Indian Institute of Engineering, Science and Technology, Shibpur
B.Tech. 2^{nd} Semester Mid-Term Examination, February, 2024
Introduction To Computing (CS - 1201)

Full Marks: 30

Time: 2 hours

(Answer Question 1 and any two questions from the rest.
All parts of the same question must be answered together.
For the programming problems use C language.)

1. (a) Distinguish between primary and secondary memory.
   (b) Convert the following numbers from the given base to the desired base up to 3-digit accuracy.
      (i) $(0.513)_{10}$ to (Base 8)
      (ii) $(306.D)_{16}$ to (Base 2)
   (c) Write a program to print hexadecimal and octal numbers of a given decimal number.

[$2 + (2 \times 2) + 4 = 10$]

2. (a) Draw the block diagram of a computing system and describe each of the units.
   (b) Compute the arithmetic operations $(+12)_{10} + (-10)_{10}$ in binary utilizing 8-bit 2's complement representation.

[$6 + 4 = 10$]

3. (a) Write a program to perform an arithmetic operation among five operations ('+', '-', '*', '/', and '%') on two integer numbers and display the output. The numbers and the option of the arithmetic operator ('+', '-', '*', '/', and '%') are user supplied.
   (b) Write a program to compute x^y, where x and y are unsigned integers. Do not use the standard library function *pow*().

[$6 + 4 = 10$]

4. (a) Write a program to store 10 integers in an array, where, inputs are given by the user, and print the array in reverse order.
   (b) Write a program to evaluate the following series
   $$S = 1 + X + X^2 + X^3 + \ldots \text{ up to } n^{th} \text{ term.}$$
   Here, X and n are user inputs.

[$6 + 4 = 10$]

5. (a) Write a program to check whether a given integer is prime or not.
   (b) Write a program to swap two integers without using any temporary variable.
   (c) How many times will the body of each loop be executed?
      (i) $int\ x = 5;\ y = 50;\ while(x <= y)\ \{x = y/x;\}$
      (ii) $int\ m = 1;\ do\{m = m + 2;\}while(m < 10);$
      (iii) $int\ i;\ for(i = 0; i <= 5; i = i + 2/3)\{x = x + 2;\}$
      (iv) $int\ m = 10;\ int\ n = 7;\ while(m\%n >= 0)\{m = m + 1; n = n + 2;\}$

[$4 + 4 + (0.5 \times 4 = 2) = 10$]