

KPIT TECHNOLOGIES

WEEKLY REPORT

WEEK 1- Report (DATE: 24/5/2024)

<u>Student name</u>	<u>Week</u>	<u>Branch</u>	<u>USN</u>
<u>Juweriah</u> <u>Heria</u>	<u>1</u>	<u>Circuit (ECE)</u>	<u>1NH20EC053</u>

Yashavant Kanetkar Book 19th edition

Question 1-50:

1) Calculate simple interest for a set of values representing principal, number of years and rate of interest

```
# include <stdio.h>
int main( )
{
float p, n, r, si ;
p = 1000 ;
n = 3 ;
r = 8.5 ;
si = p * n * r / 100 ;
printf ( "%f\n" ,si ) ;
return 0 ;
}
```

Output : 255

2) Ramesh's basic salary is input through the keyboard. His dearness allowance is 40% of basic salary, and house rent allowance is 20% of basic salary. Write a program to calculate his gross salary.

```
# include <stdio.h>
int main( )
{
float bp, da, hra, grpay ;
printf ( "\nEnter Basic Salary of Ramesh: " ) ;
scanf ( "%f", &bp ) ;
da = 0.4 * bp ;
hra = 0.2 * bp ;
```

```

grpay = bp + da + hra ;
printf ( "Basic Salary of Ramesh = %f\n", bp ) ;
printf ( "Dearness Allowance = %f\n", da ) ;
printf ( "House Rent Allowance = %f\n", hra ) ;
printf ( "Gross Pay of Ramesh is %f\n", grpay ) ;
return 0 ;
}

```

Output:

```

Enter Basic Salary of Ramesh: 1200
Basic Salary of Ramesh = 1200.000000
Dearness Allowance = 480.000000
House Rent Allowance = 240.000000
Gross Pay of Ramesh is 1920.000000

```

3)The distance between two cities (in kilometers) is input through the keyboard. Write a program to convert and print this distance in meters, feet, inches and centimeters.

```

#include <stdio.h>
int main( )
{
float km, m , cm, ft, inch ;
printf ( "\nEnter the distance in Kilometers: " ) ;
scanf ( "%f", &km ) ;
m = km * 1000 ;
cm = m * 100 ;
inch = cm / 2.54 ;
ft = inch / 12 ;
printf ( "Distance in meters = %f\n", m ) ;
printf ( "Distance in centimeter = %f\n", cm ) ;
printf ( "Distance in feet = %f\n", ft ) ;
printf ( "Distance in inches = %f\n", inch ) ;
return 0 ;
}

```

Output

```

Enter the distance in Kilometers: 3
Distance in meters = 3000.000000
Distance in centimeter = 300000.000
Distance in feet = 9842.519531
Distance in inches = 118110.234375

```

4) If the marks obtained by a student in five different subjects are input through the keyboard, write a program to find out the aggregate marks and percentage marks obtained by the student. Assume that the maximum marks that can be obtained by a student in each subject is 100.

```

#include <stdio.h>
int main( )
{
int m1, m2, m3, m4, m5, aggr ;
float per ;

```

```

printf ( "\nEnter marks in 5 subjects: " );
scanf ( "%d %d %d %d %d", &m1, &m2, &m3, &m4, &m5 );
aggr = m1 + m2 + m3 + m4 + m5 ;
per = aggr / 5 ;
printf ( "Aggregate Marks = %d\n", aggr );
printf ( "Percentage Marks = %f\n", per );
return 0 ;
}

```

Output:

```

Enter marks in 5 subjects: 85 75 60 72 56
Aggregate Marks = 348
Percentage Marks = 69.000000

```

5) Which of the following are invalid C constants and why?

'3.15'	35,550	3.25e2
2e-3	'eLearning'	"show"
'Quest'	23	4 6 5 2

'3.15' and 'eLearning' and 'Quest' are invalid because single quotes denote character constants in C, which should contain only a single character.

35,550 is invalid because commas are not allowed in numeric constants.

2^3 is invalid because the caret symbol (^) is not used for exponentiation in C; instead, it represents the bitwise XOR operator.

4 6 5 2 is invalid because numeric constants should not contain spaces.

6) Which of the following are invalid variable names and why?

B'day	int	\$hello
#HASH	dot.	Number
totalArea	_main()	temp_in_Deg
total%	1st	stack-queue
variable name	%name%	salary

B'day \$hello #HASH _main() total% %name% stack-queue
(No special symbol except underscore allowed in variable naming).

int

(Keyword cannot be used as a variable.)

Same as 1st

(Variable name should start with an alphabet.)

7) State whether the following statements are True or False

(a) C language was developed by Dennis Ritchie.

(b) Operating systems like Windows, UNIX, Linux and Android are written in C.

(c) C language programs can easily interact with hardware of a PC / Laptop.

(d) A real constant in C can be expressed in both Fractional and Exponential forms.

(e) A character variable can at a time store only one character.

(f) The maximum value that an integer constant can have varies from one compiler to another. (g) Usually, all C statements are written in small case letters.

- (h) Spaces may be inserted between two words in a C statement.
- (i) Spaces cannot be present within a variable name.
- (j) C programs are converted into machine language with the help of a program called Editor. (
- k) Most development environments provide an Editor to type a C program and a Compiler to convert it into machine language.
- (l) int, char, float, real, integer, character, char, main, printf and scanf are keywords

(a) True

(b) True

(c) True

(d) True

(e) True

(f) True

(g) True

(h) True

(i) True

(j) False

(k) True

(l) False

8) QMatch the following pairs:

- | | |
|----------------|--------------------------|
| (a) \n | (1) Literal |
| (b) 3.145 | (2) Statement terminator |
| (c) -6513 | (3) Character constant |
| (d) 'D' | (4) Escape sequence |
| (e) 4.25e-3 | (5) Input function |
| (f) main() | (6) Function |
| (g) %f, %d, %c | (7) Integer constant |
| (h) ; | (8) Address of operator |
| (i) Constant | (9) Output function |
| (j) Variable | (10) Format specifier |
| (k) & | (11) Exponential form |
| (l) printf() | (12) Real constant |
| (m) scanf() | (13) Identifier |

(a) Escape Sequence

- (b) Real Constant
- (c) Integer Constant
- (d) Character Constant
- (e) Exponential Form
- (f) Function
- (g) Format Specifier
- (h) Statement Terminator
- (i) Literal
- (j) Identifier
- (k) Address of Operator
- (l) Output Function
- (m) Input Function

9) Point out the errors, if any, in the following programs:

(a) int main()

```
{
int a ; float b ; int c ;
a = 25 ; b = 3.24 ; c = a + b * b – 35 ;
}
```

(b) #include <stdio.h>

int main()

```
{
int a = 35 ; float b = 3.24 ;
printf ( "%d %f %d", a, b + 1.5, 235 ) ;
}
```

(c) #include <stdio.h>

int main()

```
{
int a, b, c ;
scanf ( "%d %d %d", a, b, c ) ;
}
```

(d) #include <stdio.h>

int main()

```
{
int m1, m2, m3
printf ( "Enter values of marks in 3 subjects" )
scanf ( "%d %d %d", &m1, &m2, &m3 )
printf ( "You entered %d %d %d", m1, m2, m3 )
}
```

(a) Statement Terminator is missing, and it couldn't be figured out whether the expression is $(a+b)*(b-35)$ or $a + (b*b)-35$ because of unavailability of parentheses.

(b) Nesting of comments is not allowed.

(c) "&" Operator is missing.

(d) Statement terminator operator ";" is missing in integer declaration and scanf & printf functions.

10) Attempt the following questions:

(a) Temperature of a city in Fahrenheit degrees is input through the keyboard. Write a program to convert this temperature into Centigrade degrees.

(b) The length and breadth of a rectangle and radius of a circle are input through the keyboard. Write a program to calculate the area and perimeter of the rectangle, and the area and circumference of the circle.

