Students are instructed to write algorithm for the problems in the observation note. In the observation note for each problem record minimum 5 test cases.

Also maintain error log

1. Write a C program to compute the following

$$f = \frac{x^3 - 2x^2 + x - 6.3}{x^2 + 0.05x + 3.14}$$

2. Write a C program to print the roots of a quadratic equation.
3. Write the complete C program that asks the user to enter the value for t from the keyboard and then it computes and prints the value of p which is expressed as a function of t by

$$p(t) = \begin{cases} 20 & \text{when} & 0 < t \le 2 \\ 4(t+2) & \text{when} & 13 < t \le 16 \ \text{or} \ t > 30 \\ 4(t^2 + 2t) & & Otherwise \end{cases}$$

4. Write a program that outputs the day of the week given a date expressed as j (day) m (month) a (year). You will use the following formula:

$$m_1 = \begin{cases} m-2 & si \ m \ge 3 \\ m+10 & si \ m < 3 \end{cases} \qquad a_1 = \begin{cases} a & si \ m \ge 3 \\ a-1 & si \ m < 3 \end{cases}$$

and with ns being the two first digits of $a1$ and as the two last digits of $a1$

$$f = j + a_s + \frac{a_s}{4} - 2n_s + \frac{n_s}{4} + \frac{26m_1 - 2}{10}$$

The day of the week will then be given by the modulo of f and 7 (0 is Sunday, 1 Monday etc). Let the date be DD/MM/CCYY (european format), where DD is the day of the month, MM is the month, CC the century-digits and YY the year within the century. The for the date 23/06/1994. Starting with the century CC-digits, calculate CC/4 - 2*CC-1 and remember the result. With all divisions in this exercise, discard any remainder and just keep the whole part. So, in our example, this is 19/4=4 minus 2*19=38 minus 1, giving minus 35.

Now, using the year YY, calculate 5*YY/4. In this example that's 5*94 = 470/4 = 117, discarding the remainder. Adding this to our existing result gives 117-35 = 82.
Using the month MM, calculate 26*(MM+1)/10. In our example this is 26*7 = 182 / 10 = 18, again discarding the remainder. Add this to our running total giving 82+18 = 100.
Finally just add the day DD. Here 100 + 23 = 123.

Now divide the result by 7, just **keeping the remainder**; here 123(mod 7) = 4. Counting Sunday as zero, Monday = 1 etc, we get 4 = Thursday. *Easy, when you know how :-)*

5. Write a program to find the biggest among two numbers without using any control structures.
6. Write a C program to print * in the format given below.

Right Triangle	Pyramid	Diamond	Right Arrow
* ** *** **** *****	* *** ***** ******* *********	* *** ***** ******* ********* ******* ***** *** *	***** **** *** ** * * ** *** **** *****

7. Write a program for a matchstick game being played between the computer and a user. Your program should ensure that the computer always wins. Rules for the game are as follows:

    − There are 21 matchsticks.

    − The computer asks the player to pick 1, 2, 3, or 4 matchsticks.

    − After the person picks, the computer does its picking.

    − Whoever is forced to pick up the last matchstick loses the game.

8. A number is said to be perfect if it is equal to the sum of all numbers which are its factors (excluding itself). So, for example, 6 is perfect, because it is the sum of its factors 1,2,3. Write a program which determines if a number is perfect. It should also print its factors.
9. Write a program that takes as input a natural number x and prints the smallest palindrome larger than x. A palindrome is a word, number, phrase, or other sequence of characters which reads the same backward as forward, such as madam, racecar. There are also numeric palindromes, including date/time stamps using short digits 11/11/11 11:11 and long digits 02/02/2020.
    Input: n = 121
    Output: Next smallest palindrome of 121 is 131

10. According to a study, the approximate level of intelligence of a person can be calculated using the following formula: $i = 2 + (y + 0.5 \, x)$

    Write a program, which will produce a table of values of i, y and x, where y varies from 1 to 6, and, for each value of y, x varies from 5.5 to 12.5 in steps of 0.5.

    Deadline: 19.08.2024