Indian Institute of Engineering Science and Technology, Shibpur
B.Tech. 1^{st} Semester Final Examinations, 2021
Introduction to Computing (CS - 1101)

Time: 90 minutes **Full Marks: 50**

Answer five questions (two from Group - A and three from Group - B).
For the programming problems use C language.

Group - A (Answer any two questions)

1. (a) Convert the following numbers from the given base to the desired base up to 2-digit accuracy.
   (i) $(642.53)_{10}$ to (Base 8)
   (ii) $(732.413)_8$ to (Base 16)
   (b) Using minimum number of 2-input NAND gates realise a 2-input XOR gate.

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

2. Draw the logic circuit diagram for half adder circuit using minimum number of two-input logic gates and also construct the truth table. Then draw a full adder circuit using half adders, and one extra gate if require, and finally, construct the truth table for full adder circuit.

   $[(3 + 2) + (3 + 2) = 10]$

3. (a) Perform the arithmetic operations $(+42) + (-13)$ and $(-42) - (-13)$ in binary using the 2's complement.
   (b) Simplify the following Boolean functions using three-variable map:
   i) $F(x, y, z) = \sum(1, 2, 3, 6, 7)$
   ii) $F(x, y, z) = \overline{x}.\overline{y} + y.z + \overline{x}.y.\overline{z}$

   $[(3 + 3) + (2 + 2) = 10]$

Group - B (Answer any three questions)

4. (a) Write a program to find out all prime numbers between 1 and n, where the number n has to be provided by the user.
   (b) Write a program that reads 10 integers from the console and keep it in an array. Write a function to print the elements of the array in reverse order.

   $[4 + 6 = 10]$

5. (a) Write a program to compute x^y, where x and y are unsigned integers. Also show the use of this function in $main()$. Do not use the standard library function $pow()$.
   (b) Write a program to compute the factorial of a number, n. Here, n is an input given by the user.

   $[5 + 5 = 10]$

6. Write a program that reads two integer matrices and performs multiplication. Also, print the output matrix. The size of the matrices are to be taken from the user.

   [10]

7. Write a function that can take an array of 10 integers as argument and sort the input array. Print the contents of the sorted array in the main program.

   [10]

8. (a) Write a program to compare two text files, say, "$file1.txt$" and "$file2.txt$". If they are same print "Both are same" else print "Different files".

   [10]

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