25/11/19

Indian Institute of Engineering, Science and Technology, Shibpur
B.Tech. (AE/CE/ME/MET/MIN) 1^{st} Semester Final Examination, 2019
Introduction to Computing (CS - 1101)

Time: 3 hours **Full Marks: 50**

(Answer Questin No. 1 and any four from the rest.
If not specifically mentioned assume C programming Language)

1. (Answer any four)

   (a) What are the universal logic gates? Show them with truth tables and also draw their circuit symbols.

   (b) Reduce the following logic expression. Then draw the truth table of the simplified expression and finally draw the corresponding logic circuit diagram.

   $$f(x, y, z) = xy(y + z)(x + z)$$

   (c) Consider two 4-bit integers; 0101 and 1101. Now find out their values in decimal if the encoding is considered i) Sign-Magnitude; ii) 1's complement and iii) 2's complement. Write your result in the tabular form shown below:

Bit-string	Sign-Magnitude	1's Complement	2's compement
0101			
1101			

   (d) Subtract $N(= 0011_2)$ from $M(= 0101)$ using 2's complement method, where M and N are unsigned numbers.

   (e) Assuming ASCII code write the values (in decimal) of the characters, namely, 'A', 'a', CR, LF and SPACE. $[4 \times 4\frac{1}{2}]$

2. Write a program to generate the Fibonacci sequence (*0, 1, 1, 2, 3, 5, 8, ...*) up to n^{th} term where n is an input given by the user.

   The Fibonacci numbers are generated by initializing $F_0 = 0$, $F_1 = 1$ and using the following formula: $F_n = F_{n-1} + F_{n-2}$ [8]

3. Write a function that accepts two unsigmed integers x and y to compute x^y. Also, show the use of this function in *main*(). Do not use the standard library function *pow*(). $[4 + 4 = 8]$

4. Write a program to create an array of structures that consists *Roll_No*, *Name* and *Total_Marks* as members of an structure. Also, print the *Roll_No* and *Name* of the candidate who is having highest *Total_Marks*. $[3 + 5 = 8]$

5. Write a program that takes two matrices of size m x n of integers and perform multiplication of these two matrices. Print the content of the output matrix in the main program. [8]

6. 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. [8]

7. (a) What is *FILE* keyword? Describe different file opening modes used with the library function named *fopen*().

   (b) What are the differences between *structure* and *union*? $[(2 + 4) + 2 = 8]$