F. Y. B.Sc. (Computer Science)

SEMESTER I Lab Course – I

C Programming

Exercise 1 : Testing the errors

Q. Find errors if any in the following program. Justify your answer

1. #include

```
   void main()
   {
      int x;
      printf(“Enter the value of x”);
      scanf(“%d”,x);
}
```

ERROR:

```
before numeric constant
    1. #include
     | ^~
 error: stray '\342' in program
   7 |       scanf(<U+201C>%d<U+201D>,x);
                 ^~~~~~~~
```

2. #include

```
 void main()
{
    printf("hello")
}
```

ERROR:

```
 error: expected '=', ',', ';', 'asm' or '__attribute__' at end of input
    8 | _________________________
```

4.

```
void main()
{
int a, b, c;
 a + b = c;
}
```

ERROR:

```
 error: expected identifier or '(' before numeric constant
    2 | 4. void main()
      | ^~
error: expected '=', ',', ';', 'asm' or '__attribute__' at end of input
    8 | _____________
```

5.

```
#include<stdio.h>
    void main()
```

```
    {
        while(.)
        {
            printf("hello");
        }
    }
```

ERROR:

```
 error: expected identifier or '(' before numeric constant
    2 | 5. #include<stdio.h>
 error: expected '=', ',', ';', 'asm' or '__attribute__' at end of input
   13 | _________________
```

Exercise 2: To demonstrate the use of data types, simple operators and expressions

Set A

Q. Apply all the three program development steps for the following examples.

1. Accept dimensions of a cylinder and print the surface area and volume.

```
#include <stdio.h>
void main()
```

```
{
    float radius,height,surface_area,volume;
   printf("Enter radius of a cylinder : \n");
   scanf("%f",& radius);
   printf("Enter height of a cylinder : \n");
   scanf("%f",& height);
   surface_area = (2*(22 / 7)*radius*radius)+(2*(22/7)*radius*height);
   volume = (22 / 7)*radius*radius*height;
   printf("Surface area of cylinder is: %f", surface_area);
   printf("\n Volume of cylinder is : %f", volume);

}
```

2. Accept temperatures in Fahrenheit (F) and print it in Celsius(C) and Kelvin (K) (Hint: C=5.0/9(F-32), K = C + 273.15)

```
#include<stdio.h>
#include<conio.h>
int main()
{
float cel,fer,kel;

printf("Enter Temperature in Fahrenheit :");
scanf("%f",&fer);

cel= (fer-32)/1.8 ;
```

```
printf("Celsius = %f \n",cel);

kel = (fer-32)/1.8 + 273.15 ;
printf("Kelvin  = %f \n",kel);

return (0) ;
}
```

Output:

```
Enter Temperature in Fahrenheit :56
Celsius = 13.333333
Kelvin  = 286.483337
```

3. Accept a character from the user and display its ASCII value.

```c
#include <stdio.h>
int main() {
   char c;
   printf("Enter a character: ");
   scanf("%c", &c);

   // %d displays the integer value of a character
   // %c displays the actual character
   printf("ASCII value of %c = %d", c, c);

   return 0;
}
```

Run Code

Output

```
Enter a character: G
ASCII value of G = 71
```

Set B .

Apply all the three program development steps for the following examples.

2. Accept two integers from the user and interchange them. Display the interchanged numbers

```
#include<stdio.h>
int main()
{
  int x, y, temp;

  printf("Enter the value of x and y\n");
  scanf("%d%d", &x, &y);
  printf("Before Swapping\nx = %d\ny = %d\n",x,y);
  temp = x;
  x    = y;
  y    = temp;

  printf("After Swapping\nx = %d\ny = %d\n",x,y);

  return 0;
}
```

Output:

```
Enter the value of x and y
```

```
3
6
Before Swapping
x = 3
y = 6
After Swapping
x = 6
y = 3
```

1. Accept the x and y coordinates of two points and compute the distance between the two points

```
#include <stdio.h>
#include <math.h>
int main()
{
   float x1, y1, x2, y2, gdistance;
   printf("Input x1: ");
   scanf("%f", &x1);
   printf("Input y1: ");
   scanf("%f", &y1);
   printf("Input x2: ");
   scanf("%f", &x2);
   printf("Input y2: ");
```

```
    scanf("%f", &y2);


    gdistance = ((x2-x1)*(x2-x1))+((y2-y1)*(y2-y1));
     printf("Distance between the said points:        %.4f",
sqrt(gdistance));
    printf("\n");
    return 0;
}
```

Output:

```
Input x1: 25
Input y1: 15
Input x2: 35
Input y2: 10
Distance between the said points: 11.1803
```

Exercise 3 : To demonstrate use of decision making statements such as if and if-else.

Set A

Q.Apply all the three program development steps for the following examples.

