Time:$1\frac{1}{4}$ hours **Mid Semester Exam-II: MTH409** **Full Marks 50**

The paper has EIGHT questions

1. An incomplete C program is given below. The output of the program is a=2,b=3,c=1. Write down the prototype of the function *mystery* and complete the details of the function *mystery*. [7]

```
#include<stdio.h>
int main()
{
int a=1,b=2,c=3;
mystery(&a,&b,&c);
printf("a=%d, b=%d, c=%d \n",a,b,c);
return 0;
}
```

2. Write down the output of the following program: [7]

```
#include<stdio.h>
int main()
{
int i=3,a[10],*p;
p = &i;
printf("%d %d \n",i,*p);
for(i=0;i<10;i++)
        *(a+i)=i+1;
p = &a[2];
printf("%d %d \n",i,*p);
p = a+5;
printf("%d \n",*p);
for(i=0;i<3;i++)
        *(p+i)=i+10;
printf("%d \n",*(p-1));
for(i=0;i<10;i++)
        printf("%d ",a[i]);
printf("\n");
return 0;
}
```

3. Write down the output of the following program: [5]

```
#include<stdio.h>
void aup3(int,int,int,int *);
int main()
{
int n[3];
int sum = 4;
n[0]=1,n[1]=2,n[2]=3;
aup3(n[0],n[1],n[2],&sum);
printf("sum = %d \n",sum);
printf("n[0] = %d n[1] = %d n[2] = %d \n",n[0],n[1],n[2]);
return 0;
}
void aup3(int a, int b, int c, int *total)
{
a = 4,b=4,c=4;
*total += a+b+c;
}
```

4. The trapezoidal rule is a method for finding an approximate value for a definite integral. It is given by

$$\int_a^b f(x)\,dx \approx \frac{h}{2}\left[f(a) + f(b) + 2\sum_{i=1}^{n-1} f(a+ih)\right],$$

where $h = (b-a)/n$ and n is the number of subintervals. Write a C program, using functions *trapezd* and *fu*, which calculates the definite integral

$$\int_{0.1}^{1.1} (\sin(x^2) + exp(-x)\cos x)\,dx$$

using 10 subintervals. The C function *trapezd* takes a, b, n as arguments and returns the value of the integral. And the C function *fu* takes x as argument and returns the value of the integrand function. [10]

5. A function $f(x, y)$ is defined as follows:

$$f(x,y) = \begin{cases} x - \sqrt{y}, & y > 0 \\ x + \sin y, & y < 0 \\ x + cos(x), & y = 0 \end{cases}$$

Write an implementation of a C function (*do not write the full program*) which takes x, y as arguments and returns the value of the function $f(x, y)$. [4]

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

```
#include<stdio.h>
int main()
{
int a[3][5],*p,i,j;
for(i=0;i<3;i++)
for(j=0;j<5;j++)
    a[i][j]=(i+1)*(j+2);
printf("%d %d %d\n",*a[0],*(a[1]+2),**(a+2));
p = a[1] + 1;
printf("%d %d %d\n",*p,*(p+6),*(p-2));
p = *(a+2);
printf("%d %d %d\n",*p,p[6],p[-3]);
return 0;
}
```

7. What is the output of the following program? [6]

```
#include<stdio.h>
int main()
{
int *p,i;
p = (int *)calloc(10,sizeof(int));
for(i=0;i<10;i++)
    p[i] = i+1;
for(i=4;i<7;i++)
    printf("%d ",*(p+i));
printf("\n");
p = p+5;
for(i=0;i<5;i++)
    *(p+i) = i+6;
for(i=4;i<7;i++)
    printf("%d ",p[i]));
printf("\n");
return 0;
}
```

8. Write down the output of the following *printf* statements. [5]

```
int i=234;
float a = 1231.266;
printf("%+-4·2f\n",a);
printf("%+10·2g\n",a);
printf("%-#10·4g\n",a);
printf("% +10·4d\n",i);
printf("%+10·3E\n",a);
```

Example: The output of the statements
printf("%-10·2f\n",a);
printf("%·2f\n",a);
for $a = 2345.677$ *are*

2	3	4	5	·	6	8			

2	3	4	5	·	6	8