**KPIT TECHNOLOGIES**

**WEEKLY REPORT**

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

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| **Student name** | **Week** | **Branch** | **USN** |
| **SATHWIK** | **1** | **Circuit (ECE)** | **1NH20EC142** |

**Yashavant Kanetkar Book**

**Question 1-50:**

1)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.

Ans: #include <stdio.h>

void calculatePaperSizes() {

int width = 1189;

int height = 841;

for (int i = 0; i <= 8; i++) {

printf("A%d: %d mm x %d mm\n", i, width, height);

if (i % 2 == 0) {

width /= 2;

} else {

height /= 2;

}

}

}

int main() {

calculatePaperSizes();

return 0;

}

2)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.

Ans:

#include <stdio.h>

int main() {

float length, breadth, radius;

printf("Enter the length of the rectangle: ");

scanf("%f", &length);

printf("Enter the breadth of the rectangle: ");

scanf("%f", &breadth);

printf("Enter the radius of the circle: ");

scanf("%f", &radius);

float area\_rectangle = length \* breadth;

float perimeter\_rectangle = 2 \* (length + breadth);

float area\_circle = (22.00/7.00) \* radius \* radius;

float circumference\_circle = 2 \* (22.00/7.00) \* radius;

printf("\nRectangle:\n");

printf("Area: %.2f\n", area\_rectangle);

printf("Perimeter: %.2f\n", perimeter\_rectangle);

printf("\nCircle:\n");

printf("Area: %.2f\n", area\_circle);

printf("Circumference: %.2f\n", circumference\_circle);

return 0;

}

3)If value of an angle is input through the keyboard , write a program to print all its Trigonometric ratios

#include <stdio.h>

#include <math.h>

double degreesToRadians(double degrees) {

return degrees \* (M\_PI / 180.0);

}

int main() {

double angle\_degrees;

double angle\_radians;

double sin\_value, cos\_value, tan\_value, csc\_value, sec\_value, cot\_value;

printf("Enter the value of the angle in degrees: ");

scanf("%lf", &angle\_degrees);

angle\_radians = degreesToRadians(angle\_degrees);

sin\_value = sin(angle\_radians);

cos\_value = cos(angle\_radians);

tan\_value = tan(angle\_radians);

if (sin\_value != 0) {

csc\_value = 1 / sin\_value;

} else {

csc\_value = INFINITY;

}

if (cos\_value != 0) {

sec\_value = 1 / cos\_value;

} else {

sec\_value = INFINITY;

}

if (tan\_value != 0) {

cot\_value = 1 / tan\_value;

} else {

cot\_value = INFINITY;

}

printf("\nTrigonometric Ratios for %.2f degrees:\n", angle\_degrees);

printf("Sine: %.2f\n", sin\_value);

printf("Cosine: %.2f\n", cos\_value);

printf("Tangent: %.2f\n", tan\_value);

printf("Cosecant:%s\n",(csc\_value==INFINITY)?"Undefined":(char[20]){sprintf((char[20]){}, "%.2f", csc\_value)});

printf("Secant:%s\n",(sec\_value == INFINITY) ? "Undefined" : (char[20]){sprintf((char[20]){}, "%.2f",sec\_value)}); printf("Cotangent:%s\n",(cot\_value==INFINITY)?"Undefined":(char[20]){sprintf((char[20]){}, "%.2f", cot\_value)});

return 0;

}

4)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

Ans: (a) True

(b) True

(c) True

(d) False

(e) False

(f) True

5)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 )

Ans:

1. Valid. In C, any non-zero value is considered true. -25 is non-zero, so this if statement is valid and will always evaluate to true.
2. Valid. Similar to (a), 3.14 is a non-zero value, so this if statement is valid and will always evaluate to true.
3. Valid. Assuming a is a variable, this if statement is valid. The condition will be true if a is non-zero.
4. Valid. Assuming a and b are variables, this if statement is valid. The condition will be true if the result of a + b is non-zero.
5. Valid. This is a standard comparison operation. If a is greater than or equal to b, the condition will be true.

6)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.

