Computer Science I Back paper Exam   **Indian Statistical Institute**
Dec 2018
Total marks: 100
Duration: 3 Hrs

Part I Answer any 10 of the following - 1x10 = 10 marks
1. The standard header……………… is used to access the functions 'malloc' and 'calloc'
2. In a C program, the declaration
     char *str = "Hello";
     makes str a ……………
3. To store the correct value of 11.0 / 4.0 in a variable, declare the variable as a …………. data type
4. Reversing a string is best done using the ………….. data structure.
5. A 2x2 matrix can be implemented in C using ………………… arrays.
6. Consider char x = 'a'; printf("%d", x) will print ………. value of 'a'.
7. There are two ways in which one can call a function, pass by ……….. and pass by ………….
8. A function that calls itself is called a ………………… function.
9. If a pop() operation is done on a Stack with one element, the Stack becomes ……………
10. A binary tree has at the most ……………… children
11. Arithmetic expressions are converted to …………….. form before they are processed by computers.

Part II Answer the following as True or False - 2x5 = 10 marks
1. A constant declared using Const can change its value once defined
2. A global variable is defined inside the main() function of a program
3. First-in-first-out is an example of a Queue data structure
4. Consider the code
     int x = 200, y = 8;
     int *ip = &x;
     printf("%d %f \n", *ip, *ip / y);
   The above will print 20
5. A linked list 'llist' with pointers llist->prev and llist->next is an example of a singly linked list.

Part III Answer the following - 20 marks
1. Do the following:
   a. Given,
      x = 30; y = 3.4; z = 'g' and p = &x;
      Write a printf statement to print values of x, y, z and p. Use the printf statement and the correct format specifier for decimal, float, character and pointer values.
   b. Write a for loop that initialises i to 0 and executes 5 times using the postfix increment operator

    c. Write a while loop that executes five times starting with i=5 using the prefix decrement operator

    d. Declare a struct for a node on a doubly linked list that holds an integer data value.

    e. For example, converting the expression 2 + 3 to postfix form would yield 2 3 +. Using the same principle convert the following expressions to postfix form.
        a. x * y
        b. x+y * u-v

2. Write functions that do the following:
    a. Takes an integer as a parameter, returns 1 if the number is greater than 0, -1 if the number is less than 0 and 0 if the number is equal to 0.
    b. Takes two integer values as parameters and swaps them. Use pass by reference.
    c. Takes a positive integer as a parameter and returns the factorial of the number which it computes recursively.
    d. Takes a string as a parameter and returns the length of a string.

3. Create a stack using an array or a linked list.
Write functions that perform the following operations on the stack:
    a. push a value on to the stack
    b. pop from the stack
    c. checks if the stack is empty
    d. peeks the top of the stack

4. Write functions for the following algorithms:
    a. Bubble Sort
    b. Selection Sort