

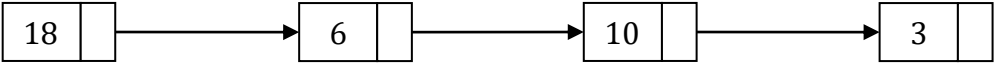
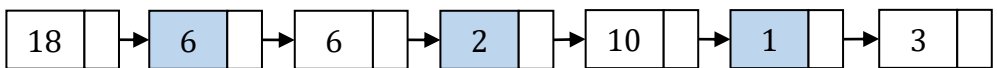
Lab	Type	Practical
Unit: I – Array		
1 & 2	A	1. Write a program to calculate area of a Circle ($A = \pi r^2$).
	A	2. Write a program to find whether a number is odd or even
	A	3. Write a program to determine whether the entered character is vowel or not.
	A	4. Write a program to find factorial of a number. (Using Loop)
	A	5. Write a program to find factorial of a number. (Using Recursion)
	B	6. Write a program to find power of a number using loop.
	B	7. Write a program to find factors of a given number.
	B	8. Write a program to check whether a number is prime or not.
	C	9. WAP to convert seconds into hours, minutes & seconds and print in HH:MM:SS [e.g. 10000 seconds mean 2:46:40 (2 Hours, 46 Minutes, 40 Seconds)].
	C	10. WAP to convert number of days into year, week & days [e.g. 375 days mean 1 year, 1 week and 3 days].
	C	11. WAP to find the sum of $1 + (1+2) + (1+2+3) + (1+2+3+4) + \dots + (1+2+3+4+\dots+n)$.
	C	12. WAP to print Armstrong number from 1 to 1000.
3	A	13. Write a program to read and display n numbers using an array.
	A	14. Write a program to calculate sum of numbers from m to n.
	A	15. Write a program to calculate average of first n numbers.
	A	16. Write a program to find position of the smallest number & the largest number from given n numbers.
	B	17. Write a program to find whether the array contains a duplicate number or not.
	B	18. Read n numbers in an array then read two different numbers, replace 1 st number with 2 nd number in an array and print its index and final array.
	C	19. WAP to print Pascal triangle.
	C	20. WAP to sort the N names in an alphabetical order.

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4	A	21. Write a program to insert a number at a given location in an array.
	A	22. Write a program to delete a number from a given location in an array.
	A	23. Write a program to insert a number in an array that is already sorted in an ascending order.
	B	24. Write a program to delete a number from an array that is already sorted in an ascending order.
	B	25. Write a program to delete duplicate numbers from an array.
	B	26. Write a program to merge two unsorted arrays.
	C	27. WAP to replace lowercase characters by uppercase & vice-versa in a user specified string.
	C	28. Suppose you are senior developer for an Relational Database Management System named "Array Database" where everything is implemented using only array, today your task is to implement aggregate function like sum, min, max, avg. For simplicity, assume that your database can only store integers.
	C	29. https://www.codechef.com/problems/CHEFHAM
5	A	30. Read two 2x2 matrices and perform addition of matrices into third matrix and print it
	A	31. Read two matrices, first 3x2 and second 2x3, perform multiplication operation and store result in third matrix and print it.
	B	32. Design anagram game using array. <ul style="list-style-type: none"> Allow a user to enter N words and store it in an array. Generate a random number between 0 to N-1. Based on the random number generated display the word stored at that index of an array and allow user to enter its anagram. Check whether the word entered by the user is an anagram of displayed number or not and display an appropriate message. Given a word A and word B. B is said to be an anagram of A if and only if the characters present in B is same as characters present in A, irrespective of their sequence. For ex: "LISTEN" == "SILENT"
6	A	33. Write a program to swap two numbers using user-defines method.
	A	34. Create class Employee_Detail with attributes Employee_ID, Name, Designation, and Salary. Write a program to read the detail from user and print it.

