ADVANCED TECH LABS

Coding • Gaming • Animation • Design

Question Bank

Advance Tech Labs

BASIC PROGRAMS:

1. Write a program to perform addition, subtraction, multiplication and division of two numbers
2. Write a program to find a^b
3. Write a program to find the area and perimeter of a Rectangle
4. Write a program to find the area and perimeter of a square.
5. Write a program to find the Simple Interest(SI=P*R*T/100)
6. Write a program to input marks of 5 subjects and find the total marks and Percentage of a student
7. Write a program to input No. of classes held and No. of Classes attended and print the Attendance Percentage
8. Write a program to find the Volume of Sphere $s = \frac{4}{3}\pi r^3$
9. Write a program to find the volume of Cone $v = \pi r^2 \frac{h}{3}$
10. Write a program to input a 4 digit no. from the user and find the reverse of the no.
11. Write a program to input the price of the item and no. of item from the user and calculate the Total price and then give a discount of 10.25% to the user.
12. Write a program to find the answer of a quadratic equations:
    $ax^2 + bx + c = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$a \neq 0$

13. Write a program to swap two Values
14. Write a program to Convert Celsius To Fahrenheit
15. Write a Program to Calculate compound interest.
    The formula to calculate compound interest annually is given by:
    $A = P(1 + R/100)^t$
    Compound Interest = A – P
    Where,
    A is amount
    P is the principal amount
    R is the rate and T is the time span
16. Python Program to Reverse a 4 digit Number
17. Write a C program to find the third angle of a triangle if two angles are given.
18. Write a C program that converts kilometers per hour to miles per hour
19. Write a C program that takes hours and minutes as input, and calculates the total number of minutes
20. Write a program in C that takes minutes as input, and display the total number of hours and minutes
21. Write a program in C that reads a forename, surname and year of birth and display the names and the year one after another sequentially.

CONDITIONAL PROGRAMMING:

1. Write a program to input age of two people and find Eldest among two.
2. Write a program to input No. of classes held and No. of Classes attended and find the Attendance Percentage and check if He / She can sit in the exam. If the attendance Percentage is less than 75% the student is not allowed to sit in the exam.
3. Write a program to input two sides of a rectangle and check whether it's a square or not
4. Write a program to input the no. of item from the user and calculate the Total price and then give a discount of 10.25% to the user if the purchase quantity is more than 1000. (Per unit price is Rs.125.75/-). Print the total amount to be paid by the user.
5. A Company decided to give bonus of 5% to employee if His / Her Years of service is more than 5 years of Service. Ask the user for their salary and year of service and print the net bonus amount.
6. A school has following rules for grading system:
    a. Below 25% - F Grade
    b. 25% to 45% - E Grade
    c. 45% to 50% - D Grade
    d. 50% to 60% - C Grade
    e. 60% to 80% - B Grade
    f. 80% to 90% - A Grade
    g. Above 90% - S Grade

   Ask the User for marks of 5 Subjects and Calculate percentage and then print the Grades according to the given conditions
7. Write a program to find whether a entered no. is Negative or not
8. Write a program to find the subtract two no. and the answer should always be Positive
9. Write a program check whether a year is Leap or not.
   If a year is divisible by 4 then it's a leap year but of the year is century year like 2000,21000,1900,... then it must be divisible by 400.
10. Write a program to find whether a 4 Digit number is palindrome or not.
    Eg. 1221 if we reverse it then we can se that 1221 is same as we reversed it
11. Ask user to enter age, sex (M or F), marital status (Y or N) and then using following rules print their place of service.
    if employee is female, then she will work only in urban areas.
    if employee is a male and age is in between 20 to 40 then he may work in anywhere
    if employee is male and age is in between 40 t0 60 then he will work in urban areas only.
    And any other input of age should print "ERROR".
12. Given an integer choice denoting the choice of the user and a list containing the single value R or two values L and B depending on the choice.
    If the user's choice is 1, calculate the area of the circle having the given radius(**R**).
    Else if choice is 2, calculate the area of the rectangle with given length(**L**) and breadth(**B**).
13. Write a program to find the answer of a quadratic equations:

