Time:1 hours **Mid Semester Exam-I: MTH409** **Full Marks 50**

1. Study the following program which is intended to convert temperatures from Celsius to Fahrenheit using the formula $F = 32 + (9/5)C$. Fill in the details below. [5]

```
#include<stdio.h>
int main()
{
float ·····;
printf(·····);
scanf(·····,&degC);
degF=·····;
printf("Celsius %f corresponds to % Fahrenheit\n",·····);
}
```

2. The following statements are part of a C program in which both the x and y are integers. What are the values of x and y in each of the following? [1+1+3+2]

a.
```
x=3,y=2;
if(x<y)
  x +=2;
if(x>y)
  y +=2;
```
x = ———, y=———

b.
```
x=0,y=0;
if(x==y){
  x =2;
  y =2;}
else {
  y =2;
  x =5;}
```
x = ———, y=———

c.
```
x=1,y=5;
for(i=1;i<5;i +=2){
  x +=i;
  y *=(i++);}
```
x = ———, y=———

d.
```
x=1,y=2;
while(x+y<12){
  x++;
  y++;}
```
x = ———, y=———

3. Write down the output of the following program: [6]

```
#include<stdio.h>
int main()
{
int i=4,j=2,k=2,l,m;
k +=j;
j *=i;
l = i++ * k;
m = i + ++k;
k = j++;
printf("i=%2d j=%2d k=%2d l=%2d m=%2d\n",i,j,k,l,m);
k /= j;
j %= i--;
l = --k * i;
m /= i++ + ++l;
k = i++ + --j  -  --m;
printf("i=%2d j=%2d k=%2d l=%2d m=%2d\n",i,j,k,l,m);}
```

4. Following is the Taylor-series expansion for $\sin(x)$:

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots.$$

Write a program that reads a value of x and calculates $\sin(x)$ using the first 10 terms only and prints out the result. [8]

5. Write a program that reads values for the coefficients a, b, c, d, e, and f of the equations

$$ax + by = c$$
$$dx + ey = f$$

of two straight lines and determines whether the lines are parallel or the lines intersect. If they intersect, the program also determines whether the lines are perpendicular. [5]

6. Write a program which takes three integers as input representing a date as day, month, year, and print out the number day, month and year for the following day's date. The program should check whether the input numbers are acceptable.
Typical input: 28 2 1992 Typical output: Date following 28:02:1992 is 29:02:1992 [8]

7. Write a program which reads characters from a line and calculates the number of vowels in the line. Then it prints out the line and the number of vowels in the line. [6]

8. Write a program which reads a single letter of alphabet. If it is a lowercase between 'a' and 'g', the program prints out the alphabet in uppercase form. If it is anything else, the program should print out uppercase 'X'. [5]