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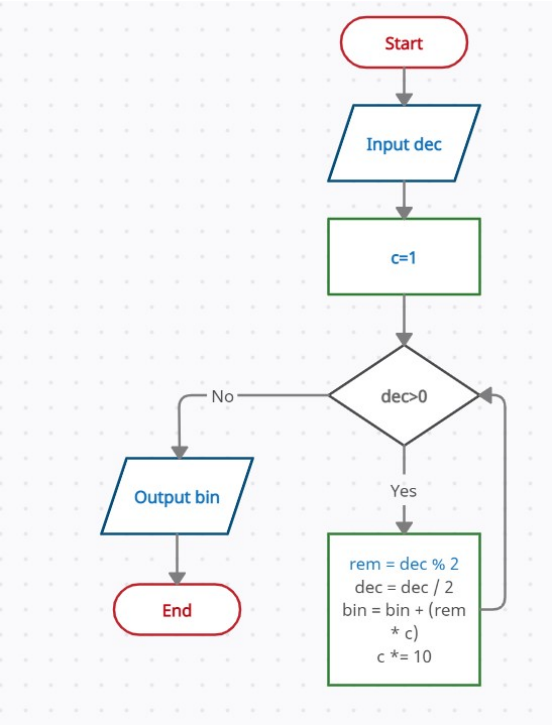
Experiment No.	**2**

AIM:	Apply various control structures to solve given problems.
Program 1	
PROBLEM STATEMENT:	Write a program to convert a decimal number to binary
ALGORITHM:	1. START 2. Input dec 3. Initialize c = 1 4. While dec>0 repeatedly do rem = dec % 2 dec = dec / 2 bin = bin + (rem * c) c *= 10 5. print bin 6. STOP

FLOWCHART:



PROGRAM:

```
#include<stdio.h>
int main()
{
   int dec,bin,rem,c=1;

   printf("Enter a decimal number\n");
   scanf("%d", &dec);

   while (dec>0)
   {
      rem = dec % 2;
      dec = dec / 2;
      bin = bin + (rem * c);
      c *= 10;
   }
   printf("Binary equivalent = %d\n", bin);

   return 0;
}
```

RESULT:

```
PS D:\C Programming\C Practicals-SPIT\Experiment-2> cd "
 prog1 } ; if ($?) { .\prog1 }
Enter a decimal number
5
Binary equivalent = 101
PS D:\C Programming\C Practicals-SPIT\Experiment-2>
```

Program 2	
PROBLEM STATEMENT:	Twin primes are consecutive odd numbers, both of which are prime numbers. Write a program which inputs two positive integers A and B and outputs all twin primes in range A to B.
ALGORITHM:	1. START 2. Input a,b 3. Initialize check=0 4. If a is even i = a+1 5. Else i = a+2 6. While i<=b repeatedly do If a and i are odd If a and i are (prime) Print a,i Check=1 a = i i = i + 2 7. If check == 0 Print no pairs found 8. STOP

PROGRAM:

```
#include<stdio.h>
#include<math.h>
int prime(int);
int main()
{
   int a,b,i,check=0;
   printf("Enter the range a to b:\n");
   scanf("%d%d",&a,&b);

   for(i=a;i+2<=b;i++)
   {
      if (i%2!=0 && (i+2)%2!=0)
      {
         if (prime(i) == 0 && prime(i+2) == 0)
         {
            printf("(%d, %d) ", i, i+2);
            check = 1;
         }
      }
   }
   if(check==0)
      printf("No prime pairs found");
   return 0;
}

int prime(int n)
{
   if (n == 1)
      return 1;
   else if (n > 1)
   {
      for (int i = 2; i <= sqrt(n); i++)
      {
         if (n % i == 0)
            return 1;
      }
   }
   return 0;
}
```

RESULT:

```
PS D:\C Programming\C Practicals-SPIT\Experiment-2> cd "c
 prog2 } ; if ($?) { .\prog2 }
Enter the range a to b:
3 15
(3, 5) (5, 7) (11, 13)
PS D:\C Programming\C Practicals-SPIT\Experiment-2> cd "c
 prog2 } ; if ($?) { .\prog2 }
Enter the range a to b:
2 20
(3, 5) (5, 7) (11, 13) (17, 19)
PS D:\C Programming\C Practicals-SPIT\Experiment-2>
```

Program 3	
PROBLEM STATEMENT:	Write a program to find out whether a number is kaprekar or not. Consider an n-digit number k. Square it and add the right n digits to the left n or n-1 digits. If the resultant sum is k, then k is called a Kaprekar number. For example, 9 is a Kaprekar number since 9^2=81 and 8+1=9
ALGORITHM:	1. START 2. Input n 3. sq = n*n 4. For i=0 sq = sq/10 c++ 5. Repeat step 4 till sq>0 6. sq = n*n 7. for i=1 k = 10^i sum = sq/k + sq%k if sum==n output kaprekar number flag =1 8. repeat step 7 till i<=c 9. if flag==0 output not a kaprekar number 10. STOP

