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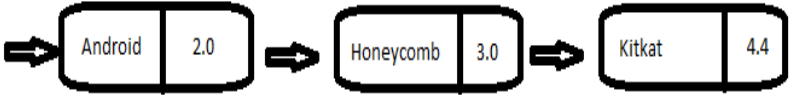

**B.M.S. College of Engineering, Bengaluru-560019**

Autonomous Institute Affiliated to VTU

**June 2025 Semester End Main Examinations****Programme: B.E.****Semester: III****Branch: Computer Science and Engineering****Duration: 3 hrs.****Course Code: 23CS3PCDST / 22CS3PCDST****Max Marks: 100****Course: Data Structures**

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

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.			<b>UNIT - I</b>	<b>CO</b>	<b>PO</b>	<b>Marks</b>
	1	a)	Write an algorithm to convert given Infix expression into Postfix expression and also convert the below given Infix expression into Postfix format. $((P + Q) * (R - S) + T) / (U + V)$	CO1	PO1	10
		b)	Write a C program which prints the largest number in an unsorted array of elements using recursion.	CO1	PO1	10
			<b>OR</b>			
	2	a)	The machine in a gaming center asks the customer to spell their name in reverse order and then it welcomes the customer with the correct name. Develop a C program to simulate the above situation using a suitable data structure.	CO 3	PO 3	10
		b)	Convert the following Infix expression to equivalent Postfix expression and also show the complete stack trace. i) $(P + Q) / (R * S) - T / U$ ii) $((P + Q) - U + (R * S)) / (T + V)$	CO 1	PO 1	10
			<b>UNIT - II</b>			
	3	a)	Analyze the below given code and complete the functionalities to simulate the working of Circular Queue. #define SIZE 10  int queue[SIZE], front = -1, rear = -1;  Enqueue(x) { if( IsFull() ) printf("Queue is Full") else {  } }	CO 2	PO 2	10

		<pre> Dequeue() {     if( IsEmpty() )         printf("Queue is Empty")     else     {     } } void display() {     if()     else     {     } } </pre>			
	b)	Demonstrate the applications of Double Ended Queue with an example program.	CO2	PO2	10
		OR			
4	a)	<p>Analyze the below given diagram and write a C program with suitable Singly linked list functionalities to complete the operations given below.</p> <p>Android mobile version List</p>  <p>Android mobile version List after update (Operation:1)</p>  <p>Android mobile version List after Operation 2:</p> 	CO 2	PO 2	10
	b)	Fresh fruits maintained in an Inventory system are almost always cleared on the basis of First-In-First-Out basis because of maintaining the quality. How do you implement above scenario using a Singly linked list concept to solve the above scenario? Write a C program for the said scenario.	CO 3	PO 3	10

		UNIT - III			
5	a)	<p>Analyze the below given diagram and write the C code to complete the operation.</p> <p>Consider two sorted linked lists as an example.</p> <div> <div>head1 → 4 → 8 → 15 → 19 → NULL</div> <div>head2 → 7 → 9 → 10 → 16 → NULL</div> </div> <p>The merged linked list should look like this:</p> <div>head1 → 4 → 7 → 8 → 9 → 10 → 15 → 16 → 19 → NULL</div>	CO 2	PO 2	10
	b)	Bookmark option in the browser has the functionality to access the URL stored in backward and forward direction, write a C code for the above scenario with suitable data structures to perform insertion and deletion of URL with dynamic memory implementation.	CO 3	PO 3	10
		OR			
6	a)	Demonstrate the functionalities of the Queue using a Singly linked list.	CO 1	PO 1	10
	b)	Hotel Manager stores all the customer details like mobile number and amount paid in a separate list to verify at the end of the day. He requires to print the number of customers count and display customers with their mobile number according to the ascending order of the amount paid. Demonstrate the above scenario using a Doubly linked list.	CO 3	PO 3	10
		UNIT - IV			
7	a)	Write a C-function to implement the deletion of node in a Binary Search Tree considering various cases.	CO 2	PO 2	10
	b)	The preorder traversal of a Binary Search tree is <b>30, 20, 10, 15, 25, 23, 39, 35, 42</b> . Analyze the above data to construct a Binary Search tree and find its Inorder and Postorder traversal.	CO 2	PO 2	10
		OR			
8	a)	The travel agency decided to have a software application to store and access the data. Demonstrate the storing and finding the maximum data in the list stored in the tree based fashion for the above requirement.			10

		b)	Construct a Binary Search Tree for the below given list and write the result of three different traversal for the same. Also, write an algorithm for three different traversals. <b>{10, 5, 1, 7, 40, 50}</b>			<b>10</b>
			<b>UNIT – V</b>			
	9	a)	In order to design a password verification application, you will decide to implement it using hashing techniques. How would you handle the collision? Explain the different methods used to handle the collision that occurs in hashing techniques.	CO 1	PO 1	<b>10</b>
		b)	Using the hash function ' <b>key mod 7</b> ', insert the following sequence of keys in the hash table using the concept of separate chaining: <b>{50, 700, 76, 85, 92, 73, 101}</b>	CO 2	PO 2	<b>10</b>
			<b>OR</b>			
	10	a)	Define the following terms with an example: <b>i) Hash Collision</b> <b>ii) Hash Key</b> <b>iii) Hash Function</b> <b>iv) Separate Chaining</b> <b>v) Open Addressing</b>	CO 1	PO 1	<b>10</b>
		b)	Consider inserting the keys <b>10, 22, 31, 4, 15, 28, 17, 88, 59</b> into a closed hash table of length $m = 11$ using the primary hashing function: $h(k) = k \text{ mod } m$ . Illustrate the result of inserting these keys using <b>(i) Linear probing.</b> <b>(ii) Quadratic probing with <math>h_i(k) = (h(k) + i + 3i^2) \text{ mod } m</math>.</b> <b>(iii) Double hashing with function</b> $h_i(k) = (h(k) + i(1 + k \text{ mod } (m - 1))) \text{ mod } m$ . where $i=1,2,3, \dots$	CO 2	PO 2	<b>10</b>

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