C Programming Lab

Part A

1. Program to read radius of a circle and to find area and circumference.

```c
/*Area ( PI*r*r ) and Circumference ( 2*PI*r ) of a circle*/
#include <stdio.h>
int main()
{
      int r;
      float area, circ;
      printf("Enter the radius: ");
      scanf("%d", &r);
      area = 3.14 * r * r;
      circ = 2 * 3.14 * r;
      printf("Area = %f\n", area);
      printf("Circumference = %f\n", circ);
      return 0;
}
```

Output -

```
Enter the radius: 3
Area = 28.260000
Circumference = 18.840000
```

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2. Program to read three numbers and find the biggest of three.

```c
#include<stdio.h>

int main()
{
      int a,b;
      printf("Enter two numbers: ");
      scanf("%d %d", &a, &b);
      if( a > b)
      printf("%d is the largest.\n", a);
      else
      printf("%d is the largest.\n", b);
      return 0;
}
```

Output -

```
Enter two numbers: 2 3
3 is the largest.
```

---

3. Program to demonstrate library functions in math.h

```c
#include<stdio.h>
#include<math.h>
int main()
{
       //ceil()
       printf("Ceil = %f\n", ceil(4.6));
       // floor()
       printf("Floor = %f\n", floor(4.6));
       //fabs()
       printf("Fabs = %f\n", fabs(-2));
       //sqrt()
       printf("sqrt = %f\n", sqrt(16));
       //pow()
       printf("Power = %f\n", pow(2,3));
       //log()
```

```
        printf("Log = %f\n", log(4.0));
        // log10()
        printf("Log10 = %f\n", log10(100.0));
        // exp()
        printf("Exp = %f\n", exp(4.0));
        // cos()
        printf("Cosine = %f\n", cos(0.523599));
        return 0;
}
```

Output -

```
Ceil = 5.000000
Floor = 4.000000
Fabs = 2.000000
sqrt = 4.000000
Power = 8.000000
Log = 1.386294
Log10 = 2.000000
Exp = 54.598150
Cosine = 0.866025
```

---

4. Program to generate n primes

```
#include<stdio.h>
int main()
{
    int n,i,j, count;
    printf("Enter the number: ");
    scanf("%d", &n);
    printf("Prime numbers between 2 and %d are: ",n);
    for(i=2;i<=n;i++)
    {
       count = 0;
       for(j=2;j<i;j++)
```

```
        {
                if( i % j == 0)
                        count++;
        }
        if(count == 0)
                printf("%d ",i);
    }
    printf("\n");
    return 0;
}
```

Output -

```
Enter the number: 20
Prime numbers between 2 and 20 are: 2 3 5 7 11 13 17 19
```

---

5. Program to read a number, find the sum of the digits, reverse the number and check it for palindrome.

```
#include <stdio.h>

int main()
{
    int n, num, rev = 0, rem, sum = 0;

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

    num = n;
    while (num > 0)
    {
       rem = num % 10;
       sum += rem;
```

```
        rev = (rev * 10) + rem;
        num /= 10;
    }
    printf("Sum of the digits in %d = %d\n", n, sum);
    printf("Reversed number = %d\n", rev);

    if( rev == n)
        printf("It is a palindrome number.\n");
    else
        printf("It is not a palindrome number.\n");

    return 0;
}
```

Output -

```
Enter a number: 123
Sum of the digits in 123 = 6
Reversed number = 321
It is not a palindrome number.
```

---

6. Program to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers.

```
#include<stdio.h>
int main()
{
    int i =0, a[100], sum =0;
    while(1)
    {
        printf("%d - Enter the number (999 to stop): ", (i+1));
        scanf("%d", &a[i]);
        if(a[i] == 999)
              break;
```

```
        if(a[i] > 0)
              sum += a[i];
        i++;
    }
    printf("Sum of positive numbers = %d\n", sum);
    return 0;
}
```

Output -

```
1 - Enter the number (999 to stop): 3
2 - Enter the number (999 to stop): 4
3 - Enter the number (999 to stop): 1
4 - Enter the number (999 to stop): 999
Sum of positive numbers = 8
```

---

7. Program to read percentage of marks and to display an appropriate message. (Demonstration of else-if ladder)

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

    printf("Enter the average of all the marks: ");
    scanf("%f", &avg);

    if (avg >= 80)
      printf("Distinction\n");
      else if (avg < 80 && avg >= 60)
      printf("First class\n");
      else if (avg < 60 && avg >= 50)
      printf("Second class\n");
      else if (avg < 50 && avg >= 40)
```

```
      printf("Pass\n");
    else
       printf("Fail\n");

    return 0;
}
```

Output -

```
Enter the average of all the marks: 69
First class
```

---

8. Program to perform addition and subtraction of Matrices.