PROGRAM:

```
#include<stdio.h>
#include<math.h>
int main()
{
   int n,sq,sum,i,c=0,k,flag=0;
   printf("Enter a number:\n");
   scanf("%d", &n);
   sq=n*n;
   for(i=0;sq>0;i++)
   {
      sq=sq/10;
      c++;
   }
   sq = n*n;
   for(i=1;i<=c;i++)
   {
      k = pow(10,i);
      sum = sq/k + sq%k;
      if(sum==n)
      {
         printf("%d is a kaprekar number",n);
         flag=1;
         break;
      }
   }
   if(flag==0)
      printf("%d is not a kaprekar number",n);
   return 0;
}
```

RESULT:

```
PS D:\C Programming\C Practicals-SPIT\Experiment-2> cd
 prog3 } ; if ($?) { .\prog3 }
Enter a number:
297
297 is a kaprekar number
PS D:\C Programming\C Practicals-SPIT\Experiment-2> cd
 prog3 } ; if ($?) { .\prog3 }
Enter a number:
81
81 is not a kaprekar number
PS D:\C Programming\C Practicals-SPIT\Experiment-2>
```

Program 4	
PROBLEM STATEMENT:	Note that 12*42 = 21*24 and 12*63 = 21*36 and 12*84 = 21*48 and so on. There is a property that (10a+b)*(10c+d) =(10b+a)(10d+c) where a and b are unequal and c and d are also unequal. Write a program which outputs them all between 10 to 99.
ALGORITHM:	1. START 2. a = 10,b = 99 3. for a=10 for b = 10 1. c = (10 * (a % 10)) + a / 10 2. d = (10 * (b % 10)) + b / 10 3. if ((a*b == c*d) && (c!=a) && (b!=d) && (c!=b) && (d!=a)) Output a*b = c*d Repeat steps 1-3 till b<100 4. Repeat step 3 till a<100 5. STOP
FLOWCHART:	

PROGRAM:

```
#include <stdio.h>
int main()
{
   int a, b, c, d;
   for(a=10;a<100;a++)
   {
      for(b=10;b<100;b++)
      {
         c = (10 * (a % 10)) + a / 10;
         d = (10 * (b % 10)) + b / 10;

         if ((a*b == c*d)&&(c!=a)&&(b!=d)&&(c!=b)&&(d!=a))
         {
            printf("%d*%d = %d*%d\n", a, b, c, d);
         }
      }
   }
}
```

RESULT:

```
PS D:\C Programming\C Practicals-SPIT\E
 prog4 } ; if ($?) { .\prog4 }
12*42 = 21*24
12*63 = 21*36
12*84 = 21*48
13*62 = 31*26
13*93 = 31*39
14*82 = 41*28
21*24 = 12*42
21*36 = 12*63
21*48 = 12*84
23*64 = 32*46
23*96 = 32*69
24*21 = 42*12
24*63 = 42*36
24*84 = 42*48
26*31 = 62*13
26*93 = 62*39
28*41 = 82*14
31*26 = 13*62
31*39 = 13*93
32*46 = 23*64
32*69 = 23*96
34*86 = 43*68
36*21 = 63*12
36*42 = 63*24
36*84 = 63*48
39*31 = 93*13
39*62 = 93*26
41*28 = 14*82
42*12 = 24*21
42*36 = 24*63
42*48 = 24*84
43*68 = 34*86
63*48 = 36*84
64*23 = 46*32
64*69 = 46*96
68*43 = 86*34
69*32 = 96*23
69*64 = 96*46
82*14 = 28*41
84*12 = 48*21
84*24 = 48*42
84*36 = 48*63
86*34 = 68*43
93*13 = 39*31
93*26 = 39*62
96*23 = 69*32
96*46 = 69*64
PS D:\C Programming\C P
```

Program 5	
PROBLEM STATEMENT:	Take two numbers as input and calculate their LCM and GCD (HCF).
ALGORITHM:	1. START 2. Input a,b 3. For i=1 If a%i==0 and b%i==0 Gcd = i 4. Repeat step 3 till i<=a 5. lcm = (a*b)/gcd 6. Ouput lcm,gcd 7. STOP

PROGRAM:	#include<stdio.h>
	int main()
	{
	int a,b,gcd,lcm,i;
	printf("Enter the two numbers:\n");
	scanf("%d%d",&a,&b);
	
	for(i=1;i<=a;i++)
	{
	if(a%i==0&&b%i==0)
	{
	gcd=i;
	}
	}
	lcm = (a*b)/gcd;
	printf("GCD = %d\nLCM = %d\n",gcd,lcm);
	return 0;
	}

RESULT:

```
Enter the two numbers:
72 120
GCD = 24
LCM = 360
PS D:\C Programming\C Practicals-SPIT\Experiment-2>
```

CONCLUSION:	In this experiment, we learnt how to use various control flow statements like: while loop, for loop and nested loops in our programs