29-4-16

INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY, SHIBPUR
Dual Degree B.Tech–M.Tech 2nd Semester (CST/IT/EE/ETC/ARCH) Examination, 2016
Introduction to Computing (CS - 1201)

Full Marks: 35 Time: 2 Hours

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

1. Answer any five of the following short questions:

   (a) Convert the Decimal number 200 to Binary, Octal and Hexadecimal.

   (b) What is a Universal gate? Realise the logic function $f(x, y) = xy + \overline{x}$ using Universal gates only.

   (c) What is the problem of using decimal number systems instead of binary for the basic hardware operations of a digital computer?

   (d) Write down the truth table, logic expression for a half subtracter with logic circuit diagram. Note that the half subtracter is very similar to half adder except the logic of subtraction is needed instead of addition.

   (e) While multiplying two big positive integers (both are declared as 'int') you may get a negative result. What could be the interpretation?

   (f) How do we compare two strings? For example what is the property used to encode character code to ensure this comparison?

   (g) Why 2's complement numbers are used to represent negative numbers in computers?

   [3 × 5]

2. Write a recursive function to generate Fibonacci sequence up to n_{th} term where n is an argument to this function. Write a main program to test it. The Fibonacci numbers are generated by setting $F_0 = 0$, $F_1 = 1$ and using the formula $F_n = F_{n-1} + F_{n-2}$ to get the rest. [5]

3. Write a program to dynamically allocate space to a $n \times n$ matrix A consists of integer elements and initialize the elements as per the given condition shown below:

$$\begin{aligned} A[i][j] &= 1 \quad \text{if } A[i][j] \geq T \\ &= 0 \quad \text{Otherwise; for i, j=0, 1, \ldots, 9} \end{aligned}$$

   Where n and T are user input. [5]

4. Write a program to sort an array of 5 given numbers in ascending order. [5]

5. Define a structure for complex numbers and read two complex numbers to perform addition of these complex numbers. [5]

6. Write a program to copy all the vowels from one existing file (say, file.txt) into another file (destination file, say file2.txt). [5]

7. Write a program to read 10 integers in an array as well as find the sum, average, maximum, and the minimum of these numbers. [5]