PROGRAMMING IN C

PRACTICAL ANSWERS

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Practical 03

1. **Write a program to input two numbers and display the highest number.**

```
#include <stdio.h>
int main()
{
   int n1,n2,max;
   printf("Enter Two Numbers : ");
   scanf("%d %d",&n1,&n2);
  if(n1>n2)
      max=n1;
   else
     max=n2;
  printf("The Highest is %d\n",max);
}
```

2. **Write a complete program to ask user enter three integer numbers, and then tell the user the largest value and smallest value among the three numbers.**

```
#include <stdio.h>
int main() {
   int n1, n2, n3;
   int largest, smallest;
   printf("Enter three integer numbers: ");
   scanf("%d %d %d", &n1, &n2, &n3);
   largest = n1;
```

```
    smallest = n1;
    if (n2 > largest)
        largest = n2;
    else if (n2 < smallest)
        smallest = n2;
    if (n3 > largest)
        largest = n3;
    else if (n3 < smallest)
        smallest = n3;
    printf("Largest number: %d\n", largest);
    printf("Smallest number: %d\n", smallest);
}
```

3. **Display employee name, new salary, when the user inputs employee name, and basic salary. You can refer following formula and the table to calculate new salary:**

New Salary = Basic Salary + Increment

Basic Salary	**Increment**
Less than 5000	**5% of Basic Salary**
More than or equal 5000 and less than 10000	**10% of Basic Salary**
More than or equal 10,000	**15% of Basic Salary**

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

```
{
   char empname[20];
   float bs,inc,ns;
   printf("Enter Employee Name :");
   scanf("%s",&empname);
   printf("Enter Basic Salary :");
   scanf("%f",&bs);
   if(bs>=10000)
      inc=bs*0.15;
   else if(bs>=5000)
      inc=bs*0.10;
   else
      inc=bs*0.05;
   ns=bs+inc;
   printf("Employee Name : %s\n",empname);
   printf("New Salary : %.2f \n",+ns);
}
```

4. **Diameter, Circumference and Area of a Circle) Write a program that reads in the radius of a circle and prints the circle's diameter, circumference and area. Use the constant value 3.14159 for π. Perform each of these calculations inside the printf statement(s) and use the conversion specifier %f.**

```
#include <stdio.h>
#define PI 3.14159
int main()
{
   double radius, diameter, circumference, area;
```

```
    printf("Enter the radius of the circle: ");
    scanf("%lf", &radius);
    diameter = 2 * radius;
    circumference = 2 * PI * radius;
    area = PI * radius * radius;
    printf("Diameter: %.2f\n", diameter);
    printf("Circumference: %.2f\n", circumference);
    printf("Area: %.2f\n", area);
}
```

5. **Write a program that reads in two integers and determines and prints if the first is a multiple of the second.**

```
#include <stdio.h>
int main()
{
    int num1, num2;
    printf("Enter the first number: ");
    scanf("%d", &num1);
    printf("Enter the second number: ");
    scanf("%d", &num2);
    if (num2 != 0 && num1 % num2 == 0)
    {
        printf("%d is a multiple of %d\n", num1, num2);
    }
    else
    {
```

```
        printf("%d is not a multiple of %d\n", num1, num2);
    }
}
```

6. **Write a C program that prints the integer equivalents of some uppercase letters, lowercase letters, digits and special symbols. As a minimum, determine the integer equivalents of the following: A B C a b c 0 1 2 $ * + / and the blank character.**

```
#include <stdio.h>
int main()
 {
   printf("Integer equivalents:\n");
   printf("Uppercase letters:\n");
   printf("A: %d\n", 'A');
   printf("B: %d\n", 'B');
   printf("C: %d\n", 'C');

   printf("\nLowercase letters:\n");
   printf("a: %d\n", 'a');
   printf("b: %d\n", 'b');
   printf("c: %d\n", 'c');

   printf("\nDigits:\n");
   printf("0: %d\n", '0');
   printf("1: %d\n", '1');
   printf("2: %d\n", '2');
```

```
    printf("\nSpecial symbols:\n");
    printf("$: %d\n", '$');
    printf("*: %d\n", '*');
    printf("+: %d\n", '+');
    printf("/: %d\n", '/');
    printf("Blank character: %d\n", ' ');
}
```

7. **The gross remuneration of a company salesman comprises the Basic Salary and certain additional allowances and bonuses as given below:**
   Salesmen with over 5 years' service receive a 10% additional allowance of Basic Salary each month.
   Salesmen working in Colombo (Input character 'C' if the city is Colombo) receive an additional allowance of Rs. 2,500/- per month.
   The monthly bonus payment is computed as given below:

Monthly Sales(Rs)	Bonus as a percentage of monthly sales
0-25000	**10**
25000-50000	**12**
>=50000	**15**

Write a program to output the gross monthly remuneration of a salesman.