(c) Paper of size A0 has dimensions 1189 mm x 841 mm. Each subsequent size A(n) is defined as A(n-1) cut in half, parallel to its shorter sides. Thus, paper of size A1 would have dimensions 841 mm x 594 mm. Write a program to calculate and print paper sizes A0, A1, A2 ... A8.

a)

```
#include<stdio.h>

int main()
{
    float f,c;
    printf("enter the temperature in fahrenheit:");
    scanf("%f",&f);
    c=((f-32) *5)/9;
    printf("%f", c);
    return 0;
}
```

b)

```
#include<stdio.h>
int main()
{
    float l,b,r;
    float area_rec,perimeter,area_circle,circumference;
    printf("enter length,breadth and radius:");
    scanf("%f %f %f", &l,&b,&r);
    area_rec=l*b;
    perimeter=2*(l+b);
    area_circle=r*3.14*r;
}
```

```

    circumference=2*3.14*r;
    printf("area of rectangle:%f\n",area_rec);
    printf("perimeter:%f\n",perimeter);
    printf("area of circle:%f\n",area_circle);
    printf("circumference:%f\n",circumference);
    return 0;
}

```

c)

```

#include<stdio.h>
int main()
{
    int l,b,max=0,min=0;
    l=1189;
    b=841;
    printf("A0 is %dmm x %dmm\n",l,b);
    for(int i=1;i<=8;i++)
    {
        if(l>b)
        {
            min=b;
            max=l;
        }
        else
        {
            min=l;
            max=b;
        }
        l=max/2;
        b=min;
        printf("A%d is %d mm x %d mm\n",i,b,l);
    }
    return 0;
}

```

11)Determine the hierarchy of operations and evaluate the following expression, assuming that i is an integer variable:

$$i = 2 * 3 / 4 + 4 / 4 + 8 - 2 + 5 / 8$$

$$i = 2 * 3 / 4 + 4 / 4 + 8 - 2 + 5 / 8$$

$$i = 6 / 4 + 4 / 4 + 8 - 2 + 5 / 8$$

$$i = 1 + 4 / 4 + 8 - 2 + 5 / 8$$

$$i = 1 + 1 + 8 - 2 + 5 / 8$$

$$i = 1 + 1 + 8 - 2 + 0$$

$$i = 2 + 8 - 2 + 0$$

$i = 10 - 2 + 0$

$i = 8 + 0$

12) Determine the hierarchy of operations and evaluate the following expression, assuming that k is a float variable:

$k = 3 / 2 * 4 + 3 / 8$

$k = 3 / 2 * 4 + 3 / 8$

$k = 1 * 4 + 3 / 8$

$k = 4 + 3 / 8$

$k = 4 + 0$

$k = 4$

13) If lengths of three sides of a triangle are input through the keyboard, write a program to find the area of the triangle.

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

```
# include <math.h>
```

```
int main( )
```

```
{
```

```
float a, b, c, sp, area ;
```

```
printf ( "\nEnter sides of a triangle: " ) ;
```

```
scanf ( "%f %f %f", &a, &b, &c ) ;
```

```
sp = ( a + b + c ) / 2 ;
```

```
area = sqrt ( sp * ( sp - a ) * ( sp - b ) * ( sp - c ) ) ;
```

```
printf ( "Area of triangle = %f\n", area ) ;
```

```
return 0 ;
```

```
}
```

Output:

Enter sides of a triangle: 4 5 6

Area of triangle = 9.921567

14) If a five-digit number is input through the keyboard, write a program to reverse the number.

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

```
int main( )
```

```
{
```

```
int n, d5, d4, d3, d2, d1 ;
```

```
long int revnum ;
```

```
printf ( "\nEnter a five digit number (less than 32767): " ) ;
```

```
scanf ( "%d", &n ) ;
```

```
d5 = n % 10 ;
```

```
n = n / 10 ;
```

```
d4 = n % 10 ;
```

```
n = n / 10 ;
```

```
d3 = n % 10 ;
```

```
n = n / 10 ;
```

```
d2 = n % 10 ;
```

```
n = n / 10 ;
```



```

d1 = n % 10 ;
revnum = d5 * 10000 + d4 * 1000 + d3 * 100 + d2 * 10 + d1 ;
printf ( "The reversed number is %ld\n", revnum ) ;
return 0 ;
}

```

Output:

Enter a five digit number (less than 32767): 12345
The reversed number is 54321

15) Consider a currency system in which there are notes of six denominations, namely, Re. 1, Rs. 2, Rs. 5, Rs. 10, Rs. 50, Rs. 100. If a sum of Rs. N is entered through the keyboard, write a program to compute the smallest number of notes that will combine to give Rs. N.

```

#include <stdio.h>
int main( )
{
int amount, nohun, nofifty, noten, nofive, notwo, noone, total ;
printf ( "Enter the amount: " ) ;
scanf ( "%d", &amount ) ;
nohun = amount / 100 ;
amount = amount % 100 ;
nofifty = amount / 50 ;
amount = amount % 50 ;
noten = amount / 10 ;
amount = amount % 10 ;
nofive = amount / 5 ;
amount = amount % 5 ;
notwo = amount / 2 ;
amount = amount % 2 ;
noone = amount / 1 ;
amount = amount % 1 ;
total = nohun + nofifty + noten + nofive + notwo + noone ;
printf ( "Smallest number of notes = %d\n", total ) ;
return 0 ;
}

```

Output:

Enter the amount: 570
Smallest number of notes = 8

16) Point out the errors, if any, in the following C statements:

- (a) `x = (y + 3) ;`
- (b) `cir = 2 * 3.141593 * r ;`
- (c) `char = '3' ;`
- (d) `4 / 3 * 3.14 * r * r * r = vol_of_sphere ;`
- (e) `volume = a3 ;`
- (f) `area = 1 / 2 * base * height ;`
- (g) `si = p * r * n / 100 ;`

- (h) `area of circle = 3.14 * r * r ;`
- (i) `peri_of_tri = a + b + c ;`
- (j) `slope = (y2 - y1) ÷ (x2 - x1) ;`
- (k) `3 = b = 4 = a ;`
- (l) `count = count + 1 ;`
- (m) `char ch = '25 Apr 12' ;`

(a) Valid.

(b) Valid.

(c) "char" is a keyword and we cannot use keyword as a variable.

(d) lvalue required, as we cannot take any expression on LHS.

(e) a3 doesn't specify any operation.

(f) Valid.

(g) Valid.

(h) Spaces are not allowed in variable names.

(i) Valid.

(j) "?" (Symbol) is not any valid operator.

(k) Value required as LHS should not have any constant value or any expression.

(l) Valid.

(m) Length of character is one.

17) Evaluate the following expressions and show their hierarchy.

(a) `ans = 5 * b * b * x - 3 * a * y * y - 8 * b * b * x + 10 * a * y ;`

(a = 3, b = 2, x = 5, y = 4 assume ans to be an int)

(b) `res = 4 * a * y / c - a * y / c ;`

(a = 4, y = 1, c = 3, assume res to be an int)

(c) `s = c + a * y * y / b ;`

(a = 2.2, b = 0.0, c = 4.1, y = 3.0, assume s to be a float)

(d) `R = x * x + 2 * x + 1 / 2 * x * x + x + 1 ;`

(x = 3.5, assume R to be a float)

(a) -84

(b) 4

(c) INFINITE

(d) 23.750000

18) Indicate the order in which the following expressions would be evaluated:

(a) $g = 10 / 5 / 2 / 1 ;$

(b) $b = 3 / 2 + 5 * 4 / 3 ;$

(c) $a = b = c = 3 + 4 ;$

(d) $x = 2 - 3 + 5 * 2 / 8 \% 3 ;$

(e) $z = 5 \% 3 / 8 * 3 + 4$

(f) $y = z = -3 \% -8 / 2 + 7 ;$

(a) $///$

(b) $/ * / +$

(c) $+ = = =$

(d) $= - + * / \%$

(e) $= \% / * +$

(f) $= = \% / +$

19) What will be the output of the following programs?

