U.S.N.										

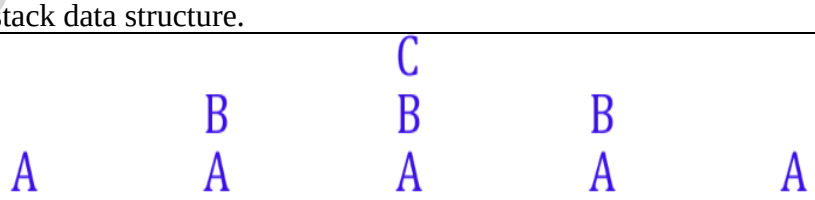
B.M.S. College of Engineering, Bengaluru-560019

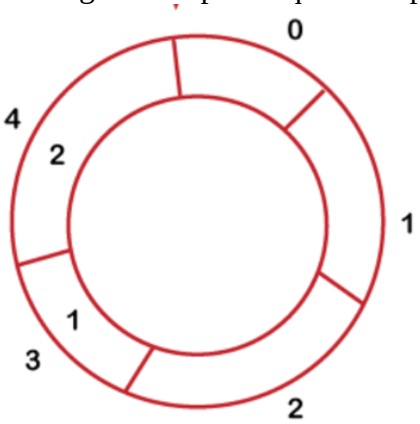
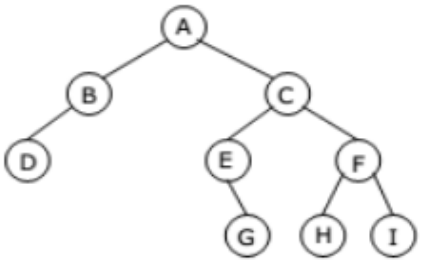
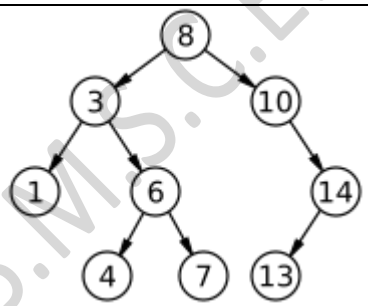
Autonomous Institute Affiliated to VTU

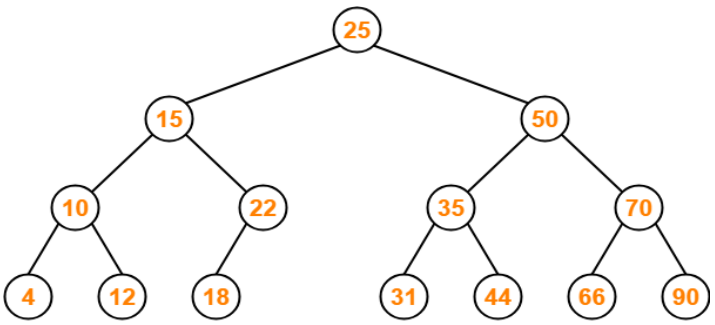
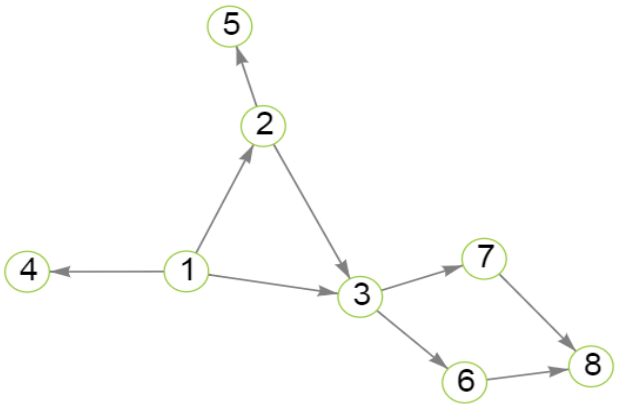
January / February 2025 Semester End Main Examinations

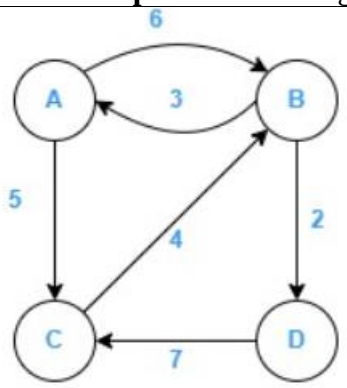
Programme: B.E. **Semester: VI**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 22IS6OEDSA **Max Marks: 100**
Course: Data Structures and Algorithms