1. Write a program to accept an integer and check if it is even or odd.

```
#include <stdio.h>
```

```
int main()
{
    int number;

    printf("Enter a number: ");
    scanf("%d", &number);

    if (number % 2 == 0)
    {
       printf("%d is an even number.\n", number);
    }
   else
   {
       printf("%d is an odd number.\n", number);
   }

   return 0;
}
```

Output:

```
Enter a number: 5
5 is an odd number.
```

2. Accept a character as input and check whether the character is a digit. (Check if it is in the range ‘0’ to ‘9’ both inclusive)

```
#include<stdio.h>
int main()
```

```
{
   char character;
   printf("Enter a Character\n");
   scanf("%c", &character);

   if(character >= '0' && character <= '9')
 {
       printf("%c is a Digit \n", character);
       }
   else
      {
    printf("%c is a not Digit \n", character);
      }
}
```

Output:

```
Enter a Character
5
5 is a Digit
```

3. Write a program to accept a number and check if it is divisible by 5 and 7.

```
#include<stdio.h>
void main()
{


  int num,f,m;
  printf("\nEnter a number ");
  scanf("%d",&num);
```

```
  if(num%5==0)
  {
   f=1;
  }
    if(num%7==0)
  {
    m=1;
  }
if(f==1 && m==1)
 {
 printf("\nThe number %d is divisible by 5 and 7",num);
 }
else if(f==1)
 {
 printf("\nThe number %d is divisible by 5 but not by 7",num);
}
else if(m==1)
{
 printf("\nThe number %d is divisible by 7 but not by 5",num);
}
else
{
    printf("\nThe number %d is neither divisible by 5 nor by 7",num);
}
}
```

Output

Enter a number 456

The number 456 is neither divisible by 5 nor by 7

Set B

Q. Apply all the three program development steps for the following examples.

1. Accept the time as hour, minute and seconds and check whether the time is valid. (Hint: 0<=hour<=minute <=second

```
#include <stdio.h>
main()
{
        int h , m ,s;
        printf("Enter time in format hh mm ss\n");
        scanf("%d%d%d",&h,&m,&s);

        if((h>=0&&h<24)&&(m>=0&&m<60)&&(s>=0&&s<60))

                printf("Valid\n");
        else
                printf("Invalid\n");
}
```

Output:

```
Enter time in format hh mm ss
12 45 56
Valid
```

2. Accept any year as input through the keyboard. Write a program to check whether the year is a leap year or not. (Hint leap year is divisible by 4 and not by 100 or divisible by 400

```c
#include <stdio.h>
int main() {
  int year;
  printf("Enter a year: ");
  scanf("%d", &year);

  // leap year if perfectly divisible by 400
  if (year % 400 == 0) {
    printf("%d is a leap year.", year);
  }
  // not a leap year if divisible by 100
  // but not divisible by 400
  else if (year % 100 == 0) {
    printf("%d is not a leap year.", year);
  }
  // leap year if not divisible by 100
  // but divisible by 4
  else if (year % 4 == 0) {
    printf("%d is a leap year.", year);
  }
  // all other years are not leap years
  else {
    printf("%d is not a leap year.", year);
  }
```

```
  return 0;
}
```

Output 1

```
Enter a year: 1900
1900 is not a leap year.
```

Exercise 4 : Start Date To demonstrate decision making statements (switch case)

Set A

Apply all the three program development steps for the following examples.

```
#include <stdio.h
void main()
{
  int cdigit;
printf("Input Digit(0-9) : ");            scanf("%d",&cdigit
  switch(cdigit   {
          case 0:
               printf("Zero\n");
    break;
```

```
        case 1:
            printf("One\n
    break;
        case 2:
            printf("Two\n");
    break;
        case 3:
            printf("Three\n");
   break;
        case 4:
            printf("Four\n");
   break;
        case 5:
            printf("Five\n");
   break;
        case 6:

            printf("Six\n");
 break;
        case 7:
            printf("Seven\n
```

```
   break;
        case 8:
            printf("Eight\n
break;
        case 9:
            printf("Nine\n");
break;
        default:
            printf("Invalid digit. \nPlease try again ....\n");
  break;
     }
}
```

Output:

```
Input Digit(0-9) : 9
NINE
```

2. Write a program, which accepts two integers and an operator as a character (+ - * /), performs the corresponding operation and displays the result.

```
#include<stdio.h>
int main()
{
```

```
 int a,b,res;
 char c;

 printf("\n Enter any one operator +, -, *, / :");
 scanf("%c",&c);
 switch(c)
 {
   case '+':
printf("\n Enter two numbers: ");
   scanf("%d%d",&a,&b);
res=a+b;
   printf("\n The sum is %d",res);
   break;
   case '-':
printf("\n Enter two numbers: ");
   scanf("%d%d",&a,&b);
res=a-b;
   printf("\n The difference is %d",res);
   break;
   case '*':
printf("\n Enter two numbers: ");
   scanf("%d%d",&a,&b);
   res=a*b;
   printf("\n The product is %d",res);
   break;
   case '/':
printf("\n Enter two numbers: ");
   scanf("%d%d",&a,&b);
   res=a/b;
   printf("\n The quotient is %d",res);
```

```
    break;
    default: printf ("\n Invalid entry");
  }
}
```