(a) `# include <stdio.h>`

`int main()`

`{`

`int i = 2, j = 3, k, l ;`

`float a, b ;`

`k = i / j * j ;`

`l = j / i * i ;`

`a = i / j * j ;`

`b = j / i * i ;`

`printf ("%d %d %f %f\n", k, l, a, b) ;`

`return 0 ;`

`}`

(b) `# include <stdio.h>`

`int main()`

`{`

`int a, b, c, d ;`

`a = 2 % 5 ;`

`b = -2 % 5 ;`

`c = 2 % -5 ;`

`d = -2 % -5 ;`

`printf ("a = %d b = %d c = %d = %d\n", a, b, c, d) ;`

`return 0 ;`

`}`

(c) `# include <stdio.h>`

`int main()`

`{`

`float a = 5, b = 2 ;`

`int c, d ;`

`c = a % b ;`

```

d = a / 2 ;
printf ( "%d\n", d ) ;
return 0 ;
}
(d) # include <stdio.h>
int main( )
{
printf ( "nn \n\n nn\n" ) ;
printf ( "nn /n/n nn/n" ) ;
return 0 ;
}
(e) # include <stdio.h>
int main( )
{
int a, b ;
printf ( "Enter values of a and b" ) ;
scanf ( " %d %d ", &a, &b ) ;
printf ( "a = %d b = %d", a, b ) ;
return 0 ;
}

```

- A) 0 3 0.000000 2.000000
- B) a = 2 b = -2 c = 2 d = -2
- C) 2
- D) nn

```

nn
nn /n/n nn/n
E) Enter values of a and b a = 3 b = 4

```

20) State whether the following statements are true or False:

- (a) * or /, + or - represents the correct hierarchy of arithmetic operators in C.
 - (b) [] and { } can be used in Arithmetic instructions.
 - (c) Hierarchy decides which operator is used first.
 - (d) In C, Arithmetic instruction cannot contain constants on left side of =.
 - (e) In C ** operator is used for exponentiation operation.
 - (f) % operator cannot be used with floats.
- (a) True
 - (b) False
 - (c) True
 - (d) True
 - (e) False
 - (f) True

21) Fill in the blanks:

- (a) In $y = 10 * x / 2 + z$; ____ operation will be performed first.
- (b) If a is an integer variable, $a = 11 / 2$ would store ____ in a.
- (c) The expression, $a = 22 / 7 * 5 / 3$ would evaluate to ____.
- (d) The expression $x = -7 \% 2 - 8$ would evaluate to ____.
- (e) If d is a float the operation $d = 2/7$ would store ____ in d.

Sol. (a) multiplication

- (b) 5
- (c) 5
- (d) -9
- (e) 0.0

22) Attempt the following questions:

- (a) If a five-digit number is input through the keyboard, write a program to calculate the sum of its digits. (Hint: Use the modulus operator %)
- (b) Write a program to receive Cartesian co-ordinates (x, y) of a point and convert them into polar co-ordinates (r, ϕ). Hint: $r = \sqrt{x^2 + y^2}$ and $\phi = \tan(y/x)$
- (c) Write a program to receive values of latitude (L1, L2) and longitude (G1, G2), in degrees, of two places on the earth and output the distance (D) between them in nautical miles. The formula for distance in nautical miles is: $D = 3963 \cos^{-1} (\sin L1 \sin L2 + \cos L1 \cos L2 * \cos (G2-G1))$
- (d) Wind-chill factor is the felt air temperature on exposed skin due to wind. The wind-chill temperature is always lower than the air temperature, and is calculated as per the following formula: $wcf = 35.74 + 0.6215t + (0.4275t - 35.75) * v^{0.16}$ where t is temperature and v is wind velocity. Write a program to receive values of t and v and calculate wind-chill factor (wcf).
- (e) If value of an angle is input through the keyboard, write a program to print all its Trigonometric ratios.
- (f) Two numbers are input through the keyboard into two locations C and D. Write a program to interchange the contents of C and D.

a)

```
#include<stdio.h>
int main()
{
    int n,d=0,sum=0;
    printf("enter n:");
    scanf("%d",&n);
    while(n>0)
    {
        d=n%10;
        sum=sum+d;
        n=n/10;
    }
    printf("sum: %d\n",sum);
    return 0;
}
```

```
b) #include<stdio.h>
#include<math.h>
```

```

int main()
{
    float x,y,r=0,w=0;
    printf("enter coordinate(x,y):");
    scanf("%f %f",&x,&y);
    r=sqrt(x*x+y*y);
    w=atan2(y,x);
    w=w*180/3.14;
    printf("polar coordinates : (%f,%f)",r,w);
    return 0;
}

```

```

c) #include<stdio.h>

#include<math.h>
int main()
{
    float l1,l2,g1,g2,d=0;
    printf("enter l1,g1,l2,g2:");
    scanf("%f %f %f %f", &l1, &l2, &g1, &g2);
    d=3963*acos(sin(l1)*sin(l2)+cos(l1)*cos(l2)*cos(g2-g1));
    printf("distance: %f", d);
    return 0;
}

```

```

d) #include<stdio.h>

#include<math.h>
int main()
{
    float angle,s=0,c=0,t=0;
    printf("enter angle:");
    scanf("%f",&angle);
    angle=angle*3.14/180;
    s=sin(angle);
    c=cos(angle);
    t=tan(angle);
    printf("sine: %f, cos: %f, tan: %f\n",s,c,t);
    return 0;
}

```

```

e) #include<stdio.h>

#include<math.h>
int main()
{

```

```

float t,v,wcf=0;
printf("enter t and v:");
scanf("%f %f",&t,&v);
wcf=35.74+0.6215*t+(0.4275*t-35.75)*pow(v,0.16);
printf("wcf:",wcf);
return 0;
}

```

```

f) #include<stdio.h>

int main()
{
    int c,d,temp=0;
    printf("enter c and d:");
    scanf("%d %d",&c,&d);
    temp=c;
    c=d;
    d=temp;
    printf(" after swap c:%d d:%d",c,d);
    return 0;
}

```

23) While purchasing certain items, a discount of 10% is offered if the quantity purchased is more than 1000. If quantity and price per item are input through the keyboard, write a program to calculate the total expenses.

```

# include <stdio.h>
int main( )
{
    int qty, dis ;
    float rate, tot ;
    printf ( "Enter quantity and rate " ) ;
    scanf ( "%d %f", &qty, &rate) ;
    if ( qty > 1000 )
        dis = 10 ;
    else
        dis = 0 ;
    tot = ( qty * rate ) - ( qty * rate * dis / 100 ) ;
    printf ( "Total expenses = Rs. %f\n", tot ) ;
    return 0 ;
}

```

Output:

Enter quantity and rate 1200 15.50
Total expenses = Rs. 16740.000000

24)In a company an employee is paid as under:

If his basic salary is less than Rs. 1500, then HRA = 10% of basic salary and DA = 90% of basic salary. If his salary is either equal to or above Rs. 1500, then HRA = Rs. 500 and DA = 98% of basic salary. If the employee's salary is input through the keyboard write a program to find his gross salary.

```
# include <stdio.h>
int main( )
{
float bs, gs, da, hra ;
printf ( "Enter basic salary " ) ;
scanf ( "%f", &bs ) ;
if ( bs < 1500 )
{
hra = bs * 10 / 100 ;
da = bs * 90 / 100 ;
}
else
{
hra = 500 ;
da = bs * 98 / 100 ;
}
gs = bs + hra + da ;
printf ( "gross salary = Rs. %f\n", gs ) ;
return 0 ;
}
```

25)If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss. Also determine how much profit he made or loss he incurred.

```
# include <stdio.h>
int main( )
{
float cp, sp, p, l ;
printf ( "\nEnter cost price and selling price: " ) ;
scanf ( "%f %f", &cp, &sp ) ;
p = sp - cp ;
l = cp - sp ;
if ( p > 0 )
printf ( "The seller made a profit of Rs. %f\n", p ) ;
if ( l > 0 )
printf ( "The seller incurred loss of Rs. %f\n", l ) ;
if ( p == 0 )
printf ( "There is no loss, no profit\n" ) ;
return 0 ;
}
```

