Chapter-05

Problem-5.2:Fill in the blanks in the following statements:

(a)The …….operator is true only when both the operands are true.
Ans: logical AND (&&).

(b)Multiway section can be accomplished using an else if statement or the statement.
Ans: switch.

(c)The…….. statement when executed in a switch statement causes. immediate exit from the structure
Ans: break.

(d)The ternary conditional expression using the operator ?: code be easily coded using ……..statement.

Ans: if…else.

(e)The expression !(x!=y)can be replaced by the expression……
Ans: x==y.

Problem-5.1:State whether the following are true or false :

(a)When if statements are nested , the last else gets associated with the nearest if without an else.
Ans: False.

(b)One if can have more than one else clause.
Ans: False.

(c)A switch statement can always be replaced by a series of if..else statements.
Ans: False.

(d)A switch expression can be of any type.
Ans: False.

(e)A program stops its execution when a break statement is encountered.
Ans: False.

(f)Each expression in the else if must test the same variable.
Ans: True.

(g)Any expression can be used for the if expression.
Ans: True.

(h)Each case label can have only one statement.
Ans: True.

(i)The default case is required in the switch statement.
Ans: True.

(j)The predicate! ((x>=10) (y==5)) is equivalent to (x<10) && (y!=5).
Ans: True.

Problem-5.3:Find errors, if any, in each of the following segments:

Solution:

(a)if((x+y=z) && (y>0))
printf(" ");

Ans: Error.

Correct ans: if((x+y==z) && (y>0))
printf(" ");

(b) if (code >1)
a= b+c
else
a=0

Ans: Error.

Correct ans: if (code >1)
a= b+c;
else
a=0;

(c) if(p>0) || (q <0)
printf("Sign is negative");

Ans: Error.

Correct ans:if((p>0) || (q <0))
printf("Sign is negative");

<u>Problem-5.5</u>:Rewrite each of the following without using compound relations:

(a) if(grade<=59&&grade>=50)
second=second+1;

Solution:

if(grade<=59)
second=second+1;

if(grade>=50)
second=second+1;

(b) if (number>100||number<0)
printf("Out of range");
else
sum=sum+number;

Solution:

if (number>100)
printf("Out of range");
else if(number<0)
printf("Out of range");
else
sum=sum+number;

(c) if (M1>60&&M2>60||T>200)
printf("Admitted\n");
else
printf ("Not admitted");

Solution:

```
if (M1>60)
printf (“Admitted\n”);
if (M2>60)
printf (“Admitted\n”);
else if(T>200)
printf (“Admitted\n”);
else
printf (“Not admitted”);
```

Problem-5.4:The following is a segment of a program:

```
x=1;
y=1;
if(n>0)
x=x+1;
y=y-1;
printf("%d %d", x,y);
```

what will be the values of x and y if n assumes a value of (a) 1and (b) 0.

Solution:

(a)The value of x is 2 & y is 0.
(b)The value of x & y is imaginary.

Problem-5.6:Assuming x=10 ,state whether the following logical expressions are true or false:

(a)x==10 && x>10 && !x Ans:False.
(b)x==10 || x> 10 && !x Ans:True.
(c)x==10 && x>10 ||!x Ans:False.
(d)x==10 ||x>10 || !x Ans:True.

Problem-5.7:Find errors,if any, in the following switch related statements.Assume that the variables x and y are of int type and x=1 and y=2.

Solution:

(a)switch(y);
Ans: Error.
Correct ans: switch(y)
(b)case 10;
Ans: Error.
Correct ans: case 10:
(c)switch(x+y)
Ans:No error.
(d)switch(x) {Case 2: y= x+y; break};
Ans: Error.
Correct ans: switch(x) {Case 2: y= x+y; break;}

Problem-5.8:Simplify the following compound logical expressions:

(a) !(x<=10)
Ans:(x>10)

(b)!(x==10)||!((y==5)||(z<0))
Ans: (x>0)

(c)!((x+y==z)&&!(z>5))
Ans: (x<z)

(d)!((x<=5)&&(y==10)&&(z<5))
Ans: (x>5)

<u>Problem-5.9:</u>Assuming that x=5, y=0,and z=1 initially ,what will be their values after executing the following code segments?