Ans: #include <stdio.h>

int main() {

int number, originalNumber, reversedNumber = 0, remainder;

printf("Enter a five-digit number: ");

scanf("%d", &number);

if (number < 10000 || number > 99999) {

printf("The number entered is not a five-digit number.\n");

return 1;

}

originalNumber = number;

while (number != 0) {

remainder = number % 10;

reversedNumber = reversedNumber \* 10 + remainder;

number /= 10;

}

printf("Reversed number: %d\n", reversedNumber);

if (originalNumber == reversedNumber) {

printf("The original and reversed numbers are equal.\n");

} else {

printf("The original and reversed numbers are not equal.\n");

}

return 0;

}

7)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.

Ans:

#include <stdio.h>

int main() {

int angle1, angle2, angle3;

printf("Enter the three angles of the triangle:\n");

printf("Angle 1: ");

scanf("%d", &angle1);

printf("Angle 2: ");

scanf("%d", &angle2);

printf("Angle 3: ");

scanf("%d", &angle3);

if (angle1 + angle2 + angle3 == 180) {

printf("The triangle is valid.\n");

} else {

printf("The triangle is not valid.\n");

}

return 0;

}

8)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.

Ans: #include <stdio.h>

#include <math.h>

double degreesToRadians(double degrees) {

return degrees \* (M\_PI / 180.0);

}

int main() {

double angle\_degrees;

double sin\_value, cos\_value, sum\_of\_squares;

printf("Enter the value of the angle in degrees: ");

scanf("%lf", &angle\_degrees);

double angle\_radians = degreesToRadians(angle\_degrees);

sin\_value = sin(angle\_radians);

cos\_value = cos(angle\_radians);

sum\_of\_squares = sin\_value \* sin\_value + cos\_value \* cos\_value;

if (fabs(sum\_of\_squares - 1.0) < 1e-6) {

printf("The sum of the squares of sine and cosine of the angle is equal to 1.\n");

} else {

printf("The sum of the squares of sine and cosine of the angle is not equal to 1.\n");

}

return 0;

}

9)Using conditional operators determine:

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

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

Ans: #include <stdio.h>

int main () {

char ch;

printf("Enter a character: ");

scanf("%c", &ch);

(ch >= 'a' && ch <= 'z')? printf ("The character is a lowercase alphabet.\n"): printf ("The character is not a lowercase alphabet.\n");

((ch >= 32 && ch <= 47) || (ch >= 58 && ch <= 64) || (ch >= 91 && ch <= 96) || (ch >= 123 && ch <= 126))

? printf("The character is a special symbol.\n")

: printf("The character is not a special symbol.\n");

return 0;

}

10)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.

Ans: #include <stdio.h>

int main() {

int ascii\_value = 0;

while (ascii\_value <= 255) {

printf("ASCII Value: %d, Equivalent Character: %c\n", ascii\_value, ascii\_value);

ascii\_value++;

}

return 0;

}

11)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:

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

Ans:

#include <stdio.h>

int computer\_pick(int matchsticks\_left) {

return (matchsticks\_left - 1) % 5;

}

int main() {

int matchsticks = 21;

int user\_pick;

while (matchsticks > 1) {

printf("Pick 1, 2, 3, or 4 matchsticks: ");

scanf("%d", &user\_pick);

if (user\_pick < 1 || user\_pick > 4 || user\_pick > matchsticks) {

printf("Invalid input! Please pick a valid number of matchsticks.\n");

continue;

}

matchsticks -= user\_pick;

printf("Remaining matchsticks: %d\n", matchsticks);

if (matchsticks == 1) {

printf("You picked up the last matchstick. You lose!\n");

break;

}

int computer\_pick\_amount = computer\_pick(matchsticks);

printf("The computer picks %d matchstick(s).\n", computer\_pick\_amount);

matchsticks -= computer\_pick\_amount;

printf("Remaining matchsticks: %d\n", matchsticks);

}

printf("Game Over!\n");

return 0;

}

12)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.

