Time:2 hours **Midsem: MTH409** **Maximum Marks 50**

1. Rewrite the following code without ***switch*** construct. [7]

```
int i,s=0;
printf("Enter i:");
scanf("%d",&i);
switch(i%5){
      case 4:  s=i++;
      case 2:  i++;
               break;
      case 0:  s +=2*i;
               i++;
               break;
        default: s +=i;
       }
   printf("i=%d  s=%d\n",i,s);
```

Further, write down the output if input value of i is (a) 2, (b) 4 and (c) 5.

2. Rewrite the following code without ***while***, ***continue*** and ***goto*** constructs. [8]

```
int i,j,a=0;
printf("Enter i & j :");
scanf("%d%d",&i,&j);
while(i+2*j<10)
{
if(i%3==0)
  {
   a +=j;
   i +=3;
   continue;
  }
  if(i%3==1)
  {
   a +=j%5;
   i +=2;
   }
a +=j%5;
j++;
}
printf("i=%d  j=%d  a=%d\n",i,j,a);
```

Further, write down the output if input values i, j are (a) 1 , 1 (b) 3 , 1 and (c) 2 , 2.

3. Rewrite the following code without ***for***, ***break***, ***continue***, and ***goto*** constructs. [7]

```
int i,j,a;
printf("Enter i & j :");
scanf("%d%d",&i,&j);
for(a=0;  ;i*=2)
{
    if(i+j>=10)
       break;
    else if(i+j==5)
        {
        j++;
        continue;
        }
    else
       j++;
    a +=i*j%5;
}
printf("i=%d  j=%d  a=%d\n",i,j,a);
```

Further, write down the output if input values $\boldsymbol{i}$, $\boldsymbol{j}$ are (a) 1 , 2 and (b) 2 , 1.

4. Consider the Taylor series for $\sin x$ which can be written as

$$\sin x = \sum_{k=1}^{\infty} t_k, \qquad \text{where} \quad t_k = (-1)^{k-1} \frac{x^{2k-1}}{(2k-1)!}.$$

Write a C program that reads (from keyboard) a real number x and a positive integer n. It then calculates and prints an approximate value of $\sin x$ by adding terms such that the last added term has power less than or equal to n. (For example, if $n = 4$, it adds terms upto power 3. But it adds terms upto power 7 if $n = 7$.) [9]

5. Write a C program that reads (from keyboard) a nonzero integer n. If $n = 0$, then it stops with an appropriate message. It calculates sum of n terms of the series $1 + 3 + 5 + 7 + \cdots$ if $n > 0$. On the other, it calculates sum of $|n|$ terms of the series $-1 - 4 - 7 - 10 - \cdots$ if $n < 0$. Finally, it prints out the sum. [9]

6. A triangle is valid if sum of its any two sides is greater than the third side. If three sides of a valid triangle are a, b and c, then its area is given by $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$, where s is the semi-perimeter of the triangle. Write a C program that [10]

   (a) Accepts coordinates of two-dimensional points A, B and C and check whether ABC forms a valid triangle. If not, then it stops with an appropriate message.

   (b) It calculates and prints the area of the triangle.

   (c) It also checks whether it is a right-angled triangle and prints appropriate message.