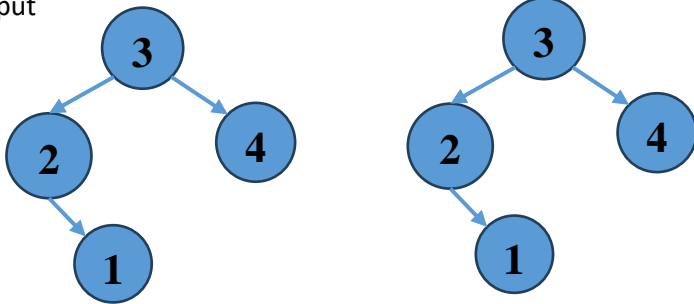
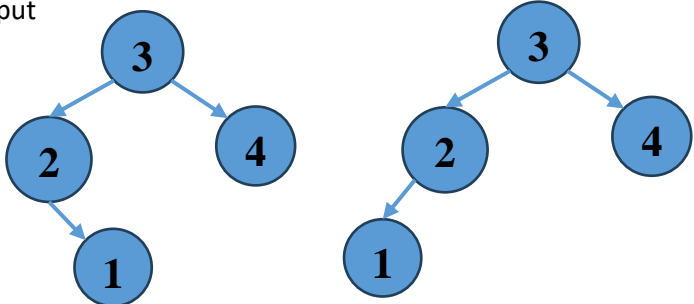
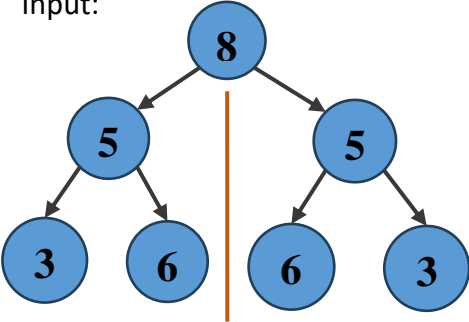
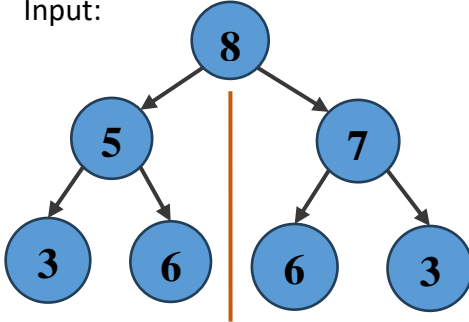
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	A	35. Create array of object of class Student_Detail with attributes Enrollment_No, Name, Semester, CPI for 5 students, scan their information and print it.
	B	36. Create methods to convert temperature from Celsius to Fahrenheit and vice versa. Take temperature input from user and call the appropriate conversion method.
	C	37. Create a class BankAccount with attributes like account number, balance, account holder and name. Create an array of BankAccount objects to store bank accounts. Implement methods to deposit money, withdraw money and check balance.
Unit: I – Stack		
7	A	38. Write a menu driven program to implement following operations on the Stack using an Array <ul style="list-style-type: none"> • PUSH, POP, DISPLAY • PEEP, CHANGE
	A	39. How stack can be used to recognize strings aca, bcb, abcba, abbcbbba? Write a program to solve the above problem.
	B	40. Write a program to determine if an input character string is of the form $a^i b^j$ where $i \geq 1$ i.e., Number of 'a' should be equal to number of 'b'.