Output:

```
Enter any one operator +, -, *, / :*

Enter two numbers: 6 4

The product is 24
```

Set B

Q. **Apply all the three program development steps for the following examples**.

1. Accept radius from the user and write a program having menu with the following options and corresponding actions Options

1. Area of Circle Actions Compute area of circle and print. 2. Circumference of Circle. 3. Volume of Sphere Compute Circumference of circle and print Compute Volume of Sphere and print .

```
#include<stdio.h>
#include<conio.h>

  void area()
  {
      float radius,area_of_circle;
```

```
  printf("\nEnter radius of circle: ");
  scanf("%f",&radius);
  area_of_circle=(3.142*radius*radius);
  printf("\nArea of Circle: %f",area_of_circle);
}


void circumference()
{
    float radius,circumference_of_circle;
  printf("\nEnter radius of circle: ");
  scanf("%f",&radius);
  circumference_of_circle=2*3.142*radius;
  printf("\nCircumference of Circle: %f",circumference_of_circle);
}

void volume()
{
  float radius,volume_of_sphere;
  printf("\nEnter radius of sphere: ");
    scanf("%f",&radius);
    volume_of_sphere=4/3*3.142*radius*radius;
    printf("\nVolume of Sphere: %f",volume_of_sphere);
}
```

Exercise 5: To demonstrate use of simple loops.

Set A

Q. Apply all the three program development steps for the following examples.

1. Write a program to accept an integer n and display all even numbers upto n. 1.

```c
#include <stdio.h>


int main()
{
   int i, n;

   /* Input upper limit of even number from user */
   printf("Print all even numbers till: ");
   scanf("%d", &n);

   printf("Even numbers from 1 to %d are: \n", n);

   /*
    * Start loop counter from 1, increment it by 1,
    * will iterate till n
    */
   for(i=1; i<=n; i++)
   {
      /* Check even condition before printing */
      if(i%2 == 0)
      {
         printf("%d\n", i);
      }
   }

   return 0;
}
```

Output:

Even numbers between 1 to 10:

2, 4, 6, 8, 10

2. Write a program to accept an integer and check if it is prime or not.

```c
#include <stdio.h>

int main() {

 int n, i, flag = 0;
 printf("Enter a positive integer: ");
 scanf("%d", &n);

 // 0 and 1 are not prime numbers
 // change flag to 1 for non-prime number
 if (n == 0 || n == 1)
   flag = 1;

 for (i = 2; i <= n / 2; ++i) {

   // if n is divisible by i, then n is not prime
   // change flag to 1 for non-prime number
   if (n % i == 0) {
     flag = 1;
     break;
   }
 }

 // flag is 0 for prime numbers
 if (flag == 0)
   printf("%d is a prime number.", n);
```

```
  else
    printf("%d is not a prime number.", n);

  return 0;
}
```
Run Code

Output

```
Enter a positive integer: 29
29 is a prime number.
```

3.Write a program to accept an integer and count the number of digits in the number.

```
#include <stdio.h>
int main()
{
int n;
int count=0;
printf("Enter any number");
scanf("%d",&n);
while(n!=0)
{
n=n/10;
count++;
}
printf("\nThe number of digits are: %d", count);
return 0;
}
```

Output

```
Enter any number: 1000

The number of digits are: 4
```

4. Write a program to display the first n Fibonacci numbers. (1 1 2 3 5 ……)

```c
#include <stdio.h>
int main() {

 int i, n;

 // initialize first and second terms
 int t1 = 0, t2 = 1;

 // initialize the next term (3rd term)
 int nextTerm = t1 + t2;

 // get no. of terms from user
 printf("Enter the number of terms: ");
 scanf("%d", &n);

 // print the first two terms t1 and t2
 printf("Fibonacci Series: %d, %d, ", t1, t2);

 // print 3rd to nth terms
 for (i = 3; i <= n; ++i) {
   printf("%d, ", nextTerm);
```

```
    t1 = t2;
    t2 = nextTerm;
    nextTerm = t1 + t2;
  }

  return 0;
}
```
Run Code

Output

```
Enter the number of terms: 10
Fibonacci Series: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34,
```

5. Write a program which accepts a number and checks if the number is a palindrome (Hint number = reverse of number)

```
#include <stdio.h>
int main() {
  int n, reversed = 0, remainder, original;
    printf("Enter an integer: ");
    scanf("%d", &n);
    original = n;

    // reversed integer is stored in reversed variable
    while (n != 0) {
        remainder = n % 10;
        reversed = reversed * 10 + remainder;
```

```
        n /= 10;
    }

    // palindrome if orignal and reversed are equal
    if (original == reversed)
        printf("%d is a palindrome.", original);
    else
        printf("%d is not a palindrome.", original);

    return 0;
}
```

Run Code

Output

```
Enter an integer: 1001
1001 is a palindrome.
```