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

14. Write a C program to find maximum between two numbers.
15. Write a C program to find maximum between three numbers.
16. Write a C program to check whether a number is negative, positive or zero.
17. Write a C program to check whether a number is divisible by 5 and 11 or not.
18. Write a C program to check whether a number is even or odd.
19. Write a C program to check whether a year is leap year or not.
20. Write a C program to check whether a character is alphabet or not.
21. Write a C program to input any alphabet and check whether it is vowel or consonant.
22. Write a C program to input any character and check whether it is alphabet, digit or special character.
23. Write a C program to check whether a character is uppercase or lowercase alphabet.
24. Write a C program to input week number and print week day.
25. Write a C program to input month number and print number of days in that month.
26. Write a C program to count total number of notes in given amount.
27. Write a C program to input angles of a triangle and check whether triangle is valid or not.
28. Write a C program to input all sides of a triangle and check whether triangle is valid or not.
29. Write a C program to check whether the triangle is equilateral, isosceles or scalene triangle.
30. Write a C program to find all roots of a quadratic equation.
31. Write a C program to calculate profit or loss.
32. Write a C program to input marks of five subjects Physics, Chemistry, Biology, Mathematics and Computer. Calculate percentage and grade according to following:
    Percentage >= 90% : Grade A
    Percentage >= 80% : Grade B
    Percentage >= 70% : Grade C
    Percentage >= 60% : Grade D
    Percentage >= 40% : Grade E
    Percentage < 40% : Grade F
33. Write a C program to input basic salary of an employee and calculate its Gross salary according to following:
    Basic Salary <= 10000 : HRA = 20%, DA = 80%
    Basic Salary <= 20000 : HRA = 25%, DA = 90%
    Basic Salary > 20000 : HRA = 30%, DA = 95%
34. Write a C program to input electricity unit charges and calculate total electricity bill according to the given condition:
    For first 50 units Rs. 0.50/unit
    For next 100 units Rs. 0.75/unit
    For next 100 units Rs. 1.20/unit
    For unit above 250 Rs. 1.50/unit
    An additional surcharge of 20% is added to the bill
35. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.

36. Write a program in C which is a Menu-Driven Program to perform a simple calculation.
37. Write a program in C to calculate and print the Electricity bill of a given customer. The customer id., name and unit consumed by the user should be taken from the keyboard and display the total amount to pay to the customer. The charge are as follow

Unit	Charge/unit
upto 199	@1.20
200 and above but less than 400	@1.50
400 and above but less than 600	@1.80
600 and above	@2.00

If bill exceeds Rs. 400 then a surcharge of 15% will be charged and the minimum bill should be of Rs. 100/-

38. Write a C program to check whether a triangle can be formed by the given value for the angles.
39. Write a C program to read temperature in centigrade and display a suitable message according to temperature state below
    Temp < 0 then Freezing weather
    Temp 0-10 then Very Cold weather
    Temp 10-20 then Cold weather
    Temp 20-30 then Normal in Temp
    Temp 30-40 then Its Hot
    Temp >=40 then Its Very Hot

LOOPING:

