Indian Institute of Engineering Science and Technology, Shibpur
B. Tech. 2nd Semester (ARCH/CST/EE/ETC/IT) Examinations, 2018
Introduction to Computing (CS 1201)

Full Marks: 35

Time: 2 Hours

Answer question no. 1 and any four from the rest.
For the programming problems use the C language.

1. *Answer any five questions.*

   $[3 \times 5 = 15]$

   (a) What is a MACRO? How is it expanded?

   (b) Show the IEEE 754 32-bit floating point format explaining different fields.

   (c) What are the lowest and highest values of an integer for 14-bit 1's complement and 2's complement representations? What is the problem with 1's complement representation?

   (d) Draw the logic circuit diagram and construct the truth table for the following boolean expression. The boolean expression may be suitably simplified; if possible.

   $$f(a, b, c) = (a' + bc)(ac + b')(c' + ab)$$

   (e) Show XOR logic gate symbol and truth table. Also, design a NOT gate using an XOR gate.

   (f) Explain Pre- and post-increment operations in C with examples.

   (g) Show the use of the Ternary operator in C with examples.

   (h) How do you allocate space to 5 integers using dynamic memory allocation technique in C?

2. Write down the truth table, logic expressions for a 4-bit Binary to Gray converter and draw the logic circuit diagram.

   [5]

3. Define a structure to represent complex numbers. Next, write a function that will accept two complex numbers as arguments, add these two complex numbers and return the sum to the calling function. Also, write *main()* to demonstrate the calling of the function.   [5]

4. Write a recursive function to find the sum of the digits of a non-negative integer number. [5]

5. Write a program to copy one existing file; say, *file1.txt* into another named file; say *file2.txt* such that the destination file will retain only the lower case alphabets contained in the source file. In this case take file names as input through command line arguments as follows

   $ ./a.out file1.txt file2.txt

   where $ is indicating the command prompt.

   [5]

6. Write a program that can accept n number of integers and store them in an array. Here, n is an user input. Next, sort the numbers in ascending order.   [5]

7. Write a program to accept two numbers as strings, add them as integers and print the result as string. Example: Accept "13" and "27" as string, add as integers (13+27=40) and then print "40" as string.

   [5]

8. Write short notes on

   $[2 \times 2\frac{1}{2}]$

   a) Advantages and disadvantages of arrays in comparison to a singly-linked list?

   b) Explain the features of static and register storage classes in C programming.