Indian Institute of Engineering, Science and Technology, Shibpur
B.Tech. 1st Semester Mid-Term Examination, October, 2023
Introduction To Computing (CS - 1101)

Time: 2 hours | Full Marks: 30

(Answer any three questions.
All parts of the same question must be answered together.
For the programming problems use C language.)

1. (a) What are the universal logic gates? Why are they called universal logic gates? Draw their circuit symbols and mention truth tables.

   (b) Derive the truth table for the following boolean expresiion:

   $$Y = f(A, B, C) = A.\overline{C} + \overline{BC} + C$$

   Implement the above expression in digital logic circuit using basic logic gates. Consider 2-input logic gates to desgin the circuit. [3 + (3 + 4) = 10]

2. (a) Write a program to perform an arithmetic operation on two integer numbers and display the output. The numbers and the arithmetic operator ('+', '-', '*', '/', and '%') are user supplied.

   (b) State the difference between *while* and *do-while* loops with suitable example.

   [6 + 4 = 10]

3. (a) Write a program to compute x^y, where x and y are unsigned integers. Do not use the standard library funct ion *pow*().

   (b) Write a program to print the following pattern using loop for $n(= 4)$ number of rows. Here n is a user input.

   ```
   A
   A  B
   A  B  C
   A  B  C  D
   ```

   [4 + 6 = 10]

4. (a) Write a program to check whether an input character is an alphabet or not.

   (b) Write a program to store 10 integers in an array, where, inputs are given by the user and hence, find the maximum and minimum elements among the array elements and display the result in the main program.

   [4 + 6 = 10]