(a)
```
if(x && y)
    x=10;
  else
    y=10;
```

Output:
10
10

(b)
```
if(x|| y ||z)
    y=10;
  else
    z=0;
```

Output:
1
0

(c)
```
if(x)
    if(y)
      z=10;
    else
      z=0;
```

Output:
10
0

(d)
```
if(x ==0 || x && y)
    if(!y)
      z=0;
    else
      y=1;
```

Output:
0
1

<u>Problem-5.10:</u>Assuming that x=2,y=1 and z=0 initially ,what will be their values after executing the following code segments?

(a)
```
switch(x)
{
    case 2:
      x=1;
      y=x+1;
```

case 1:
x=0;
break;
default:
x=1;
y=0;
}
Output:
1
0
(b)
switch(y)
{
case 0:
x=0;
y=0;
case 2:
x=2;
z=2;
default:
x=1;
y=2;
}
Output:
0 0 0

Problem-5.11:Find the error ,if any,in the following statements:
Solution:
(a)if(x>=10)
printf("\n");
Ans: No error.
(b)if(x>=10)
printf("OK");
Ans: No error.
(c)if(x==10)
printf ("Good");
Ans : No error.
(d)if(x=<10)
printf("Welcome");
Ans : Error.
Correct ans: if(x<=10)
Printf("Welcome");

Problem-5.12:What is the output of the following program?
Solution:
main()

```
{
                    int                    m=5;
if(m<3)           printf("%d",           m+1);
else   if   (m<5)   printf("%d",   m+2);
else   if   (m<7)   printf("%d",   m+3);
else      printf("%d",                 m+4);
getch();
}
```

Output:

8

Problem-5.13:What is the output of the following program?

Program:

```
main                                                    ()
{
                    int                                 m=1;
                    if(                                 m==1)
                                                        {
                    printf                              ("Delhi");
                                                        if(m==2)
                                                        printf("Chennai");
                                                        else
                                                        printf("Banglore");
                                                        }
else
Printf("END");
getch();
}
```

Output:

1
Delhi
2
Chennai
3
Banglore

RQ-5.14:What is the output of the following program?

Program:

```
main()
{
int                                                     m;
for(m=1;                    m<5;                        m++)
printf("%d\n",(m%2)     ?       m       :       m*2);
getch();
}
```

Output:

1 4 3 8

Problem-5.15:What is the output of following program?

```
Program:
main()
{
int m,n,p;
for(m=0; m<3;m++)
for(n=0;n<3;n++)
for(p=0;p<3;p++)
if(m+n+p==2)
goto print;
print:
printf("%d %d %d",m,n,p);
getch();
}
```

Output:

0 0 2

Problem-5.16:What will be the value of x when the following segment is executed?

```
int x=10,y=15;
x= (x<y)? (y+x) : (y-x) ;
```

Solution:

The value of x after execution is :-25.

RQ-5.17:What will be the output when the following segment is executed?

```
int x=0;
if(x>=0)
if(x>0)
    printf("Number is positive");
else
    printf("Number is negative");
```

Output:

0

Number is positive

1

Number is negative

RQ-5.18: What will be the output when the following segment is executed?

```
Program:
char ch = ‘a’
switch(ch)
{
    case ‘a’:
```

```
                                                    printf(“A”);
                                case                ‘b’:
                                                    printf(“B”);
                                case                ‘c’:
                                                    printf(“C”);
}
```

Output:

```
a
A
b
B
c
C
```

Problem-5.19:What will be the output of the following segment when executed?

Program:

```
main()
{
 int                                                x=10,y=20;
if((                    x<y)||                      (x+5)>10)
                                                printf("%d",x);
else
                                                    printf("%d",y);
getch();
}
```

Output:

```
10
```

Problem-5.20:What will be the output of the following segment when executed?