Output:

Enter cost price and selling price: 25 15
The seller incurred loss of Rs. 10.000000

26) Any integer is input through the keyboard. Write a program to find out whether it is an odd number or even number.

```
# include <stdio.h>
int main( )
{
int n ;
printf ( "\nEnter any number: " ) ;
scanf ( "%d", &n ) ;
if ( n % 2 == 0 )
printf ( "The number is even\n" ) ;
else
printf ( "The number is odd\n" ) ;
return 0 ;
}
```

Output:

Enter any number: 45
The number is odd

27) Any year is input through the keyboard. Write a program to determine whether the year is a leap year or not.

```
# include <stdio.h>
int main( )
{
int yr ;
printf ( "\nEnter a year: " ) ;
scanf ( "%d", &yr ) ;
if ( yr % 100 == 0 )
{
if ( yr % 400 == 0 )
printf ( "Leap year\n" ) ;
else
printf ( "Not a Leap year\n" ) ;
}
else
{
if ( yr % 4 == 0 )
printf ( "Leap year\n" ) ;
else
printf ( "Not a leap year\n" ) ;
}
return 0 ;
}
```

Output:

Enter a year: 2020 Leap year

28)What will be the output of the following programs?

(a) # include <stdio.h>

```
int main( )  
{  
int a = 300, b, c ;  
if ( a >= 400 )  
b = 300 ;  
c = 200 ;  
printf ( "%d %d\n", b, c ) ;  
return 0 ;  
}
```

(b) # include <stdio.h>

```
int main( )  
{  
int x = 10, y = 20 ;  
if ( x == y ) ;  
printf ( "%d %d\n", x, y ) ;  
return 0 ;  
}
```

(c) # include <stdio.h>

```
int main( )  
{  
int x = 3 ;  
float y = 3.0 ;  
if ( x == y )  
printf ( "x and y are equal\n" ) ;  
else  
printf ( "x and y are not equal\n" ) ;  
return 0 ;  
}
```

(d) # include <stdio.h>

```
int main( )  
{  
int x = 3, y, z ;  
y = x = 10 ;  
z = x < 10 ;  
printf ( "x = %d y = %d z = %d\n", x, y, z ) ;  
return 0 ;  
}
```

(e) # include <stdio.h>

```
int main( )  
{  
int i = 65 ;  
char j = 'A' ;  
if ( i == j )  
printf ( "C is WOW\n" ) ;  
else  
printf ( "C is a headache\n" ) ;  
return 0 ;  
}
```

- (a) garbage_value 200
- (b) 10 20
- (c) x and y are equal
- (d) x = 10 ,y = 10 ,z = 0
- (e) C is WOW

29) Point out the errors, if any, in the following programs:

(a) # include <stdio.h>

```
int main( )
{
float a = 12.25, b = 12.52 ;
if ( a = b )
printf ( "a and b are equal\n" ) ;
return 0 ;
}
```

(b) # include <stdio.h>

```
int main( )
{
int j = 10, k = 12 ;
if ( k >= j )
{
{
k = j ;
j = k ;
}
}
return 0 ;
}
```

(c) # include <stdio.h>

```
int main( )
{
if ( 'X' < 'x' )
printf ( "ascii value of X is smaller than that of x\n" ) ;
}

```

(d) # include <stdio.h>

```
int main( )
{
int x = 10 ;
if ( x >= 2 ) then
printf ( "%d\n", x ) ;
return 0 ;
}
```

(e) # include <stdio.h>

```
int main( )
{
int x = 10, y = 15 ;
if ( x % 2 = y % 3 )
printf ( "Carpathians\n" ) ;
}
```

```

(f) # include <stdio.h>
int main( )
{
int a, b ;
scanf ( "%d %d", a, b ) ;
if ( a > b ) ;
printf ( "This is a game\n" ) ;
else
printf ( "You have to play it\n" ) ;
return 0 ;
}

```

- (a) Assignment a = b is used instead of comparison a == b.
- (b) Redundant braces { inside the if block.
- (c) No error; the program is correct.
- (d) then is not a valid keyword in C; remove then.
- (e) Assignment x % 2 = y % 3 is used instead of comparison x % 2 == y % 3.
- (f) scanf("%d %d", a, b) should use address-of operator: scanf("%d %d", &a, &b). Semicolon after if (a > b) makes the if statement empty.

30) State whether the following statements are True or False:

- (a) ; is a valid statement.
 - (b) Ifs can be nested.
 - (c) If there are multiple statements in if or else block, they should be enclosed within a pair of { }.
 - (d) If can occur within an if block but not in the else block.
 - (e) By default there is only one statement in if block and only one in the else block.
 - (f) Nothing happens on execution of a null statement.
- (a) True
 - (b) True
 - (c) True
 - (d) False
 - (e) True
 - (f) True

31) Match the following pairs:

- (a) Multiples statements (1) Assignment operator
 - (b) else block (2) Comparison operator
 - (c) ; (3) Relational operators
 - (d) < > <= >= == != (4) optional
 - (e) == (5) { }
 - (f) + - * / % (6) Arithmetic operators
 - (g) = (7) Null statement
 - (h) Default control instruction (8) if - else
 - (i) Decision control instruction (9) Sequence
- (a) Multiple statements - (5) { }
 - (b) else block - (4) optional
 - (c) ; - (7) Null statement
 - (d) < > <= >= == != - (3) Relational operators

- (e) == - (2) Comparison operator
- (f) + - * / % - (6) Arithmetic operators
- (g) = - (1) Assignment operator
- (h) Default control instruction - (9) Sequence
- (i) Decision control instruction - (8) if – else

Question 32: Which of the following are valid ifs?

- (a) if (-25)
- (b) if (3.14)
- (c) if (a)
- (d) if (a + b)
- (e) if (a >= b)
- (a) Valid
- (b) Valid
- (c) Valid
- (d) Valid
- (e) Valid

33) Attempt the following questions:

- (a) A five-digit number is entered through the keyboard. Write a program to obtain the reversed number and to determine whether the original and reversed numbers are equal or not.
- (b) If ages of Ram, Shyam and Ajay are input through the keyboard, write a program to determine the youngest of the three.
- (c) Write a program to check whether a triangle is valid or not, if three angles of the triangle are entered through the keyboard. A triangle is valid if the sum of all the three angles is equal to 180 degrees.
- (d) Write a program to find the absolute value of a number entered through the keyboard.
- (e) Given the length and breadth of a rectangle, write a program to find whether the area of the rectangle is greater than its perimeter. For example, the area of the rectangle with length = 5 and breadth = 4 is greater than its perimeter.
- (f) Given three points (x1, y1), (x2, y2) and (x3, y3), write a program to check if the three points fall on one straight line.
- (g) Given the coordinates (x, y) of center of a circle and its radius, write a program that will determine whether a point lies inside the circle, on the circle or outside the circle. (Hint: Use sqrt() and pow() functions)
- (h) Given a point (x, y), write a program to find out if it lies on X-axis, Yaxis or origin.
- (i) According to Gregorian calendar, it was Monday on the date 01/01/01. If any year is input through the keyboard write a program to find out what is the day on 1st January of this year.