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

```
{
   float basic_salary, allowance, bonus, gross_remuneration;
   int years_of_service, monthly_sales;
   char city;
   printf("Enter basic salary: ");
   scanf("%f", &basic_salary);
   printf("Enter years of service: ");
   scanf("%d", &years_of_service);
   printf("Enter city of working (Ex: C for Colombo): ");
   scanf(" %c", &city);
   printf("Enter monthly sales: ");
   scanf("%d", &monthly_sales);

   if (years_of_service > 5) {
   allowance = basic_salary * 0.1;
   } else {
   allowance = 0;
   }
   if (city == 'C' || 'c') {
   allowance += 2500;
   }
   if (monthly_sales < 25000) {
   bonus = monthly_sales * 0.1;
   } else if (monthly_sales < 50000) {
   bonus = monthly_sales * 0.12;
   } else {
   bonus = monthly_sales * 0.15;
```

```
        }
        gross_remuneration = basic_salary + allowance + bonus;
        printf("Gross monthly remuneration: Rs %.2f\n", gross_remuneration);

    }
```

Practical 04

If else and Switch Statements

Q1) Use If-Else and write a program that reads an integer and determines and prints if the number is even or odd. (i.e. divisible by 2)

```
#include <stdio.h>

int main()

{

   int no,ans;

   printf("Enter the number:");

   scanf("%d",&no);

   ans=no%2;

   if(ans==1)

      printf("%d is an odd number\n",no);

   else

      printf("%d is an even number\n",no);
```

```
}
```

Re-write the above program using a switch statement instead of an If-Else statement!

```
#include <stdio.h>

int main()

{

   int number;

   printf("Enter the number: ");

   scanf("%d", &number);

   switch (number % 2) {

      case 0:printf("%d is an even number.\n", number);break;

      case 1:

      case -1:printf("%d is an odd number.\n", number);break;

   }

}
```

Q2) Write a simple menu driven calculator to perform (+ - / *) operations. (The program must display a menu to select the desired operator.)

```
#include <stdio.h>

int main()
```

```
{
    int choice;
    float num1, num2, result;
    printf("Menu Driven Calculator\n");
    printf("----------------------\n");
    printf("1. Addition\n");
    printf("2. Subtraction\n");
    printf("3. Multiplication\n");
    printf("4. Division\n");
    printf("Enter your choice:");
    scanf("%d", &choice);
    printf("Enter two numbers: ");
    scanf("%f %f", &num1, &num2);
    switch (choice) {
        case 1:
            result = num1 + num2;
            printf("Result: %.2f\n", result);
            break;
        case 2:
            result = num1 - num2;
```

```
            printf("Result: %.2f\n", result);
            break;
        case 3:
            result = num1 * num2;
            printf("Result: %.2f\n", result);
            break;
        case 4:
            if (num2 != 0) {
                result = num1 / num2;
                printf("Result: %.2f\n", result);
            } else {
                printf("Error: Division by zero\n");
            }
            break;
        default:
            printf("Invalid choice\n");
    }
}
```

Q3) Create a text-based, menu-driven program that allows the user to choose whether to calculate the circumference of a circle, the area of a circle or the volume of a sphere. The program should then input a radius from the user, perform the appropriate calculation and display the result.

```
#include <stdio.h>
#define PI 3.14159

int main() {
   int choice;
   float radius, result;

   printf("Menu:\n");
   printf("1. Calculate the circumference of a circle\n");
   printf("2. Calculate the area of a circle\n");
   printf("3. Calculate the volume of a sphere\n");
   printf("Enter your choice: ");
   scanf("%d", &choice);

   printf("Enter the radius: ");
   scanf("%f", &radius);

   switch (choice) {
      case 1:
         result = 2 * PI * radius;
         printf("The circumference of the circle is: %.2f\n", result);
         break;
      case 2:
```

```
            result = PI * radius * radius;
            printf("The area of the circle is: %.2f\n", result);
            break;
        case 3:
            result = 4.0 / 3.0 * PI * radius * radius * radius;
            printf("The volume of the sphere is: %.2f\n", result);
            break;
        default:
            printf("Invalid choice!\n");
            break;
    }

}
```