Program:

```
main()
{
                        int             a=10,               b=5;
                                                        if(a>b)
                                                            {
                                                        if(b>5)
                                                    printf("%d",b);
                                                            }
                                                          else
                                                    printf("%d",a);
getch();
}
```

```
                    Programming                     Problem
                    Programming                     Problem
                    Programming                     Problem
```

Programming Problem
Programming Problem

Problem-5.1 Write a program to determine whether a given number is odd or even and print the message: NUMBER IS EVEN or NUMBER IS ODD (a) without using else option, and (b) with using else option.

Solution:

(a) without using else option:

```
/*……even or odd……*/

#include<stdio.h>
#include<conio.h>
void main()
{
int n;
clrscr();
printf(“Enter a number\n”)
scanf("%d",&n);
if(n%2==0)
printf("NUMBER IS EVEN ");
if(n%2==1)
printf("NUMBER IS ODD ");
getch();
}
```

(b) with else option:

```
/*……even or odd……*/
#include<stdio.h>
#include<conio.h>
void main()
{
int n;
clrscr();
printf(“Enter a number\n”)
scanf("%d",&n);
if(n%2==0)
printf("Even");
else
printf("Odd");
getch();
}
```

Problem-5.2 Write a program to find the number of and sum of all integers greater than 100 and less than 200 that are divisible by 7.

Solution:

```
/*…..number between 100-200 divisible by 7……*/
```

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i,n,r,sum;
sum=0;
clrscr();
for(i=100;i<=200;i++)
{
r=i%7;
if(r==0)
{
printf(" %d",i);
sum=sum+i;
}
printf("Sum=%d",sum);
}
getch();
}
```

<u>Problem-5.3</u> A set of two linear equations with two unknowns x1 and x2 is given below:
ax1 +bx2=m and cx1+dx2=n
The set has unique solution
x1= and x2=
provided the determinate ad-cb is not equal to zero.
Write a program that will read the values of constants a,b,c,d,m and n and compute the values of x1 and x2 .An appropriate message should be printed if ad-cb=0.

Solution:

```
/*.......two linear equation.........*/
#include<stdio.h>
#include<conio.h>
void main()
{
float a,b,c,d,m,n,x1,x2;
clrscr();
printf("Input a,b,c,d,m,n:\n");
scanf("a=%f b=%f c=%f d=%f m=%f n=%f",&a,&b,&c,&d,&m,&n);
x1=(m*d-b*n)/(a*d-c*b);
x2=(n*a-m*c)/(a*d-c*b);
if((a*d-c*b)!=0)
printf("x1=%f x2= %f",x1,x2);
else
printf("The value is infinity.\n");
getch();
}
```

Problem-5.4 Given a list of marks ranging from 0 to 100, write a program to print number of students:
(a)Who have obtained more than 80 marks, (b) who have obtained more than 60 marks,
(c)Who have obtained more than 40 marks, (d) who have obtained 40 or less marks,
(e)In the range 81 to 100, (f) in the range 61to 80,
(g)in the range 41 to 60, and (h) in the range 0 to 40.
The program should use a minimum numbers of if statements.
Solution:

```
/*….marks obtain……*/
#include<stdio.h>
#include<conio.h>
void main()
{
int marks,count,a,b,c,d,i;
a=0; b=0; c=0;d=0;
clrscr();
printf("Input 20 boy's marks\n");
for(i=1;i<=20;i++)
{
scanf("%d",&marks);
if(marks>80)
a++;
else if(marks>60)
b++;
else if(marks>40)
c++;
else if(marks<=40)
d++;
}
printf("Number of students who have obtained more than 80 marks=%d\nNumber of

students who have obtained more than 60 marks=%d\n Number of students who have obtained more than 40 marks=%d\n Number of students who have obtained 40 or less marks=%d",a,b,c,d);

getch();
}
```

Problem-5.5 Admission to a professional course is subjects to the following conditions:
(a) Marks in Mathematics>=60
(b) Marks in Physics>=50

(c) Marks in Chemistry>=40
(d) Total in all three subjects>=200 or Total in Mathematics and Physics>=150
Given the marks in the three subjects, write a program to process the applications to list the eligible candidates.

Solution:

```
/*……..admission for a professional course……*/
#include<stdio.h>
#include<conio.h>
void main()
{
int r,m,c,p,b;
clrscr();
printf("Input Mathmatics,Physics and Chemistry");
scanf("%d%d%d",&m,&p,&c);
r=m+p+c;
b=m+p;
if(m>=60&&p>=50&&c>=40&&r>=200&&b>=150)
printf("The candidate is eligible");
else
printf("The candidate is not eligible");
getch();
}
```

<u>Problem-5.7:</u> Shown below is a Floyd's triangle .

```
1
2 3
4 5 6
7 8 9 10
11……..15
79..... .. .. .. ..91
```

(a) Write a program to print this triangle.

Solution:

```
/*…….Floyd's triangle……..*/
#include<stdio.h>
#include<conio.h>
void main()
{
int i,j,count,n;
clrscr();
count=0;
printf("\n\nHow many rows of Floyd triangle: ");
scanf("%d",&n);
for(i=1;i<=n;i++)
{
```

```
                                                    for(j=1;j<=i;j++)
                                                    {
                                                    count++;
                                                    printf("%d",count);
                                    printf("                        ");
                                                    }
                                                    printf("\n");
                                                    }
                                                    getch();
}
```

(b) Modify the program the following from of Floyd's triangle.

1

0 1

1 0 1

0 1 0 1

1 0 1 0 1

Solution:

```
/*…….Floyd's                                        triangle……..*/

#include<stdio.h>
#include<conio.h>
void                                                main()
{
                                    int                 i,j,n;
                                                    clrscr();
                                                    count=0;
        printf("\n\nHow     many    rows    of    Floyd    triangle:    ");
                                                    scanf("%d",&n);
                                                    for(i=1;i<=n;i++)
                                                    {
                                                    for(j=2;j<=i+1;j++)
                                                    {
                                                    printf("%d",(i+j)%2);
                                    printf("                        ");
                                                    }
                                                    printf("\n");
                                                    }
                                                    getch();
                                                    }
```

<u>Problem-5.8</u> Acloth showroom has announced the following seasonal discounts on purchase ofitems

Purchase amount	Discount
	Mill

cloth	Handloom	items
0-100		5%
101-200	5%	7.5%
201-300	7.5%	10.0%
Above300	10.0%	15.0%

Write a program using switch and if statements to compute the net amount to be paid by a coustomer.

Solution:

```
/*…….marketing of a showroom……*/
#define MC1 0
#define MC2 0.05
#define MC3 0.075
#define MC4 0.10
#define HI1 0.05
#define HI2 0.075
#define HI3 0.10
#define HI4 0.15
#include<stdio.h>
#include<conio.h>
void main()
{
float price,net,discount;
int level,jobnumber;
clrscr();
input:
printf("Enter level jobnumber and purchase amount\n");
printf("Enter zero for level to End\n");
scanf("%d%d%f",&level,&jobnumber,&price);
if(level==0) goto stop;
if(0<=price<=100)
level=1;
else if(101<=price<=200)
level=2;
else if(201<=price<=300)
level=3;

else
level=4;
switch(level)
{
case 1:
discount=MC1+HI1;
break;
case 2:
discount=MC2+HI2;
```