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

int main()
{
    int n,x=0,rev=0,ld=0;
    printf("enter n:");
    scanf("%d",&n);
```

```

x=n;
while(x>0)
{
    ld=x%10;
    rev=rev*10+ld;
    x=x/10;
}
if(rev==n)
printf("equal");
else
printf("not equal");
return 0;
}

```

b)

```

b) #include<stdio.h>

int main()
{
    int a,b,c,y=0;
    printf("enter a,b,c:");
    scanf("%d %d %d",&a,&b,&c);
    if(a>b)
    {
        if(b>c)
            y=c;
        else
            y=b;
    }
    else
    {
        if(a<c)
            y=a;
        else
            y=c;
    }
    printf("youngest:%d\n",y);
    return 0;
}

```

c)

```

#include<stdio.h>
int main()
{
    float a,b,c,sum=0;
    printf("enter angles of triangle:");
    scanf("%f %f %f",&a,&b,&c);
    sum=a+b+c;
    if(sum==180)

```

```
    printf("valid");
    else
    printf("invalid");
    return 0;
}
```

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

#include <math.h>
int main() {
    double num, absoluteValue;
    printf("Enter a number: ");
    scanf("%lf", &num);
    absoluteValue = fabs(num);
    printf("The absolute value of %.2f is %.2f\n", num, absoluteValue);
    return 0;
}
```

e)

```
#include <stdio.h>
int main() {
    float length, breadth, area, perimeter;
    printf("Enter length and breadth of the rectangle: ");
    scanf("%f %f", &length, &breadth);
    area = length * breadth;
    perimeter = 2 * (length + breadth);
    if (area > perimeter)
        printf("Area of the rectangle is greater than its perimeter.\n");
    else
        printf("Area of the rectangle is not greater than its perimeter.\n");
    return 0;
}
```

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

int main() {
    float x1, y1, x2, y2, x3, y3;
    printf("Enter coordinates of three points (x1, y1), (x2, y2), and (x3, y3): ");
    scanf("%f %f %f %f %f %f", &x1, &y1, &x2, &y2, &x3, &y3);
    if ((x1 * (y2 - y3) + x2 * (y3 - y1) + x3 * (y1 - y2)) == 0)
        printf("The three points fall on one straight line.\n");
    else
        printf("The three points do not fall on one straight line.\n");
    return 0;
}
```

g)

```
#include <stdio.h>
int main() {
    float x, y;
    printf("Enter coordinates of the point (x, y): ");
    scanf("%f %f", &x, &y);
    if (x == 0 && y == 0)
        printf("The point lies at the origin.\n");
    else if (x == 0)
        printf("The point lies on the Y-axis.\n");
    else if (y == 0)
        printf("The point lies on the X-axis.\n");
    else
        printf("The point does not lie on any axis.\n");
    return 0;
}
```

h)

```
#include <stdio.h>
int main() {
    float x, y;
    printf("Enter coordinates of the point (x, y): ");
    scanf("%f %f", &x, &y);
    if (x == 0 && y == 0)
        printf("The point lies at the origin.\n");
    else if (x == 0)
        printf("The point lies on the Y-axis.\n");
    else if (y == 0)
        printf("The point lies on the X-axis.\n");
    else
        printf("The point does not lie on any axis.\n");
    return 0;
}
```

i) #include <stdio.h>

```
int main() {
    int year, dayOfWeek;
    printf("Enter a year: ");
    scanf("%d", &year);
```



```

    dayOfWeek = (1 + 5 * ((year - 1) % 4) + 4 * ((year - 1) % 100) + 6 *
((year - 1) % 400)) % 7;
    switch (dayOfWeek) {
        case 0:
            printf("Monday\n");
            break;
        case 1:
            printf("Tuesday\n");
            break;
        case 2:
            printf("Wednesday\n");
            break;
        case 3:
            printf("Thursday\n");
            break;
        case 4:
            printf("Friday\n");
            break;
        case 5:
            printf("Saturday\n");
            break;
        case 6:
            printf("Sunday\n");
            break;
    }
    return 0;
}

```

34) The marks obtained by a student in 5 different subjects are input through the keyboard. The student gets a division as per the following rules:

Percentage above or equal to 60 - First division

Percentage between 50 and 59 - Second division

Percentage between 40 and 49 - Third division

Percentage less than 40 - Fail

Write a program to calculate the division obtained by the student.

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

```
int main( )
```

```
{
```

```
int m1, m2, m3, m4, m5, per ;
```

```
printf ( "Enter marks in five subjects " ) ;
```

```
scanf ( "%d %d %d %d %d", &m1, &m2, &m3, &m4, &m5 ) ;
```

```
per = ( m1 + m2 + m3 + m4 + m5 ) * 100 / 500 ;
```

```
if ( per >= 60 )
```

```
printf ( "First division\n" ) ;
```

```
else
```

```
{
```

```
if ( per >= 50 )
```

```
printf ( "Second division\n" ) ;
```

```

else
{
if ( per >= 40 )
printf ( "Third division\n" ) ;
else
printf ( "Fail\n" ) ;
}
}
return 0 ;
}

```

35) A company insures its drivers in the following cases:

- If the driver is married.
- If the driver is unmarried, male & above 30 years of age.
- If the driver is unmarried, female & above 25 years of age.

In all other cases, the driver is not insured. If the marital status, sex and age of the driver are the inputs, write a program to determine whether the driver should be insured or not. The final outcome of the program would be—either the driver should be insured or the driver should not be insured. So, the program can be conveniently written using logical operators. For this let us first identify those cases in which the driver is insured. They are—Driver is married, Driver is an unmarried male above 30 years of age, and Driver is an unmarried female above 25 years of age. Since all these cases lead to the driver being insured, they can be combined together using && and || as shown in the program below.

```

# include <stdio.h>
int main( )
{
char sex, ms ;
int age ;
printf ( "Enter age, sex, marital status " ) ;
scanf ( "%d %c %c", &age, &sex, &ms ) ;
if ( ( ms == 'M' ) || ( ms == 'U' && sex == 'M' && age > 30 ) ||
( ms == 'U' && sex == 'F' && age > 25 ) )
printf ( "Driver should be insured\n" ) ;
else
printf ( "Driver should not be insured\n" ) ;
return 0 ;
}

```

36) Write a program to calculate the salary as per the following table:

Gender	Years of Service	Qualifications	Salary
Male	>= 10	Post-Graduate	11000
	>= 10	Graduate	10000
	< 10	Post-Graduate	10000
	< 10	Graduate	7000
Female	>= 10	Post-Graduate	12000
	>= 10	Graduate	9000
	< 10	Post-Graduate	10000
	< 10	Graduate	6000

```
# include <stdio.h>
int main( )
{
char g ;
int yos, qual, sal = 0 ;
printf ( "Enter Gender, Years of Service and
Qualifications (0 = G, 1 = PG): " ) ;
scanf ( "%c%d%d", &g, &yos, &qual ) ;
if ( g == 'm' && yos >= 10 && qual == 1 )
sal = 11000 ;
else if ( ( g == 'm' && yos >= 10 && qual == 0 ) ||
( g == 'm' && yos < 10 && qual == 1 ) )
sal = 10000 ;
else if ( g == 'm' && yos < 10 && qual == 0 )
sal = 7000 ;
else if ( g == 'f' && yos >= 10 && qual == 1 )
sal = 12000 ;
else if ( g == 'f' && yos >= 10 && qual == 0 )
sal = 9000 ;
else if ( g == 'f' && yos < 10 && qual == 1 )
sal = 10000 ;
else if ( g == 'f' && yos < 10 && qual == 0 )
sal = 6000 ;
printf ( "\nSalary of Employee = %d\n", sal ) ;
return 0 ;
}
```

37)A year is entered through the keyboard, write a program to determine whether the year is leap or not. Use the logical operators && and ||.