Lab	Type	Practical
	B	<p>41. Chef has a string which contains only the characters '{', '}', '[', ']', '(' and ')'. Now Chef wants to know if the given string is balanced or not. If is balanced then print 1, otherwise print 0.</p> <ul style="list-style-type: none"> A balanced parenthesis string is defined as follows: <ul style="list-style-type: none"> The empty string is balanced If P is balanced then (P), {P}, [P] is also balanced if P and Q are balanced PQ is also balanced "()", "{}()", "[]" are balanced parenthesis strings "([{}])", "()" are not balanced. Input: The first line of the input contains a single integer T denoting the number of test cases. The description of T test cases follows. The first and only line of each test case contains a single string Output: For each test case, print a single line containing the answer. Example of Input & Output <ul style="list-style-type: none"> Input: <ul style="list-style-type: none"> Enter No of Test Cases: 4 () [] ([{}])[] [{}] Output <ul style="list-style-type: none"> 1 0 1 0
	C	42. https://www.codechef.com/problems/SUDBOOKS
	C	<p>43. Given a set of time intervals in any order, our task is to merge all overlapping intervals into one and output the result which should have only mutually exclusive intervals</p> <ul style="list-style-type: none"> Input: Intervals = {{1,3},{2,4},{6,8},{9,10}} Output: {{1, 4}, {6, 8}, {9, 10}} Explanation: Given intervals: [1,3],[2,4],[6,8],[9,10], we have only two overlapping intervals here,[1,3] and [2,4]. Therefore we will merge these two and return [1,4],[6,8], [9,10] Input: Intervals = {{6,8},{1,9},{2,4},{4,7}} Output: {{1, 9}} Reference : https://www.geeksforgeeks.org/merging-intervals/
	C	44. https://www.codechef.com/problems/VOWANX
8	A	45. Write a program to convert infix notation to postfix notation using stack.

Lab	Type	Practical
	B	46. Write a program to convert infix notation to prefix notation using stack.
	A	47. Write a program for evaluation of postfix Expression using Stack.
	B	48. Write a program for evaluation of prefix Expression using Stack.
	C	49. https://www.codechef.com/DSAPREP_10/problems/STKSORT
Unit: II – Queue		
9	A	50. Write a menu driven program to implement following operations on the Queue using an Array <ul style="list-style-type: none"> • ENQUEUE • DEQUEUE • DISPLAY
	B	51. Write a menu driven program to implement following operations on a circular queue using an Array <ul style="list-style-type: none"> • Insert • Delete • Display all elements of the queue
	B	52. Write a menu driven program to implement following operations on the Doubled Ended Queue using an Array <ul style="list-style-type: none"> • Insert at front end, Insert at rear end • Delete from front end, Delete from rear end • Display all elements of the queue
	C	53. Implement Priority Queue using array that performs following operations: INSERT, DELETE, DISPLAY
	C	54. Percy the peacock loves colorful parties. He has a stack of different feathers. He wears the bottom one to parties and puts it on top later. When he buys new feathers, he adds them on top. Can you write a program to pick his party feather? <ul style="list-style-type: none"> • For example: You have 10 queries, each separated by a space. If a query is "buy_<color-name>", he adds that colored feather on top. If it's "fetch", the program prints the bottom feather color and moves it to the top. His suitcase starts empty. • Input: 10 <ul style="list-style-type: none"> ○ buy_red, buy_blue, buy_green, fetch, fetch, buy_yellow, fetch, fetch, fetch, fetch
	C	55. https://www.codechef.com/problems/CHFQUEUE

Lab	Type	Practical
Unit: II – Linked List		
10	A	56. Write a program to implement a node structure for singly linked list. Read the data in a node, print the node.
	A	57. Write a menu driven program to implement following operations on the singly linked list. <ul style="list-style-type: none"> • Insert a node at the front of the linked list. • Display all nodes. • Delete a first node of the linked list. • Insert a node at the end of the linked list. • Delete a last node of the linked list. • Delete a node from specified position.
	C	58. Write a program to count the number of nodes in a singly circularly linked list.
	C	59. WAP to check whether 2 singly linked lists are same or not.
11	A	60. Write a program to implement stack using singly linked list.
	B	61. Write a program to implement queue using singly linked list.
	C	62. WAP to remove duplicate elements from a singly linked list.
12	A	63. Write a program to copy a linked list.
	A	64. Write a program to reverse a linked list.
	B	65. Write a program to sort elements of a linked list.
	C	66. WAP to swap K^{th} node from beginning with K^{th} node from end in a singly linked list.
	C	<p>67. WAP to perform given operation in the linked list. There exist a Linked List. Add a node that contains the GCD of that two nodes between every pair adjacent node of Linked List.</p> <p>Input </p> <p>Output </p>

