University of Engineering & Management, Kolkata

Even Semester Lab Examination, June, 2021

Course: B.Tech **Semester:2nd**

Paper Name: Programming for Problem Solving Laboratory-II

Paper Code: ESC293

Full Marks: 60 **Time:3 hours**

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1. For University Sports Day for the participants' score sheet, you are required to find the runner-up score. You are given scores. Store them in a list and find the score of the runner-up. You can use in build functions to solve the problem.

   The first line contains . The second line contains an array of integers each separated by a space.

   Constraints

   - 2<=n<=10
   - -100<=A[i]<=100

   Final output: Print the runner-up score.

   ex: Given list is [2,4,6,6,5] . The maximum score is , second maximum is . Hence, we print as the runner-up score.

2. Write a program to implement a sort technique inwhich the sorted array is built one entry at a time.
3. Write a program to implement bubble sort. Given the numbers 7, 1, 4, 12, 67, 33, and 45. How many swaps will be performed to sort these numbers using the bubble sort.
4. Write a program to implement a sort technique that works by repeatedly stepping through the list to be sorted.
5. Write a program to implement a sort technique that works on the principle of divide and conquer strategy.
6. Write a program to define a union and a structure both having exactly the same members. Using the size of operator, print the size of structure variable as well as union variable and comment on the result.

7. Declare a structure time that has three fields—hr,min, sec. Create two variables start_time and end_time. Input their values from the user. Then while start_time does not reach the end_time,display GOOD DAY on the screen.
8. Declare a structure fraction that has two fields—numerator and denominator. Create two variables and compare them using function. Return 0 if the two fractions are equal, –1 if the first fraction is less than the second and 1 otherwise. You may convert a fraction into a floating point number for your convenience.
9. Write a program to calculate the area of one of the geometric figures—circle, rectangle or a triangle. Write a function to calculate the area.The function must receive one parameter which is a structure that contains the type of figure and the size of the components needed to calculate the area must be a part of a union. Note that a circle requires just one component, rectangle require stwo components and a triangle requires the sizeof three components to calculate the area.
10. Write a program to interchange the value of thefirst element with the last element, second element with second last element, so on and so forth of a doubly linked list.

11. Write a program to create a linked list from an already given list. The new linked list must contain every alternate element of the existing singly linked list.

12. Write a program to delete the first element of a doubly linked list. Add this node as the last node of the list.
13. Write a program to count the number of non-zero values in a circular linked list.

14. Write a program to multiply a polynomial with a given number.

15. Write a program that prints the nth element from the end of a linked list in a single pass.

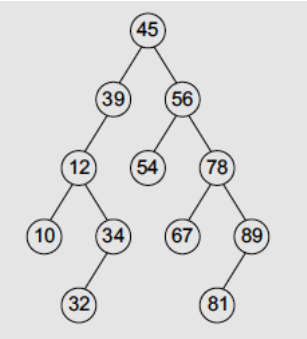
16. Write a program to reverse a string using recursion.

17. Write a program to convert the expression “a+b-*f+”into “postfix expression”.
18. Write a program to convert the expression “a-b+c*/d”into “prefix expression”.
19. Write a program to input two stacks and compare their contents.
20. Write a program to check nesting of parentheses using a stack.
21. Write a program to input two queues and compare their contents.
22. Write a program to create a queue from a stack.
23. Write a program to create a stack from a queue.
24. Write a program to create a queue which permitsinsertion at any vacant location at the rear end.
25. Write a program to create a queue using arrays which permits deletion from both the ends.
26. Draw the expression tree of the given infix expression: Mention all the steps
    a*b/c+e/f*g+k-x*y
    Convert the above expression into postfix expression and construct the binary expression tree

27. Consider the AVL tree given below and insert 18,81, 29, 15, 19, 25, 26, and 1 in it.

Delete nodes 39, 63, 15, and 1 from the AVL tree formed after solving the above question.