Q4) Write a C program to read a character from the user and determine whether the given letter is vowel or not. (Use a switch statement which also includes 'default' state).

```
#include <stdio.h>

int main()

{

   char ch;

   printf("Input a character:");

   scanf("%c",&ch);

   switch(ch)
```

```
  {
     case'A':printf("A is a vowel");break;
     case'E':printf("E is a vowel");break;
     case'I':printf("I is a vowel");break;
     case'O':printf("O is a vowel");break;
     case'U':printf("U is a vowel");break;
     default:printf("%c is not a vowel\n",ch);
  }
}
```

Q5) Write a C program to enter month number and print total number of days in month using switch case. First assume that the given month belongs to a non-leap year.

```
#include <stdio.h>
int main()
{
  int m;
  printf("Enter month number:");
  scanf("%d",&m);
  switch(m)
  {
```

```
        case 1:printf("January has 31 days.\n");break;
        case 2:printf("February has 28 days.\n");break;
        case 3:printf("March has 31 days.\n");break;
        case 4:printf("April has 30 days.\n");break;
        case 5:printf("May has 31 days.\n");break;
        case 6:printf("June has 30 days.\n");break;
        case 7:printf("July has 31 days.\n");break;
        case 8:printf("August has 31 days.\n");break;
        case 9:printf("September has 30 days.\n");break;
        case 10:printf("October has 31 days.\n");break;
        case 11:printf("November has 30 days.\n");break;
        case 12:printf("December has 31 days.\n");break;
        default:printf("Invalid Month Number\n");
    }
}
```

Practical 05

Section A

Q1) Write a C program to print numbers from 0 to 100. (You are required to write 3 separate answers each using While, Do..While, For, looping structures).

While

```
#include <stdio.h>
int main()
{
   int x=0;
   while(x<=100)
   {
      printf("%d",x);
      x++;
   }
}
```

Do..While

```
#include <stdio.h>
int main()
{
   int x=0;
   do
   {
      printf("%d",x);
      x++;
   }
   while(x<=100);
}
```

For

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

```
    int x;
    for(x=0;x<=100;x++)
    {
        printf("%d",x);
    }
}
```

Q2) Write a C program to calculate and print the total of 10 marks and the average. If the average is less than 50 program should print “Fail!” otherwise “Pass!”

```
#include <stdio.h>
int main()
{
    int marks[10];
    int i, total = 0;
    float avg;
    printf("Enter 10 marks:\n");
    for (i = 0; i < 10; i++)
    {
        printf("Mark %d: ", i + 1);
        scanf("%d", &marks[i]);
        total += marks[i];
    }
    avg = (float)total / 10;
    printf("\nTotal marks: %d\n", total);
    printf("Average marks: %.2f\n", avg);
    if (avg < 50)
```

```
    {
    printf("Fail!\n");
    }
  else
    {
    printf("Pass!\n");
    }
}
```

Q3) Write a C program to calculate factorial of a user given number. Hint:

- **Select an appropriate looping structure.**
- **Factorial of '0' is '1' (0! = 1)**
- **Ex: factorial of number 5 is calculated as 5! = 5*4*3*2*1**

```
#include <stdio.h>
int main()
{
   int number, factorial = 1;
   printf("Enter a number: ");
   scanf("%d", &number);
   if (number == 0)
      {
         printf("Factorial of 0 is 1\n");
      }
   else
      {
      for (int i = number; i >= 1; i--)
```

```
            {
            factorial *= i;
            }
        printf("Factorial of %d is %d\n", number, factorial);
        }
    }
```

Q4) Write a C program to calculate the sum of all digits of a user given number.