Lab	Type	Practical
	C	68. Write a program to swap two consecutive nodes in the linked list. Don't change the values of nodes, implement by changing the link of the nodes. <ul style="list-style-type: none"> Input: 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 Output: 2 → 1 → 4 → 3 → 6 → 5 → 8 → 7
	C	69. Write a program to remove the duplicates nodes from given sorted Linked List. <ul style="list-style-type: none"> Input: 1 → 1 → 6 → 13 → 13 → 13 → 27 → 27 Output: 1 → 6 → 13 → 27
	C	70. https://www.codechef.com/problems/DSMID004
13	A	71. Write a menu driven program to implement following operations on the circular linked list. <ul style="list-style-type: none"> Insert a node at the front of the linked list. Delete a node from specified position. Insert a node at the end of the linked list. Display all nodes.
	A	72. Write a menu driven program to implement following operations on the doubly linked list. <ul style="list-style-type: none"> Insert a node at the front of the linked list. Delete a node from specified position. Insert a node at the end of the linked list. (Home Work) Display all nodes. (Home Work)
	B	73. WAP to delete alternate nodes of a doubly linked list.
	B	74. WAP to split a circular linked list into two halves.
	B	75. Write a program to simulate music player application using suitable data structure. There is no estimation about number of music files to be managed by the music player. Your program should support all the basic music player operations to play and manage the playlist.
	C	76. Write a program to perform addition of two polynomial equations using appropriate data structure.
Unit: III – Nonlinear Data Structures: Tree and Graph		
14	A	77. Write a menu driven program to implement Binary Search Tree (BST) & perform following operations <ul style="list-style-type: none"> Insert a node, Delete a node, Search a node

Lab	Type	Practical
	B	<p>78. Write a menu driven program to implement Binary Search Tree (BST) & perform following operations</p> <ul style="list-style-type: none"> Preorder Traversal, Postorder Traversal, Inorder Traversal
	C	<p>79. Write a program to check whether the given two trees are same or not.</p> <p>Input</p>  <p>Output: Given trees are same</p> <p>Input</p>  <p>Output: Given trees are not same</p>
	C	<p>80. Write a program to check whether the given tree is symmetric or not.</p> <div> <p>Input:</p>  <p>Output: Given tree is symmetric</p> </div> <div> <p>Input:</p>  <p>Output: Given tree is not symmetric</p> </div>

Lab	Type	Practical
	C	81. https://www.codechef.com/problems/BINTREE
15	A	82. Write a program to construct a binary tree from given postorder and preorder traversal sequence.
	B	83. WAP to find the smallest and largest elements in the Binary Search Tree.
	C	84. Write a program to implement phone book dictionary using Binary Search Tree which provides following operations: <ul style="list-style-type: none"> • Add new entry in phone book, • Remove entry from phone book, • Search phone number • List all entries in ascending order of name and • List all entries in descending order of name
16	A	85. Write a program to create a graph & implement the adjacency list representation of the graph <ul style="list-style-type: none"> • Apply DFS and BFS on the given graph.
	A	86. Write a program to apply DFS & BFS for a graph.
	C	87. https://www.codechef.com/problems/JAG
Unit: IV – Hashing		
17	A	88. In an array of 20 elements, arrange 15 different values, which are generated randomly between 1,00,000 to 9,99,999. Use hash function to generate key and linear probing to avoid collision. $H(x) = (x \text{ mod } 18) + 2$. Write a program to input and display the final values of array.
	B	89. Implement a Dictionary (key, value) pair using Hash-table.
Unit: V – Sorting and Searching		
18	A	90. Write a program to implement a Linear Search using Array.
	A	91. Write a program to implement a Binary Search using Array.
19	A	92. Write a program to implement Bubble using Array.
	B	93. Write a program to implement Insertion Sort using Array.
20	A	94. Write a program to implement Selection Sort using Array.
	B	95. Write a program to implement Radix Sort using Array.

Lab	Type	Practical
21	A	96. Write a program to implement Merge Sort using Array.
	B	97. Write a program to implement Quick Sort using Array.
22	A	98. Write a program to implement Heap Sort using Array.
	B	99. Write a program to implement Shell Sort using Array.
	C	100. https://www.codechef.com/problems/HOLIDAYS