```
                                                    break;
                                        case        3:
                                                    discount=MC3+HI3;
                                                    break;
                                        case        4:
                                                    discount=MC4+HI4;
                                                    break;
                                                    default:
                        printf("Error       in      level       code\n");
                                    goto                        stop;
                                                                }
                                                    net=price-(price*discount);
                            printf("Net                         amount=%f\n",net);
                                        goto                    input;
        stop:printf("\n\nEND       OF      THE         PROGRAM");
                                                    getch();
                                                                }
```

Problem-5.10 Write a program to compute the real roots of a quadratic equation

ax2+bx2+c=0
The roots are given by the equtions:
x1 and x2
The program should request for the values of the constants a,b and c print the values of x1 and x2.Use the following:

(a) No solution, if both a and b are zero
(b) There is only one root if a=0(x=-c/b)
(c) There are no real roots, if b2-4ac is negative
(d) Otherwise, there no real roots
Test your program with appropriate data so that all logical paths are working as per your design. Incorporate appropriate output messages.

Solution:

```
/*…….roots        of      quadratic       equation        ….*/

 #include<stdio.h>
 #include<conio.h>
 #include<math.h>
                                        void                    main()
                                                                {
                                    float           a,b,c,x,discriminant,root1,root2;
                                                    clrscr();
            printf("Input       values      of      a,      b       and     c\n");
                        scanf("%f           %f                  %f",&a,&b,&c);
                                                    discriminant=b*b-4*a*c;
                                                    if(a==0&&b==0)
```

```
                printf("No                    solution\n");
                else                          if(a==0)
                                              {
                                              x=-(c/b);
                                              printf("x=%f",x);
                                              }
                else                          if(discriminant<0)
        printf("Roots          are            imaginary\n");
                                              else
                                              {
                                              root1=-b+sqrt(discriminant)/2*a;
                                              root2=-b-sqrt(discriminant)/2*a;
        printf("Root1=%f                      Root2=%f",root1,root2);
                                              }
                                              getch();
                                              }
```

Problem-5.9 Write a program that will read the value of x and evaluate the following function

y= { 1 for x <o
o for x<o
-1 for x<o

using
(a) nested if statements.
(b) else if statements and
(c) conditional operator ?

Solution:

```
/*……evaluate          the          equation……..*/
 (a)nested            if           statements:
#include<stdio.h>
#include<conio.h>
void                                 main()
                                     {
                     float           x,y;
                                     clrscr();
                     printf("Input   x\n");
                                     scanf("%f",&x);
                                     if(x!=0)
                                     {
                                     if(x>0)
                                     printf("y=1");
                                     if(x<0)
                                     printf("y=-1");
                                     }
                                     if(x==0)
                                     printf("y=0");
                                     getch();
```

```
}
```
(b)else if statements:
```
#include<stdio.h>
#include<conio.h>
void main()
 {
float x,y;
clrscr();
printf("Input x\n");
scanf("%f",&x);
if(x!=0)
{
if(x>0)
{
printf("1");
}
else
printf("-1");
}
else
printf("0");
getch();
}
```
(c)conditional operator:
```
#include<stdio.h>
#include<conio.h>
void main()
{
clrscr();
float y,x;
printf("Input x\n");
scanf("%f",&x);
y=(x!=0)? ((x>0)?1:-1) :0;
printf("%d",y);
getch();
}
```

<u>Problem-5.11:</u> Write a program to read three integer values from the keyboard and displays the output stating that they are the sides of right-angled triangle.

Solution:

```
/*……right-angled triangle……..*/
#include<stdio.h>
#include<conio.h>
```

```
void main()
{
int a,b,c, x, y, z;
clrscr();
printf("Input three integer values a b and c\n");
scanf("%d%d%d",&a,&b,&c);
x=a*a;
y=b*b;
z=c*c;
if(a>b&&a>c&&(x==y+z))
printf("The values are sides of right-angled triangle");
else if(b>a&&b>c&&(y==x+z))
printf("The values are sides of right-angled triangle");
else if(c>a&&c>b&&z==x+y)
printf("The values are sides of right-angled triangle");
else
printf("The values are not sides of right-angled triangle");
getch();
}
```

Problem-5.12: An electricity board charges the following rates for the use of electricity:
For the first 200 units: 80 per unit
For the next 100 units: 90per unit
Beyond 300 units: Rs.1.00 per unit
All users are charged a minimum of Rs. 100 as meter charge. If the total amount is more than Rs.400, then an additional surcharge of 15% of total amount is charged. Write a program to read the names of users and number of units consumed and print out the charges with names.

Solution:

```
/*…….pay bill……..*/
 #include<stdio.h>
 #include<conio.h>
 void main()
 {
    float units, total, net;
    char name;
    clrscr();
    printf("Input users name and units\n");
    scanf("%s %f", name, &units);

      if(units<=200)
           total=100+0.80*units;
      else if(units<=300)
          total=100+0.90*units;
```

```
        else if(units>300)
             total=100+1.00*units;
      }
    if(total>400)
      {
       net=total+ total*0.15;
       printf("Total=%f", net);
       }
       else
       printf("Total=%f", total);
  getch();
  }
```

Problem-5.13: Write a program to compute and display the sum of all integers that are divisible by 6 but not divisible by 4and lie between 0 to 100. The program should also count and display the number of such values.

Solution:

```
/*……numbers between 0-100 divisible by 6 but not divisible by 4….*/
#include<stdio.h>
#include<conio.h>
void main()
 {
  int i, count;
  count=0;
  clrscr();
  for(i=0;i<=100;i++)
    {
      if(i%6==0&&i%4!=0)
        {
         count=count+1;
         printf("  %d",i);
        }
    }
 printf("\n");
 printf("count=%d",count);
 getch();
}
```

Problem-5.15: Write a program read a double-type value x that represents angle in radians and a character-type variable t that represents the type of trigonometric function and display the value of
(a) sin(x), if s or S is a assigned to T,
(b) cos(x), if c or C is assigned to T, and
(c) tan(x), if t or T is assigned to T
Using (i) if...else statement and (ii) switch statement.

Solution-1:

(i)if…else statement :

```
/*……trigonometric function…….*/
#include<stdio.h>
#include<conio.h>
#include<math.h>
#include<ctype.h>
void main()
{
  int x,c,s,d,t; clrscr();
  float r,result;
  s=1;
  c=2;
  t=3;
  printf(“Input the value of x  and character value\n”);
  scanf("%d",&x);
   r=x*(180/3.1416);
   scanf("%d",&d);
  {
   if(d==1)
   result=sin(r);
   else if(d==2)
   result=cos(r);
   else if(d==3)
   result==tan(r);
   else
          printf("no response.");
     }
    printf("\n%f",result);
    getch();
   }
```

Solution-2:

(ii) switch statement:

```
 /*……trigonometric function……..*/
 #include<stdio.h>
 #include<conio.h>
 #include<math.h>
 void main()
 {
     int i,x;
     float v,r;
     char t;
     clrscr();
     printf("Input the value of x\n");
     scanf("%d",&x);
       r=x*(180/3.1416);
      printf("Input charecter");
      scanf("%c",&t);
```

```
switch(t)
 {
   case 's':
   case 'S':
              v=sin(r);
   case 'c':
   case 'C':
             v=cos(r);
   case 't':
   case 'T':
              v=tan(r);
 }
 printf("%f",v);
 getch();
     }
```

Problem-5.14 Write an interactive program that could read a positive integer number and decide whether the number is a prime number display the output accordingly. Modify the program to count all prime numbers that lie 100 to 200. [Note: A prime number is positive integer that is divisible only by 1or by itself]

Solution:

```
/*……prime number ……*/
  #include<stdio.h>
  #include<conio.h>
  void main()
  {
   int i,j,count;
   clrscr();
   printf("\n\nSeries of prime number from 100 to 200:\n");
   for(i=100;i<=200;i++)
     {
        for(j=2;j<=i;j++)
           {
              if(i%j==0)
              break;
           }
        if(i==j)
             {
               printf("%4d\n",i);
              count+=1;
             }
     }
    printf("The countable number is: %d",count);
    getch();
    }
```