- **If user input 123 your program should output 6. (calculated as 1+2+3)**

```
#include <stdio.h>
int main()
{
   int no, sum = 0;
   printf("Enter a number: ");
   scanf("%d", &no);
   while (no > 0)
      {
      sum += no % 10;
      no /= 10;
      }
   printf("The sum of the digits is: %d\n", sum);
}
```

Q5) Write a C program to reverse the digits of a number using do-while statement.

```
#include <stdio.h>
int main()
{
   int number, reversedNumber = 0, remainder;
   printf("Enter an integer: ");
   scanf("%d", &number);
   do  {
      remainder = number % 10;
      reversedNumber = reversedNumber * 10 + remainder;
      number /= 10;
      } while (number != 0);
   printf("Reversed number: %d\n", reversedNumber);
}
```

Q6) Write a C program to calculate nth power of a given integer. The user input base and exponent. (Do NOT use inbuilt functions, instead use a loop)

```
#include<stdio.h>
int main()
{
  int base, exponent;
  long value = 1;
  printf("Enter a base value:");
  scanf("%d", &base);
  printf("Enter an exponent value: ");
  scanf("%d", &exponent);
  while (exponent != 0)
```

```
  {
    value *= base;
    --exponent;
  }
  printf("result = %ld", value);
}
```

Q7) Write a C program to print first 10 numbers of “Fibonacci Sequence”.

```
#include <stdio.h>
int main()
{
   int n1 = 0, n2 = 1, nt, i;
   printf("First 10 numbers of Fibonacci sequence: \n");
   for (i = 0; i < 10; i++)
      {
      if (i <= 1)
         nt = i;
      else
         {
            nt = n1 + n2;
            n1 = n2;
            n2 = nt;
         }
      printf("%d ", nt);
      }
}
```

Q8) Write a C program to check whether a given number is an Armstrong Number! (Refer to previous flowcharts)

```
#include <stdio.h>
int main()
{
   int num,r,sum=0,temp;
   printf("Input  a number: ");
   scanf("%d",&num);
   for(temp=num;num!=0;num=num/10)
      {
       r=num % 10;
       sum=sum+(r*r*r);
      }
   if(sum==temp)
       printf("%d is an Armstrong number.\n",temp);
   else
       printf("%d is not an Armstrong number.\n",temp);
}
```

Q9) Write a C program to print all the ASCII values for letters A to Z.

```
#include <stdio.h>
int main()
{
   char ch;
   for (ch = 'A'; ch <= 'Z'; ch++)
```

```
    {
        printf("ASCII value of %c is %d\n", ch, ch);
    }
}
```

Q10) Write a program to print this pattern.

```
*
**
***
****
*****
```

```
#include <stdio.h>
int main()
{
 int x,y;
 for(x=1;x<=5;x++)
 {
   for(y=1;y<=x;y++)
   {
      printf("*");
   }
   printf("\n");
 }
}
```

Q11) Write a program to check whether a given number is prime or not.

```
#include <stdio.h>
int main()
{
  int n, i, flag = 0;
  printf("Enter a number: ");
  scanf("%d", &n);
  if (n == 0 || n == 1)
    flag = 1;
  for (i = 2; i <= n / 2; ++i) {
    if (n % i == 0) {
      flag = 1;
      break;
    }
  }
  if (flag == 0)
    printf("%d is a prime number.", n);
  else
    printf("%d is not a prime number.", n);
}
```

Q12) Write a C program to print all factors of a given integer.

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

```
   int num, i;
   printf("Enter an integer: ");
   scanf("%d", &num);
   printf("Factors of %d are: ", num);
   for (i = 1; i <= num; ++i)
   {
      if (num % i == 0)
      {
         printf("%d ", i);
      }
   }
}
```

Q13) Write a C program to add all user inputs until user input '-1'. And then display the sum.

```
#include <stdio.h>
int main()
{
   int number, sum = 0;
   printf("Enter numbers to add.\n(enter -1 to stop):\n");
   while (1)
   {
      scanf("%d", &number);
      if (number == -1)
         break;
      sum += number;
```

```
    }
    printf("Sum: %d\n", sum);
}
```

Q14) Write a C program to read user inputs for an integer array (size = 10) and print the array.

```
#include <stdio.h>
int main()
{
    int array[10];
    int i;
    printf("Enter 10 integers:\n");
    for (i = 0; i < 10; i++)
        {
        printf("Input integer %d: ", i + 1);
        scanf("%d", &array[i]);
        }
    printf("The array you entered is:\n");
    for (i = 0; i < 10; i++)
        {
        printf("%d ", array[i]);
        }
}
```