```
# include <stdio.h>
int main( )
{
int year ;
printf ( "\nEnter year: " ) ;
scanf ( "%d", &year ) ;
if ( year % 400 == 0 || year % 100 != 0 && year % 4 == 0 )
printf ( "Leap year\n" ) ;
else
printf ( "Not a leap year\n" ) ;
return 0 ;
}
```

```
}
```

Output

Enter year: 1900

Not a leap year

38) If a character is entered through the keyboard, write a program to determine whether the character is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters:

Characters	ASCII Values
A - Z	65 - 90
a - z	97 - 122
0 - 9	48 - 57
special symbols	0 - 47, 58 - 64, 91 - 96, 123 - 127

```
# include <stdio.h>
int main( )
{
char ch ;
printf ( "\nEnter a character from the keyboard: " ) ;
scanf ( "%c", &ch ) ;
if ( ch >= 65 && ch <= 90 )
printf ( "The character is an uppercase letter\n" ) ;
if ( ch >= 97 && ch <= 122 )
printf ( "The character is a lowercase letter\n" ) ;
if ( ch >= 48 && ch <= 57 )
printf ( "The character is a digit\n" ) ;
if ( ( ch >= 0 && ch < 48 ) || ( ch > 57 && ch < 65 )
|| ( ch > 90 && ch < 97 ) || ch > 122 )
printf ( "The character is a special symbol\n" ) ;
return 0 ;
}
```

Output

Enter a character from the keyboard: A

The character is an uppercase letter

39) If the lengths of three sides of a triangle are entered through the keyboard, write a program to check whether the triangle is valid or not. The triangle is valid if the sum of two sides is greater than the largest of the three sides.

```
# include <stdio.h>
int main( )
{
int side1, side2, side3, largeside, sum ;
printf ( "\nEnter three sides of the triangle: " ) ;
scanf ( "%d %d %d", &side1, &side2, &side3 ) ;
if ( side1 > side2 )
{
if ( side1 > side3 )
{
sum = side2 + side3 ; largeside = side1 ;
}
```

```

else
{
sum = side1 + side2 ; largeside = side3 ;
}
}
else
{
if ( side2 > side3 )
{
sum = side1 + side3 ; largeside = side2 ;
}
else
{
sum = side1 + side2 ; largeside = side3 ;
}
}
if ( sum > largeside )
printf ( "The triangle is a valid triangle\n" ) ;
else
printf ( "The triangle is an invalid triangle\n" ) ;
return 0 ;
}

```

Output

Enter three sides of the triangle: 3 4 5

The triangle is a valid triangle

40)If a = 10, b = 12, c = 0, find the values of the expressions in the following table:

Expression	Value
a != 6 && b > 5	1
a == 9 b < 3	
!(a < 10)	
!(a > 5 && c)	
5 && c != 8 !c	

- (a) true
- (b) false
- (c) true
- (d) true
- (e) true

41)What will be the output of the following programs?

(a) # include <stdio.h>

int main()

{

int i = 4, z = 12 ;

if (i = 5 || z > 50)

printf ("Dean of students affairs\n") ;

else

```

printf ( "Dosa\n" ) ;
return 0 ;
}
(b) #include <stdio.h>
int main( )
{
int i = 4, j = -1, k = 0, w, x, y, z ;
w = i || j || k ;
x = i && j && k ;
y = i || j && k ;
z = i && j || k ;
printf ( "w = %d x = %d y = %d z = %d\n", w, x, y, z ) ;
return 0 ;
}
(c) # include <stdio.h>
int main( )
{
int x = 20, y = 40, z = 45 ;
if ( x > y && x > z )
printf ( "biggest = %d\n", x ) ;
else if ( y > x && y > z )
printf ( "biggest = %d\n", y ) ;
else if ( z > x && z > y )
printf ( "biggest = %d\n", z ) ;
return 0 ;
}
(d) # include <stdio.h>
int main( )
{
int i = -4, j, num ;
j = ( num < 0 ? 0 : num * num ) ;
printf ( "%d\n", j ) ;
return 0 ;
}
(e) # include <stdio.h>
int main( )
{
int k, num = 30 ;
k = ( num > 5 ? ( num <= 10 ? 100 : 200 ) : 500 ) ;
printf ( "%d\n", num ) ;
return 0 ;
}

```

(a) Dean of students affairs
 (b) $w = 1$ $x = 0$ $y = 1$ $z = 1$
 (c) biggest = 40
 (d) Indeterminate value
 (e) 30

43) Point out the errors, if any, in the following programs:

```
(a) # include <stdio.h>
int main( )
{
char spy = 'a', password = 'z' ;
if ( spy == 'a' or password == 'z' )
printf ( "All the birds are safe in the nest\n" ) ;
return 0 ;
}
```

```
(b) # include <stdio.h>
int main( )
{
int i = 10, j = 20 ;
if ( i = 5 ) && if ( j = 10 )
printf ( "Have a nice day\n" ) ;
return 0 ;
}
```

```
(c) # include <stdio.h>
int main( )
{
int x = 10, y = 20 ;
if ( x >= 2 and y <= 50 )
printf ( "%d\n", x ) ;
return 0 ;
}
```

```
(d) # include <stdio.h>
int main( )
{
int x = 2 ;
if ( x == 2 && x != 0 ) ;
printf ( "Hello\n" ) ;
else
printf ( "Bye\n" ) ;
return 0 ;
}
```

```
(e) # include <stdio.h>
int main( )
{
int j = 65 ;
printf ( "j >= 65 ? %d : %c\n", j ) ;
return 0 ;
}
```

```
(f) # include <stdio.h>
int main( )
{
int i = 10, j ;
i >= 5 ? j = 10 : j = 15 ;
printf ( "%d %d\n", i, j ) ;
return 0 ;
}
```

```
(g) # include <stdio.h>
```

```

int main( )
{
int a = 5, b = 6 ;
( a == b ? printf ( "%d\n", a ) ) ;
return 0;
}

```

(h) #include <stdio.h>

```

int main()
{
int n = 9;
(n == 9? printf ("Correct\n"); printf ("Wrong\n"));
return 0;
}

```

(a) # include <stdio.h>

```

int main( )
{
char spy = 'a', password = 'z' ;
if ( spy == 'a' or password == 'z' ) // Error: 'or' should be '||'
printf ( "All the birds are safe in the nest\n" ) ;
return 0 ;
}

```

(b) # include <stdio.h>

```

int main( )
{
int i = 10, j = 20 ;
if ( i = 5 ) && if ( j = 10 ) // Error: Invalid use of '&&' and 'if' together
printf ( "Have a nice day\n" ) ;
return 0 ;
}

```

(c) # include <stdio.h>

```

int main( )
{
int x = 10, y = 20 ;
if ( x >= 2 and y <= 50 ) // Error: 'and' should be '&&'
printf ( "%d\n", x ) ;
return 0 ;
}

```

(d) # include <stdio.h>

```

int main( )
{
int x = 2 ;
if ( x == 2 && x != 0 ) ; // Error: Semicolon terminates the 'if' statement prematurely
printf ( "Hello\n" ) ;
else
printf ( "Bye\n" ) ;
return 0 ;
}

```

(e) # include <stdio.h>