1. Write a Program to print a multiplication Table of the user Choice.
2. Take 10 integers from keyboard using loop and print their average value on the screen.
3. Write a program in C to display n terms of natural number and their sum
4.
5. Write an infinite loop.
   A infinite loop never ends. Condition is always true.
6. Factorial of any number n is represented by n! and is equal to 1*2*3*....*(n-1)*n. E.g.-
   4! = 1*2*3*4 = 24
   3! = 3*2*1 = 6
   2! = 2*1 = 2
   Also,
   1! = 1
   0! = 1
   Write a program to calculate factorial of a number.
7. Write a program to find greatest common divisor (GCD) or highest common factor (HCF) of given two numbers.
8. Take integer inputs from user until he/she presses q (Ask to press q to quit after every integer inpu). Print average and product of all numbers.
9. Write a program to find whether entered number is prime or not.
10. Write a program to find whether entered number is palindrome or not.
    Example → 1221
11. Write a program to find whether entered number is Armstrong or not.
    Example → 153 → $1^3+5^3+3^3=153$
    8208 → $8^4+2^4+0^4+8^4=8208$
12. Write a program to find whether entered number is Dissarium or not
    Example → 175 → $1^1+7^2+5^3=175$
13. Write a program to find whether entered number is Special No. or not.
    Example → 145 → 1!+4!+5!=145
14. Calculate the sum of digits of a number given by user. E.g.-
    INUPT : 123 OUPUT : 6
    INUPT : 12345 OUPUT : 15
15. A three digit number is called Armstrong number if sum of cube of its digit is equal to number itself.
    E.g.- 153 is an Armstrong number because $(1^3)+(5^3)+(3^3) = 153$.
    Write all Armstrong numbers between 100 to 500.
16. Write a program to print a number given by user but digits reversed. E.g.-
    INPUT : 123 OUTPUT : 321
    INPUT : 12345 OUTPUT : 54321
17. Write a program to find prime factor of a number. If a factor of a number is prime number then it i its prime factor.
18. Write a program to print all prime number in between 1 to 100.
19. Write a C program to swap first and last digits of a number.
20. Write C program to find LCM of two numbers

21. Write C program to find the sum of first and last digit of any number
22. Write C program to calculate product of digits of a number
23. Write a Program to Find Numbers which are Divisible by 7 and Multiple of 5 in a Given Range
24. Write a program to convert the following
    a. Binary to Octal
    b. Octal to Binary
    c. Decimal To Binary
    d. Binary to Decimal
25. Write a program to print the Following patterns:

*****	**1**	**1**
******	**12**	**22**
*******	**123**	**333**
********	**1234**	**4444**
1	a	a
23	ab	bb
456	abc	ccc
78910	abcd	dddd
a		
bc		
def		
ghij		

26. Write a program to print the following patterns:

********	**1234**	**1111**
*******	**123**	**222**
******	**12**	**33**
*****	**1**	**4**
1234	aaaa	abcd
567	bbb	abc
89	cc	ab
10	d	a
abcd		
efg		
hi		
j		

27.Write a program to print the following Patterns:

*	1	1
**	12	22
***	123	333
****	1234	4444

1	a	a
23	ab	bb
456	abc	ccc
78910	abcd	dddd

a
bc
def
ghij

28.Write a program to print the following patterns:

****	1234	1111
***	123	222
**	12	33
*	1	4

1234	abcd	aaaa
567	abc	bbb
89	ab	cc
10	a	d

abcd
efg
hi
j

29.Write a program in C to display the pattern like a diamond. Go to the editor

```
    *
   ***
  *****
 *******
*********
 *******
  *****
   ***
    *
```

30.Write a Program to print the Following Series:

a. 1+2+3+4+5+6+7+… Till n Terms
b. 0+1+1+2+3+5+8+13+21+33+…Till N terms
c. 0-1+1-2+3-5+8-13+21-33+… Till n Terms

d. $x^1+x^3+x^5+x^7+x^9+$… Till n Terms
e. 1/2! + 2/3! + 3/4! + 4/5! + …n Terms
f. $1^{1!} + 2^{2!} +3^{3!}$ + … n Terms
g. 1+2+4+7+11+16+22+29+ … n Term
h. $x^1/2+x^3/4+x^5/6+x^7/8+x^9/10+$… Till n terms
i. 1, 3, 4, 8, 15, 27, 50…
j. 1,22,333,4444...
k. 1 +11 + 111 + 1111 + .. n terms

31. Write a code for the following patterns

a.
```
        *
      * * *
    * * * * *
* * * * * * * *
        *
      *   *
    *       *
```

b.
```
* * * * * * * *
```

c.
```
        1
      2 3 2
    3 4 5 4 3
  4 5 6 7 6 5 4
5 6 7 8 9 8 7 6 5
```

d.
```
        1
      1   1
    1   2   1
  1   3   3   1
1   4   6   4   1
1 5  10  10  5  1
```