```
#include<stdio.h>
int main()
{
    int a[10][10], b[10][10], sum[10][10], diff[10][10],i, j, r, cl;

    printf("Enter number of rows and columns: ");
    scanf("%d %d", &r, &cl);

    printf("Enter %d elements into matrix A: ", (r * cl));
    for(i = 0; i < r; i++)
       for(j = 0; j < cl; j++)
             scanf("%d", &a[i][j]);
    printf("Enter %d elements into matrix B: ", (r * cl));
    for(i = 0; i < r; i++)
       for(j = 0; j < cl; j++)
             scanf("%d", &b[i][j]);

    for(i = 0; i < r; i++)
       for(j = 0; j < cl; j++)
       {
             sum[i][j] = a[i][j] + b[i][j];
```

```
            diff[i][j] = a[i][j] - b[i][j];
      }

   printf("Sum of two matrices\n");
   for(i = 0; i < r; i++)
   {
      for(j = 0; j < cl; j++)
            printf("%d ", sum[i][j]);
            printf("\n");
   }
   printf("Difference of two matrices\n");
   for(i = 0; i < r; i++)
   {
      for(j = 0; j < cl; j++)
            printf("%d ", diff[i][j]);
            printf("\n");
   }

   return 0;
}
```

Output -

```
Enter number of rows and columns: 2 2
Enter 4 elements into matrix A: 1 2 3 4
Enter 4 elements into matrix B: 1 2 3 4
Sum of two matrices
2 4
6 8
Difference of two matrices
0 0
0 0
```

Part B

1. Program to find the length of a string without using built in function.

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

int main()
{
    char s[25];
    int i = 0;
    printf("Enter a word: ");
    //scanf("%s", s);
    gets(s);
    printf("s = %s\n", s);
    while (s[i] != '\0')
       i++;
    printf("Length = %d\n", i);
    printf("Length using function = %ld\n", strlen(s));
    return 0;
}
```

Output -

```
Enter a word: noice
s = noice
Length = 5
Length using function = 5
```

2. Program to demonstrate pointers in C.

```c
#include<stdio.h>
int main()
{
    int n =10;
    int *ptr;

    printf("Value of n = %d\n", n);
    printf("Address of n = %x\n", &n);

    ptr = &n;
    printf("Address of ptr = %x\n", &ptr);
    printf("Value of ptr = %x\n", ptr);
    printf("Value of n using ptr = %d\n", *ptr);

    *ptr = 20;
    printf("New value of n = %d\n", n);
    printf("New value of n using ptr = %d\n", *ptr);

    return 0;
}
```

Output -

```
Value of n = 10
Address of n = 1158751c
Address of ptr = 11587520
Value of ptr = 1158751c
Value of n using ptr = 10
New value of n = 20
New value of n using ptr = 20
```

3. Program to check a number for prime by defining isprime( ) function.

```c
#include<stdio.h>

void isprime(int n)
{
    int c = 0, i;

    for(i = 2; i < n; i++)
       if( n % i == 0)
             c++;

       if(c == 0)
             printf("%d is a prime number.\n", n);
       else
             printf("%d is not a prime number.\n", n);
}

int main()
{
    int a;

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

    isprime(a);
    return 0;
}
```

Output -

```
Enter the number: 3
3 is a prime number.
```

4. Program to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.

```c
#include <stdio.h>
int main()
{
  char ch[150];
  int i, alpha, digit, vowel, consonant, space, splchar;
  alpha = digit = vowel = consonant = space = splchar = 0;

  printf("Enter a string: ");
  fgets(ch, sizeof(ch), stdin);

  for (i = 0; ch[i] != '\0'; ++i)
  {
      if(ch[i] >= 'a' && ch[i] <= 'z' ||  ch[i] >= 'A' && ch[i] <= 'Z' )
    {
      alpha++;
      if(ch[i] == 'a' || ch[i] == 'e' || ch[i] == 'i' || ch[i] == 'o' ||
ch[i] == 'u')
            vowel++;
      else
            consonant++;
      }
      else if (ch[i] >= '0' && ch[i] <= '9')
      digit++;
      else if (ch[i] == ' ')
      space++;
      else
      splchar++;
  }

  printf("Alphabets: %d\n", alpha);
  printf("Vowels: %d\n", vowel);
  printf("Consonants: %d\n", consonant);
  printf("Digits: %d \n", digit);
  printf("White spaces: %d\n", space);
  printf("Special Character: %d\n", splchar);
  return 0;
}
```

Output -

```
Enter a string: new h%$oriz12#
Alphabets: 8
Vowels: 3
Consonants: 5
Digits: 2
White spaces: 1
Special Character: 4
```

---

5. Program to Swap Two Numbers using Pointers.

```c
#include<stdio.h>
void swap(int *a, int *b)
{
    int t;
    t = *a;
    *a = *b;
    *b = t;
}

int main()
{
    int x, y;
    printf("Enter two numbers: ");
    scanf("%d %d", &x, &y);
    printf("Before\tx = %d\ty = %d\n", x, y);
    swap(&x, &y);
    printf("After\tx = %d\ty = %d\n", x, y);

    return 0;
}
```

Output -

```
Enter two numbers: 6 9
Before    x = 6    y = 9
After     x = 9    y = 6
```

---

6. Program to demonstrate student structure to read & display records of n students.

```c
#include<stdio.h>

struct student
{
    char name[30];
    int roll;
    float perc;
};

int main()
{
    struct student s[20];
    int i, n;

    printf("Enter the number of students: ");
    scanf("%d", &n);

    for(i = 0; i < n; i++)
    {
       printf("Enter name, roll no. and percentage of student %d: ",
(i+1));
       scanf("%s %d %f", s[i].name, &s[i].roll, &s[i].perc);
    }

    printf("\n\n************************");
    printf("\nStudents Details\n");
    printf("Name\tRoll no.\tPercentage\n");
    for(i = 0; i < n; i++)
       printf("%s\t%d\t\t%.2f\n", s[i].name, s[i].roll, s[i].perc);
```

```
    return 0;
}
```

Output -

```
Enter the number of students: 2
Enter name, roll no. and percentage of student 1: sample 69 99
Enter name, roll no. and percentage of student 2: sam2 99 69


************************
Students Details
Name    Roll no.    Percentage
sample    69        99.00
sam2    99          69.00
```