B.E. Chemical Engineering First Year Second Semester Examination 2018
Subject: INTRODUCTION TO COMPUTER PROGRAMMING
TIME 3 hrs   Full Marks 100

1. Answer any ten:

a) Define pointers. What will be the output of the following code snippet (mention type of error if you find this erronous)?

```
int x[] = {0,1,2,3,4,5,6,7,8,9};
int *y;
int i=3;
printf(*(++&x[i++]));
```

b) Define scope. How can you make a function change the value of a local variable of another function?

c) Define implicit and explicit type casting.

d) Define compile time error and runtime error with examples.

e) Give an example of user defined data types. Write down how to declare your chosen data type.

f) What is the importance of **break** statements inside **Switch-Case**?

g) Explain row-major and column major array access with suitable examples.

h) What will be the output of the following code snippet and why?
```
double x=0.0007;
scanf("%f", &x);
printf("%f", x);
```

i) Differentiate between null-pointer and void-pointer.

j) If you run the following program, how is this going to end(without keyboard interrupt) and why?
```
void f1(void);
void f2(void);
void main(){
printf("Inside main\n");
f1();
}
void f1(void){
printf("Inside f1\n");
f2();
}
void f2(void){
printf("Inside f2\n");
f1();
}
```

[Turn over

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k) Given a polynomial $P(x) = x^6 - 7x^5 + 2x^3 + 5$, what is the fasted method of computing $P(4)$ as par your intuition? Here fast means minimum number of arithmatic operations.

l) What is the meaning of "#include<stdio.h>" written on the start of almost all C programs?

4x10=40

2.
a) Write a program to print the following pattern on your standard output (monitor/file)

```
                1
            1       1
        1       2       1
    1       3       3       1
1       4       6       4       1
```

upto n-rows.

b) Write a program to print odd-placed Fibonacci elements.

6+6=12

Or,

Implement the Newton-Rapson Method to compute root of $f(x)=0$ where $f(x)=x^4-5x+2$, precise upto 4th decimal place.

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3.
a) Define 'Call by Value' and 'Call by Reference' using suitable examples.
b) Describe how a function call is implemented in C.
c) Write a function to implement Bubble sort on a predefined array of integers.

4+2+6=12

Or,

Implement a function to find the square root of an integer. Is your algorithm extendeble for n-th roots in general? If possible, explain how.

6+6=12

4.
a) What are data structures? How do we differentiate them from data types?
b) Define a Stack data structure. What are the operations defined on a stack? Implement a stack using an array along with the operations mentioned.

2+10=12

Or,

Implement a tree which can have any number of children at any node, number of children defined by user at runtime.

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5.
a) Define a bianry search tree.
b) Write a function to construct a binary search tree from an unsorted integer array.
d) Write functions to implement string length finding and string comparison in C without using built-in functions from string library.
e) Concatenate the following strings: "Modi", "Trump", "Hitler". Compare the concatenated string with "Fascists".
e) Now using those functions(whatever needed) write a function to check whether a given string is a palindrome or not.

$$2+5+5+(2+3)+4+3=24$$

Or

Given two points A and B, 10unit distance apart, a person can start walking from a point x unit distance away from A with a probability $p(x) = 6x(100-x)/1000$. She/He can go left or right with probability 0.7 and 0.3 respectively. Write a C program to find the expected distance covered by him/her after N such walks, where N is user input.

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