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

			UNIT - I	CO	PO	Marks
	1	a)	Write the syntax and use of the following functions: **Calloc() Malloc()**	CO1	PO1	**04**
		b)	With suitable illustration, give the **Classification of Data Structures.**		PO1	**08**
		c)	Write a program to depict Linked list operation to **insert 25** in **between 20 and 30**. Provided **Linked List is 20-30-50-40**.	CO2	PO2	**08**
			OR			
	2	a)	Define Data structures. Identify the type of data structure for the following **i. Stack** **ii. Graph** iii. **Array**	CO2	PO2	**08**
		b)	Using Singly linked list perform i. insert at end ii. insert at beginning	CO2	PO2	**08**
		c)	Discuss any two applications of Linked List	CO2	PO2	**04**
			UNIT - II			
	3	a)	Write the code snippet to illustrate push and pop functions for a stack data structure.	CO1	PO1	**06**
		b)	 For the given illustration of Stack, write **suitable calls** of Stack operations.	CO2	PO2	**06**
		c)	Distinguish between **Iteration and recursion**. Write a recursive tree for the **Fact(5)**.	CO2	PO2	**08**
			OR			

	4	a)	Write a program to perform **Fibonacci series using recursive code.**	*CO2*	*PO2*	**06**
		b)	Queue is a FIFO data structures with **front and rear pointers** used to depict operations on queue. Explain the usage of these pointers with suitable illustrations.	*CO2*	*PO2*	**06**
		c)	Write the front and rear pointers for the **circular Queue of size 5** for the given snapshot. queue empty states?  What are the conditions for queue full and queue empty states?	*CO2*	*PO2*	**08**
			UNIT - III			
	5	a)	Define **Binary Search Tree**. Write the various **traversals** for the tree  	*CO1*	*PO1*	**06**
		b)	 Identify if the given **tree is a BST**. If yes, can we **insert node 20 onto the right branch of node 1**? Justify your answer suitably.	*CO1*	*PO1*	**06**
		c)	What is an **Algorithm**? Write a note on the **Framework for Analysis of algorithm efficiency.**	*CO1*	*PO1*	**08**
			OR			
	6	a)	List the applications of Binary Search Trees.	*CO1*	*PO1*	**05**
		b)	Define all the 3 types of asymptotic notations. Also identify the type of function for the following i. Log n ii. N	*CO1*	*PO1*	**08**

			iii. N^2 iv. 1			
		c)	For the given BST perform the operations  Binary Search Tree i. Insert 1 ii. Insert 9 iii. Delete 30 iv. Delete 15	*CO2*	*PO2*	**07**
			UNIT - IV			
	7	a)	Differentiate between **DFS and BFS**. Perform DFS for the given graph. Consider **1 as the source vertex**. Does choosing of a different source node change the traversals? Justify.  	*CO1*	*PO1*	**10**
		b)	Write an **algorithm for Bubble sort**. Which algorithmic technique is used in this sorting technique? Perform bubble sort for the following numbers. 27 36 92 46 61 31	*CO2*	*PO2*	**10**
			OR			
	8	a)	Write the **Selection sort algorithm**. Perform the same for the given sequence 14 33 27 10 35 19 44 42	*CO2*	*PO2*	**10**

		b)	Can we **perform sorting using divide and conquer**? Justify your answer suitably. Perform **Merge sort** for the following numbers. **56 10 23 9 34 32**	*CO2*	*PO2*	**10**
			UNIT - V			
	9	a)	Construct a **max heap** for the given numbers **8 3 2 7 9 1 4** Perform **Heap sort** from the generated heap.	*CO2*	*PO2*	**10**
		b)	 For the given graph, predict the **shortest paths using Flyod's Algorithm.**	*CO2*	*PO2*	**10**
			OR			
	10	a)	**Solve the knapsack problem by Dynamic programming technique** Consider number of objects=4, Weight={1,5,3,4} for the items with the number (1,2,3,4), Capacity of Knapsack=8	*CO2*	*PO2*	**10**
		b)	i) Briefly explain different variations of transform and conquer technique, explain each with an example ii) Define Heap and illustrate the steps to sort elements using Heap Sort	*CO2*	*PO2*	**10**

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