Ans: #include <stdio.h>

int main () {

int n, i;

float num, smallest, largest;

printf("Enter the number of elements: ");

scanf("%d", &n);

printf("Enter %d numbers:\n", n);

scanf("%f", &num);

smallest = largest = num;

for (i = 1; i < n; i++) {

scanf("%f", &num);

if (num < smallest)

smallest = num;

if (num > largest)

largest = num;}

printf("Range: %.2f\n", largest - smallest);

return 0;

}

13)Which of the following statements is true for the following program?

# include<stdio.h>

int main( )

{

int x = 10, y = 100 % 90 ;

for ( i = 1 ; i <= 10 ; i++ ) ; if ( x != y ) ;

printf ( "x = %d y = %d\n", x, y ) ;

return 0 ; }

1. The printf( ) function is called 10 times.

2. The program will produce the output x = 10 y = 10.

3. The after the if ( x != y ) will not produce an error.

4. The program will not produce any output.

5. The printf( ) function is called infinite times.

Ans: The after the if ( x != y ) will not produce an error.

14)Which of the following statement is true about a for loop used in a C program?

1. for loop works faster than a while loop.

2. All things that can be done using a for loop can also be done using a while loop.

3. for ( ; ; ) implements an infinite loop.

4. for loop can be used if we want statements in a loop to get executed at least once.

5. for loop works faster than a do-while loop.

Ans:

2. All things that can be done using a for loop can also be done using a while loop. and 3. for ( ; ; ) implements an infinite loop.

15)Write a program to generate all pythagorean triplets with side length less than or equal to 30

Ans: #include <stdio.h>

void generate\_pythagorean\_triplets(int limit) {

int a, b, c;

printf("Pythagorean triplets with side lengths less than or equal to %d:\n", limit);

for (a = 1; a <= limit; a++) {

for (b = a; b <= limit; b++) {

for (c = b; c <= limit; c++) {

if (a \* a + b \* b == c \* c && c <= limit) {

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

}

}

}

}

}

int main() {

int limit = 30;

generate\_pythagorean\_triplets(limit);

return 0;

}

16)Given three variables x, y, z, write a function to circularly shift their values to right. In other words, if x = 5, y = 8, z = 10, after circular shift y = 5, z = 8, x =10. Call the function with variables a, b, c to circularly shift values.

Ans: #include <stdio.h>

void circular\_right\_shift(int \*x, int \*y, int \*z) {

int temp = \*z;

\*z = \*y;

\*y = \*x;

\*x = temp;

}

int main () {

int a = 5, b = 8, c = 10;

printf("Before circular right shift: a = %d, b = %d, c = %d\n", a, b, c);

circular\_right\_shift(&a, &b, &c);

printf("After circular right shift: a = %d, b = %d, c = %d\n", a, b, c);

return 0;

}

17) Define a function that receives weight of a commodity in Kilograms and returns the equivalent weight in Grams, Tons and Pounds. Call this function from main( ) and print the results in main( ).

Ans: #include <stdio.h>

void convert\_weight(double kg, double \*grams, double \*tons, double \*pounds) {

\*grams = kg \* 1000;

\*tons = kg / 1000;

\*pounds = kg \* 2.20462;

}

int main() {

double weight\_kg, weight\_grams, weight\_tons, weight\_pounds;

printf("Enter the weight of the commodity in kilograms: ");

scanf("%lf", &weight\_kg);

convert\_weight(weight\_kg, &weight\_grams, &weight\_tons, &weight\_pounds);

printf("Equivalent weight in:\n");

printf("Grams: %.2f\n", weight\_grams);

printf("Tons: %.2f\n", weight\_tons);

printf("Pounds: %.2f\n", weight\_pounds);

return 0;

}

18) ) Define a function to compute the distance between two points and use it to develop another function that will compute the area of the triangle whose vertices are A(x1, y1), B(x2, y2), and C(x3, y3). Use these functions to develop a function which returns a value 1 if the point (x, y) lines inside the triangle ABC, otherwise returns a value 0. Would you get any advantage if you develop these functions to work on call be reference principle?