ARRAY

1. Take 10 integer inputs from user and store them in an array and print them on screen.
2. Take 10 integer inputs from user and store them in an array. Again ask user to give a number. Now, tell user whether that number is present in array or not.
3. Take 20 integer inputs from user and print the following: number of positive numbers number of negative numbers number of odd numbers number of even numbers number of 0s.
4. Take 10 integer inputs from user and store them in an array. Now, copy all the elements in an another array but in reverse order.
5. Write a program to find the sum and product of all elements of an array.
6. Initialize and print all elements of a 2D array.
7. Find largest and smallest elements of an array.
8. Write a program to check if elements of an array are same or not it read from front or back.
9. Take an array of 10 elements. Split it into middle and store the elements in two dfferent arrays. E.g.- INITIAL array : 58 24 13 15 63 9 8 81 1 78 After spliting : 9 8 81 1 78
10. Consider an integer array, the number of elements in which is determined by the user. The elements are also taken as input from the user. Write a program to find those pair of elements that has the maximum and minimum difference among all element pairs.
11. If the input array is [10, 12, 20, 30, 25, 40, 32, 31, 35, 50, 60], your program should be able to find that the subarray lies between the indexes 3 and 8.
12. Take an array of length n where all the numbers are nonnegative and unique. Find the element in the array possessing the highest value. Split the element into two parts where first part contains the next highest value in the array and second part hold the required additive entity to get the highest value. Print the array where the highest value get splitted into those two parts.
    Sample input: 4 8 6 3 2 Sample output: 4 6 2 6 3 2
13. Write a program to shift every element of an array to circularly right. E.g.- INPUT : 1 2 3 4 5 OUTPUT : 5 1 2 3 4
14. Initialize a 2D array of 3*3 matrix. Check if the matrix is symmetric or not.
15. Input any number. Find the sum of the digits of the number using a recursive function.
16. Write a Java program to check if an array of integers contains two specified elements 65 and 77.
17. Write a Java program to remove the duplicate elements of a given array and return the new length of the array. Sample array: [20, 20, 30, 40, 50, 50, 50] After removing the duplicate elements the program should return 4 as the new length of the array.
18. Write a program to Perform Liner Searching.
19. Write a program to Perform Binary Searching.
20. Write a program to Perform Bubble Sorting.
21. Write a program to Perform Selection Sorting.

22. Write a program to Perform any sorting and then performing a Binary Serching.
23. Write a program to shuffle a given array of integers. Example: Input : nums = { 1, 2, 3, 4, 5, 6 } Output: Shuffle Array: [4, 2, 6, 5, 1, 3]
24. Write a program to Perform Matrix Multiplication.
25. Write a program to Perform Transpose of a Matrix.
26. Write a program to Reverse a Array.
27. Write a C program to find second largest element in an array.
28. Write a C program to count total number of even and odd elements in an array.
29. Write a C program to count total number of negative elements in an array.
30. Write a C program to copy all elements from an array to another array.
31. Write a C program to insert an element in an array.
32. Write a C program to delete an element from an array at specified position.
33. Write a C program to count frequency of each element in an array.
34. Write a C program to print all unique elements in the array.
35. Write a C program to count total number of duplicate elements in an array.
36. Write a C program to delete all duplicate elements from an array.
37. Write a C program to merge two array to third array.
38. Write a C program to find reverse of an array.
39. Write a C program to put even and odd elements of array in two separate array.
40. Write a C program to search an element in an array.
41. Write a C program to sort array elements in ascending or descending order.
42. Write a C program to sort even and odd elements of array separately.
43. Write a C program to left rotate an array.
44. Write a C program to right rotate an array.
45. Write a C program to add two matrices.
46. Write a C program to subtract two matrices.
47. Write a C program to perform Scalar matrix multiplication.
48. Write a C program to multiply two matrices.
49. Write a C program to check whether two matrices are equal or not.
50. Write a C program to find sum of main diagonal elements of a matrix.
51. Write a C program to find sum of minor diagonal elements of a matrix.
52. Write a C program to find sum of each row and column of a matrix.
53. Write a C program to interchange diagonals of a matrix.
54. Write a C program to find upper triangular matrix.
55. Write a C program to find lower triangular matrix.
56. Write a C program to find sum of upper triangular matrix.
57. Write a C program to find sum of lower triangular matrix.
58. Write a C program to find transpose of a matrix.

