(2)

25/11/16

Indian Institute of Engineering Science and Technology, Shibpur
B. Tech.–M. Tech. Dual Degree (AE/CE/ME/MET/MIN) 1^{st} Semester Examination
Introduction to Computing (CS - 1201)

Time: 2 hours **Full Marks: 35**

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

1. (a) Draw the circuit diagram for the following Boolean expression $f(x, y) = xy + \bar{x}$ using minimum number of two input NAND gates only.
   (b) What are the different ways of representing negative numbers. Explain with example.
   (c) Convert the decimal number 32767 to binary, octal and hexadecimal.
   (d) What is the basic difference between a text file and a binary file.
   (e) What is a Gray code? Where is it used?

   $(3+2+2+2+2)$

2. (a) Why the following function fails to swap two integers?

```
void swap (int a, int b)
{  int t; t = a; a = b; b = t; }
```

   Is it due to the parameter passing mechanism used in C functions? If yes; explain why?
   (b) Write a function *fact(int n)* to find the factorial of a number (0 to n). Also write a main program to test it.

   $(3+3)$

3. (a) Write a function *strlength (char s[])* which returns the length of a string.
   (b) Write a function *join(char s1[], char s2[])* which joins string s2 at the end of s1.
   (c) Write a function *comp (char s1[], char s2[])* that compares two strings s1 and s2 and returns 1 if they are equal otherwise 0.

   $(2+2+2)$

4. (a) Explain the features of different storage class specifiers, namely, *automatic, static, register and external*, in C programming language.
   (b) Write a program to print the sum of the following series up to n^{th} term, where x and n have to be taken from the user. Do not use the library function *pow*() for computation of x^n.

$$S = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \ldots n^{th} \text{ terms}$$

   $(3+3)$

5. (a) What are the uses of Dynamic Memory Allocation? What are the differences between Static Memory Allocation and Dynamic Memory Allocation?
   (b) Write a program that reads an array of 10 integers and sort the input array in ascending order. It also prints the contents of the sorted array.

   $(3+3)$

6. (a) Define a suitable structure to represent complex numbers.
   (b) Write a program to read 20 pairs of complex numbers by taking user inputs and store them in an array of structures. The program multiplies each pair and prints all the results.

   $(2+4)$

7. (a) What is the keyword FILE? Describe different file opening modes used with the library function named fopen().
   (b) Write a program that can compare, two text files (specified by the user in the command line) character by character. It returns a value 1 (one) if the files are identical otherwise 0 (zero).

   $(3+3)$