```

int main( )
{

```



```

    int j = 65 ;
    printf ( "j >= 65 ? %d : %c\n", j ) ; // Error: Incomplete ternary expression
    return 0 ;
}
(f) #include <stdio.h>
int main( )
{
    int i = 10, j ;
    i >= 5 ? j = 10 : j = 15 ; // Error: Ternary operator used incorrectly
    printf ( "%d %d\n", i, j ) ;
    return 0 ;
}
(g) #include <stdio.h>
int main( )
{
    int a = 5, b = 6 ;
    ( a == b ? printf ( "%d\n", a ) ) ; // Error: Incomplete ternary expression
    return 0;
}
(h) #include <stdio.h>
int main()
{
    int n = 9;
    (n == 9? printf ("Correct\n"); printf ("Wrong\n");); // Error: Semicolon terminates the 'if'
statement prematurely
    return 0;
}

```

43) Attempt the following questions:

(a) If the lengths of three sides of a triangle are entered through the keyboard, write a program to check whether the triangle is an isosceles, an equilateral, a scalene or a right-angled triangle.

(b) In digital world colors are specified in Red-Green-Blue (RGB) format, with values of R, G, B varying on an integer scale from 0 to 255. In print publishing the colors are mentioned in Cyan-Magenta-Yellow Black (CMYK) format, with values of C, M, Y, and K varying on a real scale from 0.0 to 1.0. Write a program that converts RGB color to CMYK color as per the following formulae:

White = $\text{Max}(\text{Red}/255, \text{Green}/255, \text{Blue}/255)$

Cyan = $(\text{White} - \text{Red})/255$

Magenta = $(\text{White} - \text{Green})/255$

Yellow = $(\text{White} - \text{Blue})/255$

Black = $(\text{White} - \text{Cyan} - \text{Magenta} - \text{Yellow})/3$

Note that if the RGB values are all 0, then the CMY values are all 0 and the K value is 1.

(c) A certain grade of steel is graded according to the following conditions:

(i) Hardness must be greater than 50

(ii) Carbon content must be less than 0.7

(iii) Tensile strength must be greater than 5600

The grades are as follows:

Grade is 10 if all three conditions are met

Grade is 9 if conditions (i) and (ii) are met
 Grade is 8 if conditions (ii) and (iii) are met
 Grade is 7 if conditions (i) and (iii) are met
 Grade is 6 if only one condition is met
 Grade is 5 if none of the conditions are met

Write a program, which will require the user to give values of hardness, carbon content and tensile strength of the steel under consideration and output the grade of the steel.

(d) The Body Mass Index (BMI) is defined as ratio of the weight of a person (in kilograms) to the square of the height (in meters). Write a program that receives weight and height, calculates the BMI, and reports the BMI category as per the following table:

BMI Category	BMI
Starvation	< 15
Anorexic	15.1 to 17.5
Underweight	17.6 to 18.5
Ideal	18.6 to 24.9
Overweight	25 to 25.9
Obese	30 to 30.9
Morbidly Obese	>= 40

a)

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

int main()
{
    int s1,s2,s3;
    printf("enter s1,s2,s3:");
    scanf("%d %d %d",&s1,&s2,&s3);
    if((s1==s2)&&(s2==s3))
        printf("equilateral triangle\n");
    else if((s1==s2)|| (s2==s3)|| (s3==s1))
        printf("isosceles triamgle\n");
    else if((s1!=s2)&&(s2!=s3)&&(s1!=s3))
        printf("scalene triangle\n");
    else if((s1*s1==s2*s2+s3*s3)|| (s2*s2==s1*s1+s3*s3)|| (s3*s3==s1*s1+s2*s2))
        printf("right angled triangle\n");
    else
        printf("none\n");
    return 0;
}
```

b)

```
#include<stdio.h>
int main()
{
    int r,g,b;
    float c=0,m=0,y=0,k=0,w=0;
    printf("enter r,g,b:");
    scanf("%d %d %d",&r,&g,&b);
    if((r==0)&&(g==0)&&(b==0))
```

```

{
    c=0;
    m=0;
    y=0;
    k=1;
}
else
{
    if(r/255>g/255)
    {
        if(r/255>b/255)
            w=r/255;
        else
            w=b/255;
    }
    else
    {
        if(g/255>b/255)
            w=g/255;
        else
            w=b/255;
    }
    c=(w-r/255)/w;
    m=(w-g/255)/w;
    y=(w-b/255)/w;
    k=1-w;
}
printf("c=%0.2f m=%0.2f y=%0.2f k=%0.2f ", c, m, y, k);
return 0;
}

```

c)

```

#include<stdio.h>
int main()
{
    float h,c,t;
    printf("enter h,c,t:");
    scanf("%f %f %f",&h,&c,&t);
    if((h>50)&&(c<0.7)&&(t>5600))
        printf("grade 10");
    else if ((h>50)&&(c<0.7))
        printf("grade 9");
    else if((c<0.7)&&(t>5600))
        printf("grade 8");
    else if((h>50)&&(t>5600))
        printf("grade 7");
    else if((h>50)|| (c<0.7)|| (t>5600))
        printf("grade 6");
    else

```

```

printf("grade 5");
return 0;
}

```

d)

```

#include<stdio.h>
int main()
{
    float w,h,bmi=0;
    printf("enter weight and height:");
    scanf("%f %f",&w,&h);
    bmi=w/(h*h);
    if(bmi<15)
        printf("starvation");
    else if((bmi>=15.1)&&(bmi<=17.5))
        printf("anorexic");
    else if((bmi>=17.6)&&(bmi<=18.5))
        printf("underweight");
    else if((bmi>=18.6)&&(bmi<=24.9))
        printf("ideal");
    else if((bmi>=25)&&(bmi<=29.9))
        printf("overweight");
    else if((bmi>=30)&&(bmi<=30.9))
        printf("obese");
    else
        printf("morbidly obese");
    return 0;
}

```

44}Answer the following questions:

(a) Using conditional operators determine:

(1) Whether the character entered through the keyboard is a lower case alphabet or not.

(2) Whether a character entered through the keyboard is a special symbol or not.

(b) Write a program using conditional operators to determine whether a year entered through the keyboard is a leap year or not.

(c) Write a program to find the greatest of the three numbers entered through the keyboard. Use conditional operators.

(d) Write a program to receive value of an angle in degrees and check whether sum of squares of sine and cosine of this angle is equal to 1.

(e) Rewrite the following program using conditional operators.

```

# include <stdio.h>
int main( )
{
    float sal ;
    printf ( "Enter the salary" ) ;
    scanf ( "%f", &sal ) ;
    if ( sal >= 25000 && sal <= 40000 )
        printf ( "Manager\n" ) ;
}

```

```

else
if ( sal >= 15000 && sal < 25000 )
printf ( "Accountant\n" ) ;
else
printf ( "Clerk\n" ) ;
return 0 ;
}

```

(a) #include <stdio.h>

```

int main() {
    char ch;
    printf("Enter a character: ");
    scanf(" %c", &ch);
    printf("Character is %s lowercase alphabet.\n", (ch >= 'a' && ch <= 'z') ? "a" : "not a");
    printf("Character is %s special symbol.\n", ((ch >= 33 && ch <= 47) || (ch >= 58 && ch
<= 64) || (ch >= 91 && ch <= 96) || (ch >= 123 && ch <= 126)) ? "a" : "not a");
    return 0;
}

```

(b) #include <stdio.h>

```

int main() {
    int year;
    printf("Enter a year: ");
    scanf("%d", &year);
    printf("%d is %s leap year.\n", year, ((year % 4 == 0 && year % 100 != 0) || (year % 400
== 0)) ? "a" : "not a");
    return 0;
}

```

(c) #include <stdio.h>

```

int main() {
    float num1, num2, num3, max;
    printf("Enter three numbers: ");
    scanf("%f %f %f", &num1, &num2, &num3);
    max = (num1 > num2) ? ((num1 > num3) ? num1 : num3) : ((num2 > num3) ? num2 :
num3);
    printf("The greatest number is: %.2f\n", max);
    return 0;
}

```

(d) #include <stdio.h>

#include <math.h>

```

int main() {
    float angle, sine, cosine, sum_of_squares;
    printf("Enter the angle in degrees: ");
    scanf("%f", &angle);
    sine = sin(angle * M_PI / 180);
    cosine = cos(angle * M_PI / 180);
    sum_of_squares = sine * sine + cosine * cosine;
    printf("Sum of squares of sine and cosine is %s equal to 1.\n", (sum_of_squares == 1) ? ""
: "not");
    return 0;
}

```

(e) #include <stdio.h>

```

int main() {
    float sal;
    printf("Enter the salary: ");
    scanf("%f", &sal);
    printf("Occupation: %s\n", (sal >= 25000 && sal <= 40000) ? "Manager" : ((sal >= 15000
&& sal < 25000) ? "Accountant" : "Clerk"));
    return 0;
}

```

45}Write a program to calculate overtime pay of 10 employees. Overtime is paid at the rate of Rs. 120.00 per hour for every hour worked above 40 hours. Assume that employees do not work for fractional part of an hour.

```

#include <stdio.h>
int main( )
{
    float otpay ;
    int hour, i = 1 ;
    while ( i <= 10 ) /* Loop for 10 employees */
    {
        printf ( "\nEnter no. of hours worked: " ) ;
        scanf ( "%d", &hour ) ;
        if ( hour >= 40 )
            otpay = ( hour - 40 ) * 120 ;
        else
            otpay = 0 ;
        printf ( "Hours = %d Overtime pay = Rs.%f\n", hour, otpay ) ;
        i++ ;
    }
    return 0 ;
}