28. Consider the binary search tree given below.Now do the following operations:
    a. Find the result of in-order, pre-order, andpost-order traversals.
    b. Show the deletion of the root node
    c. Insert 11, 22, 33, 44, 55, 66, and 77 in the tree



29. Consider the binary search tree given below.Now do the following operations:
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30. Consider the AVL tree given below and insert 18,81, 29, 15, 19, 25, 26, and 1 in it.
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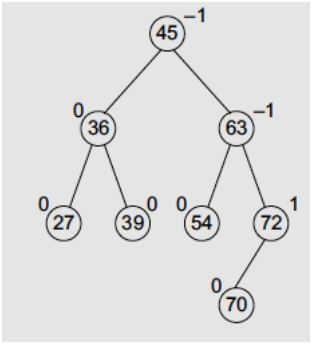
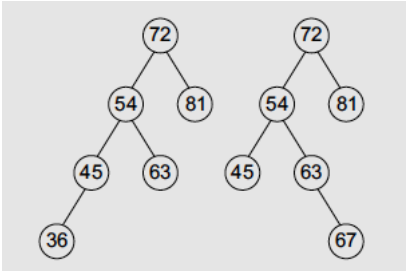


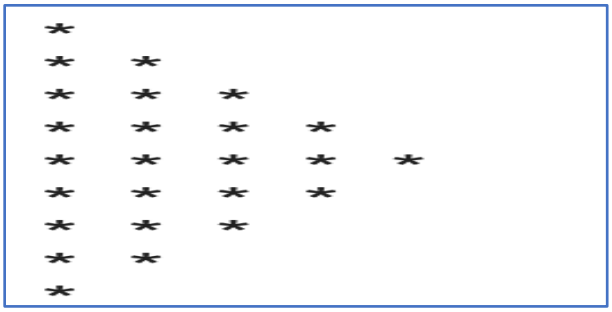
31. Create an AVL tree using the following sequence of data: 16, 27, 9, 11, 36, 54, 81, 63, 72.
32. Balance the AVL trees given below.



33. Write a Python program to sort a list of tuples using Lambda function.

34. Write a Python function that prints out the first n rows of Pascal's triangle.

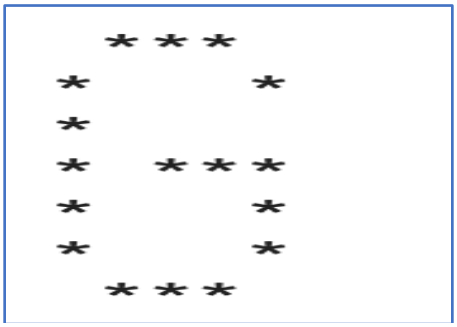
35. Write a Python program to sort a list of dictionaries using Lambda function.
36. Write a Python program to construct the following pattern, using a nested for loop.



Pattern for qno.36

37. Write a Python program to get the Fibonacci series between 0 to 50.
38. Write a Python program which accepts a sequence of comma separated 4 digit binary numbers as its input and print the numbers that are divisible by 4 in a comma separated sequence.

39. Write a Python program to print alphabet pattern 'G'



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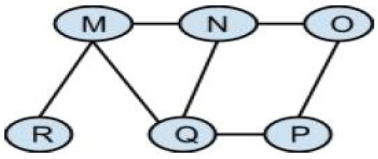
40. Write a Python program to calculate a dog's age in dog's years.

41. For the first two years, a dog year is equal to 10.5 human years. After that, each dog year equals 4 human years.

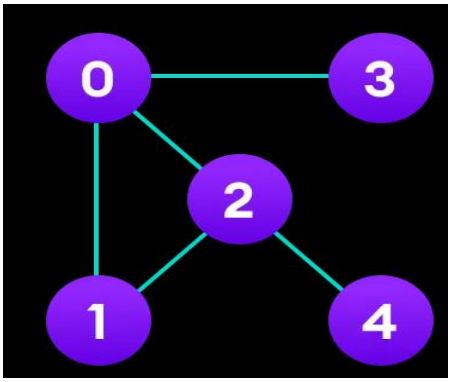
42. Consider the following graph.



Write a C program to show the breadth first search traversal of the graph,strating at any vertex. Find out the possible order for visiting the nodes.

43. What is an adjacency matrix for a graph. Write a C program to create an adjacency matrix for a simple graph.

44. Consider below graph diagram



Write a C program to show the depth first search traversal of the graph, starting at any vertex. Find out the possible order for visiting the nodes.

45. Write a program to create a linked list, display linked list and search an item that is present in the list.

46. Write a C program to find the 2nd highest element of a single linked list.