Q15) Re-Write the above code to count all the even numbers in above integer array and display the count.

```
#include <stdio.h>
int main()
{
   int array[10];
   int i, count = 0;
   printf("Enter 10 integers:\n");
   for (i = 0; i < 10; i++)
      {
      printf("Enter element %d: ", i + 1);
      scanf("%d", &array[i]);
      }
   for (i = 0; i < 10; i++)
      {
      if (array[i] % 2 == 0)
         {
         count++;
         }
      }
   printf("The number of even numbers in the array is: %d\n", count);
}
```

Section B

1. Input 10 numbers and to output number of positive, number of negative, number of zeros.

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

```
int main()
{
   int count=1,p=0,n=0,z=0,num;
   while (count<=10)
      {
         printf("Enter values:");
         scanf("%d",&num);
         if(num>0)
         {
            p=p+1;
         }
         else if(num<0)
         {
            n=n+1;
         }
         else
         {
            z=z+1;
         }
         count++ ;
      }
   printf("Number of positive values are %d\n",p);
   printf("Number of negative values are %d\n",n);
   printf("Number of zero values are %d",z);
 }
```

2. Input Marks of 10 students and output the maximum , minimum and average Marks.

```
#include <stdio.h>
int main()
{
   int marks[10];
   int i, max, min, sum = 0;

   for (i = 0; i < 10; i++)
   {
      printf("Enter the marks of 10 students %d: ", i + 1);
      scanf("%d", &marks[i]);
      sum += marks[i];
   }
   max = marks[0];
   min = marks[0];
   for (i = 1; i < 10; i++)
   {
      if (marks[i] > max)
      {
         max = marks[i];
      }
      if (marks[i] < min)
      {
         min = marks[i];
      }
```

```
    }
    float average = (float) sum / 10;
    printf("\nMaximum marks: %d\n", max);
    printf("Minimum marks: %d\n", min);
    printf("Average marks: %.2f\n", average);
}
```

3. Input price of 10 items and display the average value of an Item , number of items which the price is greater than 200.

```
#include <stdio.h>
int main()
{
    int i,count=0;
    float avg,sum=0,price;
    for(i=1;i<=10;i++)
       {
          printf("Enter the price of item %d:",i);
          scanf("%f",&price);
          sum=sum+price;
       if(price>=200)
          {
                    count=count+1;
          }
       }
    avg=sum/10;
    printf("Average is %f\n",avg);
```

```
   printf("Number of items that price greater than 200 are %d",count);
}
```

4. Input the Employee no and the Basic Salary of the Employees in an organisation ending with the dummy value -999 for Employee no and count the number Employees whose Basic Salary >=5000.

```
#include <stdio.h>
int main() {
   int empno;
   float bs;
   int count = 0;
   printf("Enter the Employee No and Basic Salary.\n(Enter -999 to stop)\n");
   while (1)
      {
      printf("Employee No: ");
      scanf("%d", &empno);
      if (empno == -999) {
         break;
      }
      printf("Basic Salary: ");
      scanf("%f", &bs);
      if (bs >= 5000)
      {
         count++;
      }
      }
```

```
    printf("Number of Employees with Basic Salary >= 5000: %d\n", count);
}
```

5. Input employee number, and hours worked by employees, and to display the following:

Employee number, Over Time Payment, and the percentage of employees whose Over Time Payment exceeding the Rs. 4000/-.

The user should input –999 as employee number to end the program, and the normal Over Time Rate is Rs.150 per hour and Rs. 200 per hour for hours in excess of 40.

```
#include<stdio.h>
int main()
{
    int EmpNo,counter=0,hours,rate,ot=0;
    while(EmpNo!=-999)
    {
        printf("Enter the employee number : ");
        scanf("%d",&EmpNo);
        printf("Enter the hours worked : ");
        scanf("%d",&hours);
        if(hours>=40)
            rate=200;
        else
            rate=150;
        ot=hours*rate;
        if(ot>=4000)
            counter++;
    }
```

```
   printf("number of employees whose Over Time Payment is greater than 4000 :
%d",counter);

}
```