a) Add G (b) Delete two letters(c) Add H (d) Add I (e) Delete three letters
Option A:	H, G, I
Option B:	G, H, I
Option C:	G, I, H
Option D:	H, I, G
Q4.	In linked lists, there are no NULL links in
Option A:	Circular Linked List
Option B:	Doubly Linked List
Option C:	Singly Linked List
Option D:	Multi Linked List
Q5.	Which of the following operations is performed more efficiently by doubly linked list than by singly linked list?
Option A:	Deleting a node whose location is given
Option B:	Searching of an unsorted list for a given item
Option C:	Inverting a node after the node with given location
Option D:	Traversing a list to process each node

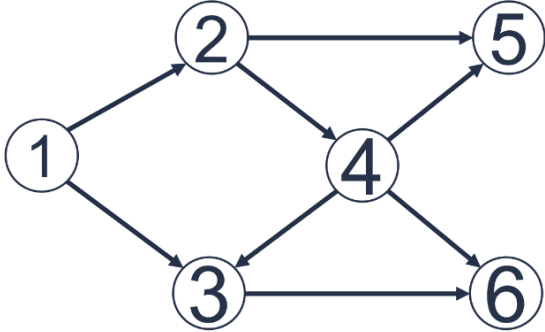Time: 2 hours 30 mins   Max. Marks: 80

Q6.	
	What will be the Pre-order traversal output of above binary tree?
Option A:	6 3 2 1 5 4 10 8 7 9 20 30
Option B:	1 2 3 4 5 6 7 8 9 10 20 30
Option C:	1 2 4 5 3 7 9 8 30 20 10 6
Option D:	6 3 10 2 5 8 20 1 4 7 9 30
Q7.	A binary tree T has n leaf nodes. The number of nodes of degree 2 in T is
Option A:	$\log_2 n$
Option B:	n-1
Option C:	n/2
Option D:	N
Q8.	Starting from the node A at the top, which algorithm will visit the least number of nodes before visiting the node F?
Option A:	Breadth First Search
Option B:	Depth First Search
Option C:	DFS and BFS will visit same number of nodes
Option D:	Both BFS and DFS will not visit node F

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Q9.	
	What will be the topological ordering for the above graph?
Option A:	1 2 3 4 5 6
Option B:	1 2 3 4 6 5
Option C:	1 3 2 4 5 6
Option D:	1 2 4 5 3 6
Q10.	Given a hash table of size 100, map the key 1892 to an appropriate location in the hash table using the Multiplication function.
Option A:	30
Option B:	32
Option C:	34
Option D:	35

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Q2. (20 Marks Each)	Solve any Four Questions out of Six 05 marks each
A	Define Data Structure. Explain Linear and Non-Linear data structures with examples.
B	Explain various techniques of Graph Representation
C	Define ADT. Write an ADT for Stack.
D	What are the advantages of using Linked List over Arrays?
E	What is Hashing? Explain any four Hash Functions with example.
F	What is Binary Search Tree? Explain with an example.

Q3. (20 Marks Each)	Solve any Two Questions out of Three 10 marks each
A	Write a C Program to convert infix expression into the postfix expression.
B	Write a program in C to implement Circular Queue using Array.
C	1. Write a C program to implement a Singly Linked List with Insert End and Delete End and Print Method. 2. Write a C Program to implement a Doubly Linked List with Insert Begin and Delete End and Print Method.

Q4. (20 Marks Each)	Solve any Two Questions out of Three 10 marks each
A	Insert the following numbers in the AVL tree. Also explain different rotations used to balance the AVL tree. **50, 25, 10, 5, 7, 3, 30, 20, 8, 15**
B	1. Explain Huffman Algorithm with an Example. 2. Write a function for Pre-Order Traversal of the Binary Search Tree.
C	Explain different graph traversal methods along with example.