Ans: #include <stdio.h>

#include <math.h>

double distance(double x1, double y1, double x2, double y2) {

return sqrt(pow(x2 - x1, 2) + pow(y2 - y1, 2));

}

double triangle\_area(double x1, double y1, double x2, double y2, double x3, double y3) {

double a = distance(x1, y1, x2, y2);

double b = distance(x2, y2, x3, y3);

double c = distance(x3, y3, x1, y1);

double s = (a + b + c) / 2; // semi-perimeter

return sqrt(s \* (s - a) \* (s - b) \* (s - c));

}

int point\_inside\_triangle(double x, double y, double x1, double y1, double x2, double y2, double x3, double y3) {

double total\_area = triangle\_area(x1, y1, x2, y2, x3, y3);

double area1 = triangle\_area(x, y, x1, y1, x2, y2);

double area2 = triangle\_area(x, y, x2, y2, x3, y3);

double area3 = triangle\_area(x, y, x3, y3, x1, y1);

return total\_area == area1 + area2 + area3;

}

int main() {

double x1, y1, x2, y2, x3, y3, x, y;

printf("Enter the coordinates of vertex A (x1 y1): ");

scanf("%lf %lf", &x1, &y1);

printf("Enter the coordinates of vertex B (x2 y2): ");

scanf("%lf %lf", &x2, &y2);

printf("Enter the coordinates of vertex C (x3 y3): ");

scanf("%lf %lf", &x3, &y3);

printf("Enter the coordinates of the point (x y): ");

scanf("%lf %lf", &x, &y);

if (point\_inside\_triangle(x, y, x1, y1, x2, y2, x3, y3)) {

printf("The point (%.2f, %.2f) lies inside the triangle ABC.\n", x, y);

} else {

printf("The point (%.2f, %.2f) does not lie inside the triangle ABC.\n", x, y);

}

return 0;

}

19) A 5-digit positive integer is entered through the keyboard, write a recursive function to calculate sum of digits of the 5-digit number.

Ans: # include <stdio.h>

int rsum ( int ) ;

int main( ) {

int num, sum ;

int n ;

printf ( "Enter number: " ) ;

scanf ( "%d", &num ) ;

sum = rsum ( num ) ;

printf ( "Sum of digits is %d\n", sum ) ;

return 0 ; }

int rsum ( int n ) {

int s, remainder ;

if ( n != 0 ) {

remainder = n % 10 ; s = remainder + rsum ( n / 10 ) ;

}

else return 0 ; return s ;

}

20) A positive integer is entered through the keyboard, write a program to obtain the prime factors of the number. Modify the function suitably to obtain the prime factors recursively.

Ans: # include<stdio.h>

void factorize ( int, int ) ;

int main( ) {

int num ;

printf ( "Enter a number: " ) ;

scanf ( "%d", &num ) ;

printf ( "Prime factors are: " ) ;

factorize ( num, 2 ) ;

return 0 ;

}

void factorize ( int n, int i ) {

if ( i <= n ) {

if ( n % i == 0 ) {

printf ( "%d ", i ) ;

n = n / i ;

}

else i++ ;

factorize ( n, i ) ;

}

}

21)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.

Ans: # 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 ;

}

22)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.

Ans:

# 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 ;

}

23)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.

Ans: # 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 ;

}

24) 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.

Ans: # 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 ;

}

25) 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 ;

}

Ans: (a) garbage\_value 200

(b) 10 20

(c) x and y are equal

(d) x = 10 ,y = 10 ,z = 0

(e) C is WOW

26)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 ;

}

Ans: (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.

27)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.

All we have to do to test whether a number is prime or not, is to divide it successively by all numbers from 2 to one less than itself. If remainder of any of these divisions is zero, the number is not a prime. If no division yields a zero then the number is a prime number. Following program implements this logic:

Ans: # include<stdio.h>

int main( )

{

int num, i ;

printf ( "Enter a number " ) ;

scanf ( "%d", &num ) ;

i = 2 ;

while ( i <= num - 1 )

{

if ( num % i == 0 )

{

printf ( "Not a prime number\n" ) ;

break ;

}

i++ ;

}

if ( i == num )

printf ( "Prime number\n" ) ;

}

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

Ans: # 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

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

Ans: # 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 ;

}

30)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.