```

Output:

```

Enter no. of hours worked: 45
Hours = 45 Overtime pay = Rs.600.000000
Enter no. of hours worked: 50
Hours = 50 Overtime pay = Rs.1200.000000
Enter no. of hours worked: 20
Hours = 20 Overtime pay = Rs.0.000000

```

46)Write a program to find the factorial value of any number entered through the keyboard.

```

#include <stdio.h>
int main( )
{
    int num, i, fact ;
    printf ( "Enter a number: " ) ;
    scanf ( "%d", &num ) ;
    fact = i = 1 ;
    while ( i <= num )

```

```

{
fact = fact * i ;
i++ ;
}
printf ( "Factorial value of %d = %d\n", num, fact ) ;
return 0 ;
}

```

Output

Enter a number: 7

Factorial value of 7 = 5040

47)Two numbers are entered through the keyboard. Write a program to find the value of one number raised to the power of another.

```

# include <stdio.h>
int main( )
{
float x, power ;
int y, i ;
printf ( "\nEnter two numbers: " ) ;
scanf ( "%f %d", &x, &y ) ;
power = i = 1 ;
while ( i <= y )
{
power = power * x ;
i++ ;
}
printf ( "%f to the power %d is %f\n", x, y, power ) ;
return 0 ;
}

```

Output:

Enter two numbers: 2.5 3

2.500000 to the power 3 is 15.625000

48)What will be the output of the following programs?

(a) # include <stdio.h>

int main()

```

{
int i = 1 ;
while ( i <= 10 ) ;
{
printf ( "%d\n", i ) ;
i++ ;
}
return 0 ;
}

```

(b) # include <stdio.h>

int main()

```

{

```

```

int x = 4, y, z ;
y = --x ;
z = x-- ;
printf ( "%d %d %d\n", x, y, z ) ;
return 0 ;
}

```

(c) # include <stdio.h>

```

int main( )
{
int x = 4, y = 3, z ;
z = x-- - y ;
printf ( "%d %d %d\n", x, y, z ) ;
return 0 ;
}

```

(d) # include <stdio.h>

```

int main( )
{
while ( 'a' < 'b' )
printf ( "malayalam is a palindrome\n" ) ;
return 0 ;
}

```

(e) # include <stdio.h>

```

int main( )
{
int i ;
while ( i = 10 )
{
printf ( "%d\n", i ) ;
i = i + 1 ;
}
return 0 ;
}

```

(f) # include <stdio.h>

```

int main( )
{
float x = 1.1 ;
while ( x == 1.1 )
{
printf ( "%f\n", x ) ;
x = x - 0.1 ;
}
return 0 ;
}

```

(a) No output (infinite loop)

(b) Output: 2 3 3

(c) Output: 3 3 1

(d) malayalam is a palindrome

malayalam is a palindrome

malayalam is a palindrome

...

(e) Output: 10

(f) No output

49) Attempt the following questions:

(a) Write a program to print all the ASCII values and their equivalent characters using a while loop. The ASCII values vary from 0 to 255.

(b) Write a program to print out all Armstrong numbers between 1 and 500. If sum of cubes of each digit of the number is equal to the number itself, then the number is called an Armstrong number. For example, $153 = (1 * 1 * 1) + (5 * 5 * 5) + (3 * 3 * 3)$.

(c) Write a program for a matchstick game being played between the computer and a user. Your program should ensure that the computer always wins. Rules for the game are as follows:

- There are 21 matchsticks.
- The computer asks the player to pick 1, 2, 3, or 4 matchsticks.
- After the person picks, the computer does its picking.
- Whoever is forced to pick up the last matchstick loses the game.

(d) Write a program to enter numbers till the user wants. At the end it should display the count of positive, negative and zeros entered.

(e) Write a program to receive an integer and find its octal equivalent. (Hint: To obtain octal equivalent of an integer, divide it continuously by 8 till dividend doesn't become zero, then write the remainders obtained in reverse direction.)

(f) Write a program to find the range of a set of numbers entered through the keyboard. Range is the difference between the smallest and biggest number in the list.

a)

```
#include <stdio.h>
int main() {
    int i = 0;
    while (i <= 255) {
        printf("ASCII value: %d, Character: %c\n", i, i);
        i++;
    }
    return 0;
}
```

b)

```
#include <stdio.h>
int main() {
    int num, originalNum, remainder, result;

    for (num = 1; num <= 500; num++) {
        originalNum = num;
        result = 0;

        while (originalNum != 0) {
            remainder = originalNum % 10;
            result += remainder * remainder * remainder;
            originalNum /= 10;
        }
    }
}
```

```

    }
    if (result == num) {
        printf("%d is an Armstrong number.\n", num);
    }
}
return 0;
}

```

c)

```

#include <stdio.h>
int main() {
    int matchsticks = 21, user_pick;
    printf("Welcome to the matchstick game!\n");
    while (1) {
        printf("Pick 1, 2, 3, or 4 matchsticks: ");
        scanf("%d", &user_pick);
        if (user_pick < 1 || user_pick > 4) {
            printf("Invalid choice. Pick again.\n");
            continue;
        }
        printf("You picked %d matchsticks.\n", user_pick);
        matchsticks -= user_pick;
        printf("Remaining matchsticks: %d\n", matchsticks);
        int computer_pick = 5 - user_pick;
        printf("Computer picked %d matchsticks.\n", computer_pick);
        matchsticks -= computer_pick;
        printf("Remaining matchsticks: %d\n", matchsticks);
        if (matchsticks <= 1) {
            printf("You lose!\n");
            break;
        }
    }
    return 0;
}

```

d)

```

#include <stdio.h>
int main() {
    int num, pos_count = 0, neg_count = 0, zero_count = 0;
    char choice;
    do {
        printf("Enter a number: ");
        scanf("%d", &num);
        if (num > 0)
            pos_count++;
        else if (num < 0)
            neg_count++;
    } while (choice != 'q');
}

```

```

        else
            zero_count++;
        printf("Do you want to enter another number? (y/n): ");
        scanf(" %c", &choice);
    } while (choice == 'y' || choice == 'Y');
    printf("Positive numbers: %d\n", pos_count);
    printf("Negative numbers: %d\n", neg_count);
    printf("Zero numbers: %d\n", zero_count);
    return 0;
}

```

e)

```

#include <stdio.h>
int main() {
    int num, octal_num = 0, remainder, base = 1;
    printf("Enter an integer: ");
    scanf("%d", &num);
    while (num != 0) {
        remainder = num % 8;
        octal_num += remainder * base;
        num /= 8;
        base *= 10;
    }
    printf("Octal equivalent: %d\n", octal_num);
    return 0;
}

```

f)

```

#include <stdio.h>
int main() {
    int n, num, smallest, largest;
    printf("Enter the number of elements: ");
    scanf("%d", &n);
    printf("Enter %d numbers:\n", n);
    scanf("%d", &num);
    smallest = largest = num;
    for (int i = 1; i < n; i++) {
        scanf("%d", &num);
        if (num < smallest)
            smallest = num;
        if (num > largest)
            largest = num;
    }
    printf("Range: %d\n", largest - smallest);

    return 0;
}

```

50)Write a program to determine whether a number is prime or not. A prime number is said to be prime if it is divisible only by 1 or itself.

```
# include<stdio.h>
int main( )
{
    int n, i ;
    printf ( "Enter a number " ) ;
    scanf ( "%d", &n ) ;
    i = 2 ;
    while ( i <= n - 1 )
    {
        if ( n% i == 0 )
        {
            printf ( "Not a prime number\n" ) ;
            break ;
        }
        i++ ;
    }
    if ( i == n)
        printf ( "Prime number\n" ) ;
}
```