

1. Write a C program that accepts three integers from the keyboard. It prints out number 1 if any two of them (or all of them) are equal and prints out zero if all of them are different. [6]
2. Write a function with prototype that takes a positive integer argument representing a calendar year and returns integer 1 if it is a leap year else 0. [Hint. A year is a leap year if (i) it is divisible by 4 but not divisible by 100 or (ii) divisible by 400.] [6]
3. Write a C program that (i) reads a number that denotes how many integer numbers are to be stored in an array; (ii) creates a dynamic array to fit the exact size of the data; (iii) reads in that many numbers from the keyboard into the dynamic array and finally (iv) calculates and prints out the maximum element of the array. [11]
4. Write down the output of the following program. [6]

```
#include<stdio.h>
int main()
{ int i_array[3] = {4,9,3};
  int *ptr1,*ptr2,*ptrs[3];
  ptr1 = &i_array[2];
  ptr2 = &i_array[0];
  ptrs[0]=ptr1;
  ptrs[1]=ptr2;
  ptrs[2]=ptr1;
  ptrs[2][0]=-13;
  printf("The values are %d %d %d\n",ptrs[0][0],*ptrs[1],*ptrs[2]);
  return 0;}
```

5. Write down the output of the following program. [11]

```
#include<stdio.h>
int main()
{ char *ptr;
  char aChars[10] = "Excellent";
  ptr = aChars;
  printf("Word = %s\n", aChars);
  *ptr = 'V';
  printf("Now word = %s\n", aChars);
  printf("Mystery char = %c\n",*ptr+3);
  printf("Mystery char = %c\n",*(ptr+3));
  *(ptr+1) = ' ';
  *(ptr+3) = ' ';
  printf("String = %s\n",ptr);
  return 0;}
```

6. Write a recursive function with prototype that takes a positive integer argument n and returns the power of two i.e. 2^n . We shall take $2^0 = 1$. [7]

7 Write a C program that does the following tasks: [11]

(a) Declare a structure called **courseRec** with four components: (i) a string containing the subject code, exactly of 6 characters, e.g. MTH409, (ii) a string containing the subject title, maximum of 50 characters, e.g. Computer programming in C, (iii) an integer containing the subject credit, e.g. 4, and (iv) an integer containing the number of students enrolled, e.g. 47.

(b) Declare a variable **subj** of the structure type declared in (a).

(c) Read the subject code of **subj** from the keyboard.

(d) Read the number of students enrolled of **subj** from the keyboard.

(e) Assign 4 to the credit of **subj**.

(f) Read the subject title of **subj** from the keyboard.

(g) Print out the components of **subj**, as shown in the example below:

```
MTH308      Introduction to Continuum Mechanics      4      42
```

8. Study the following C program and write down the output for the following keyboard inputs (i) 2 7 (ii) -5 2 and (iii) -3 -3. [6]

```
#include<stdio.h>
#include<math.h>
int main()
{int x,y,z,d;
scanf(" %d %d",&x,&y);
d = x != y ? (x-y)/abs(x-y) : 0;
switch (d){
case 1:  z = x;
        break;
case -1: z=y;
        break;
default:
        z=x;}
printf("%d\n",z);
return 0;}
```

9. Construct a structure variable **pt** which represents a point in Cartesian xy-plane. Using **pt**, construct a structure variable **tri** which represents a triangle in the xy-plane. Write a C function with prototype which accepts a triangle as argument and returns the perimeter of the triangle. [11]

10. Study the following C code and write down the output.

```
#include<stdio.h>
struct da
    {float a;
      int i;
    };
typedef struct da data;
int main(){
data *p,q;
float c=3.0;
int d=8;
q.i=3;
q.a=2.0;
p=&q;
p->i=d;
printf("%0.2f %d \n",p->a,q.i);
d=11;
p->a=c;
c=5.0;
printf("%0.2f %d \n",q.a,p->i);
return 0;}
```

11. Write down the output of the following program.

[9]

```
#include <stdio.h>
void hails(int);
int main()
{
hails(5);
return 0;}

void hails(int n)
{
printf("%d\n",n);
if (n == 1)
    printf("END\n");
else if (n%2==0)
    hails(n/2);
else
    hails(3*n + 1);
}
```