Ans: # 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 ;

}

31)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;

}

Ans: (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;

}

32)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**.**

Ans: # 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 ;

}

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.

Ans:

(a)

#include<stdio.h>

void main(){

int number,reverse=0;

printf("Enter the five digit number: ");

scanf("%d",&number);

int temp=number;

int i;

for(i=0;i<5;i++){

reverse=reverse\*10+temp%10;

temp/=10;

}

if(number==reverse)

printf("Given number and Reversed number are equal");

else

printf("Given number and Reversed number are not equal");

}

(b)

#include<stdio.h>

void main()

{

int ram,shyam,ajay;

printf("Enter the age of Ram: ");

scanf("%d",&ram);

printf("Enter the age of Shyam: ");

scanf("%d",&shyam);

printf("Enter the age of Ajay: ");

scanf("%d",&ajay);

if(ram<shyam){

if(ram<ajay)

printf("Ram is the youngest");

else

printf("Ajay is the youngest");

}

else

if(shyam<ajay)

printf("Shyam is the youngest");

else

printf("Ajay is the youngest");

}

(c)

#include<stdio.h>

void main(){

int angle1,angle2,angle3;

printf("Enter the three angles of the triangle: ");

scanf("%d %d %d",&angle1,&angle2,&angle3);

if((angle1+angle2+angle3)==180)

printf("The triangle is valid");

else

printf("The triangle is not valid");

}

(d)

#include<stdio.h>

void main(){

int number;

printf("Enter a number: ");

scanf("%d",&number);

if(number<0)

number=(-1)\*number;

printf("The Absolute value is %d",number);

}

(e)

#include<stdio.h>

void main(){

int length,width;

printf("Enter the Length and Width of a rectangle: ");

scanf("%d %d",&length,&width);

int area,perimeter;

area=length\*width;

perimeter=2\*(length+width);

if(area>perimeter)

printf("Area is greater than the perimeter of rectangle");

else

printf("Perimeter is greater than the area of rectangle");

}

(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>

#include <math.h>

int main() {

float x, y, centerX, centerY, radius, distance;

printf("Enter coordinates of the center of the circle (x, y): ");

scanf("%f %f", &centerX, &centerY);

printf("Enter radius of the circle: ");

scanf("%f", &radius);

printf("Enter coordinates of the point (x, y): ");

scanf("%f %f", &x, &y);

distance = sqrt(pow((x - centerX), 2) + pow((y - centerY), 2));

if (distance < radius)

printf("Point lies inside the circle.\n");

else if (distance == radius)

printf("Point lies on the circle.\n");

else

printf("Point lies outside the circle.\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)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

Ans: (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

35)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 )

Ans: (a) Valid

(b) Valid

(c) Valid

(d) Valid

(e) Valid

36) Write a C program to find the sum of elements above the main diagonal of a matrix.

Ans: #include <stdio.h>

int main() {

int n, sum = 0;

printf("Enter the size of matrix: ");

scanf("%d", &n);

int matrix[n][n];

printf("Enter elements of matrix:\n");

for (int i = 0; i < n; ++i) {

for (int j = 0; j < n; ++j) {

scanf("%d", &matrix[i][j]);

if (i < j) {

sum += matrix[i][j];

}

}

}

printf("Sum of elements above the main diagonal: %d\n", sum);

return 0;

}

37) Write a C program to convert a binary number to decimal.

Ans: #include <stdio.h>

#include <math.h>

int binaryToDecimal(int n) {

int decimal = 0, i = 0, remainder;

while (n != 0) {

remainder = n % 10;

n /= 10;

decimal += remainder \* pow(2, i);

++i;

}

return decimal;

}

int main() {

int num;

printf("Enter a binary number: ");

scanf("%d", &num);

printf("Decimal representation: %d\n", binaryToDecimal(num));

return 0;

}

38)Write a C program to count the occurrences of a character in a string.