59. Write a C program to find determinant of a matrix.
60. Write a C program to check Identity matrix.
61. Write a C program to check Sparse matrix.
62. Write a C program to check Symmetric matrix.
63. Find a peak element which is not smaller than its neighbours

Functions

1. Define two methods to print the maximum and the minimum number respectively among three numbers entered by user.Define a program to find out whether a given number is even or odd.
2. A person is elligible to vote if his/her age is greater than or equal to 18. Define a method to find out if he/she is elligible to vote.
3. Write a program to print the sum of two numbers entered by user by defining your own method.
4. Define a method that returns the product of two numbers entered by user.
5. Write a program to print the circumference and area of a circle of radius entered by user by defining your own method.
6. Define a method to find out if number is prime or not.
7. Write a program which will ask the user to enter his/her marks (out of 100). Define a method that will display grades according to the marks entered as below:

Marks Grade
91-100 AA
81-90 AB
71-80 BB
61-70 BC
51-60 CD
41-50 DD
<=40 Fail

8. Write a program to print the factorial of a number by defining a method named 'Factorial'. Factorial of any number n is represented by n! and is equal to 1*2*3*....*(n-1)*n. E.g.-

4! = 1*2*3*4 = 24
3! = 3*2*1 = 6
2! = 2*1 = 2
Also,
1! = 1
0! = 0

9. Print the multiplication table of 15 using recursion.
10. Define a method to print the prime factors of a number.
11. Using recursion, define a method to know nth term of a Fibonacci series.

Nth term of Fibonacci series is
F(n) = F(n-1)+(n-2)
F(0) = 0
F(1) = 1
F(2) = F(1)+(0) = 1+0 = 1
F(3) = F(2)+(1) = 1+1 = 2
F(4) = F(3)+(2) = 2+1 = 3

12. Define a method named 'perfect' that determines if parameter number is a perfect

number. Use this function in a program that determines and prints all the perfect numbers between 1 and 1000.
[An integer number is said to be "perfect number" if its factors, including 1(but not the number itself), sum to the number. E.g., 6 is a perfect number because 6=1+2+3].
13. Define a method to calculate power of a number raised to other i.e. ab using recursion where the numbers 'a' and 'b' are to be entered by the user
14. Write a program that takes as input your gross salary and your total saving and uses another function named taxCalculator() to calculate your tax. The taxCalculator() function takes as parameters the gross salary as well as the total savings amount. The tax is calculated as follows:
(a) The savings is deducted from the gross income to calculate the taxable income. Maximum deduction of savings can be Rs. 100,000, even though the amount can be more than this.
(b) For up to 100,000 as taxable income the tax is 0 (Slab 0); beyond 100,000 to 200,000 tax is 10% of the difference above 100,000 (Slab 1); beyond 200,000 up to 500,000 the net tax is the tax calculated from Slab 0 and Slab 1 and then 20% of the taxable income exceeding 200,000 (Slab 2); if its more than 500,000, then the tax is tax from Slab 0, Slab 1, Slab 2 and 30% of the amount exceeding 500,000.
15. In Java, we can create an ATM program for representing ATM transection. In the ATM program, the user has to select an option from the options displayed on the screen. The options are related to withdraw the money, deposit the money, check the balance, and exit. To withdraw the money, we simply get the withdrawal amount from the user and remove that amount from the total balance and print the successful message. To deposit the money, we simply get the deposit amount from the user, add it to the total balance and print the successful message. To check balance, we simply print the total balance of the user. We use the exit(0) method to exit from the current Transaction mode and return the user to the home page or initial screen