Ans: #include <stdio.h>

int main() {

char str[100], ch;

int count = 0;

printf("Enter a string: ");

gets(str);

printf("Enter a character to find its frequency: ");

scanf("%c", &ch);

for (int i = 0; str[i] != '\0'; ++i) {

if (str[i] == ch) {

++count;

}

}

printf("Frequency of %c = %d\n", ch, count);

return 0;

}

39)Write a C program to remove all whitespaces from a string.

Ans: #include <stdio.h>

int main() {

char str[100], newStr[100];

int j = 0;

printf("Enter a string: ");

gets(str);

for (int i = 0; str[i] != '\0'; ++i) {

if (str[i] != ' ') {

newStr[j++] = str[i];

}

}

newStr[j] = '\0';

printf("String without whitespaces: %s\n", newStr);

return 0;

}

40)Write a C program to find the second largest element in an array.

Ans: #include <stdio.h>

int main() {

int n;

printf("Enter the number of elements: ");

scanf("%d", &n);

int arr[n];

printf("Enter the elements: ");

for (int i = 0; i < n; ++i) {

scanf("%d", &arr[i]);

}

int first, second;

if (arr[0] > arr[1]) {

first = arr[0];

second = arr[1];

} else {

first = arr[1];

second = arr[0];

}

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

if (arr[i] > first) {

second = first;

first = arr[i];

} else if (arr[i] > second && arr[i] != first) {

second = arr[i];

}

}

printf("Second largest element: %d\n", second);

return 0;

}

41)Write a C program to check if a number is a perfect number.

Ans: #include <stdio.h>

int main() {

int num, sum = 0;

printf("Enter a number: ");

scanf("%d", &num);

for (int i = 1; i <= num / 2; ++i) {

if (num % i == 0) {

sum += i;

}

}

if (sum == num) {

printf("%d is a perfect number.\n", num);

} else {

printf("%d is not a perfect number.\n", num);

}

return 0;

}

42) Write a C program to display the Fibonacci series using recursion.

Ans: #include <stdio.h>

int fibonacci(int n) {

if (n == 0) {

return 0;

} else if (n == 1) {

return 1;

} else {

return (fibonacci(n - 1) + fibonacci(n - 2));

}

}

int main() {

int n;

printf("Enter the number of terms: ");

scanf("%d", &n);

printf("Fibonacci Series: ");

for (int i = 0; i < n; ++i) {

printf("%d ", fibonacci(i));

}

printf("\n");

return 0;}

43)Write a C program to print all prime numbers between a given range using recursion.

Ans: #include <stdio.h>

int isPrime(int n, int i) {

if (n <= 2) {

return (n == 2) ? 1 : 0;

}

if (n % i == 0) {

return 0;

}

if (i \* i > n) {

return 1;

}

return isPrime(n, i + 1);

}

void printPrimes(int start, int end) {

if (start > end) {

return;

}

if (isPrime(start, 2)) {

printf("%d ", start);

}

printPrimes(start + 1, end);

}

int main() {

int start, end;

printf("Enter the range (start and end): ");

scanf("%d %d", &start, &end);

printf("Prime numbers between %d and %d: ", start, end);

printPrimes(start, end);

printf("\n");

return 0;

}

44)Write a C program to check if a number is a palindrome using recursion

Ans: #include <stdio.h>

#include <string.h>

int isPalindrome(char str[], int start, int end) {

if (start >= end) {

return 1;

}

if (str[start] != str[end]) {

return 0;

}

return isPalindrome(str, start + 1, end - 1);}

int main() {

char str[100];

printf("Enter a number: ");

gets(str);

int len = strlen(str);

if (isPalindrome(str, 0, len - 1)) {

printf("%s is a palindrome.\n", str);

} else {

printf("%s is not a palindrome.\n", str);

}

return 0;

}

45) Write a C program to find the power of a number using recursion.

Ans: #include <stdio.h>

int power(int base, int exp) {

if (exp == 0) {

return 1;

} else {

return base \* power(base, exp - 1);

}

}

int main() {

int base, exp;

printf("Enter base and exponent: ");

scanf("%d %d", &base, &exp);

printf("%d^%d = %d\n", base, exp, power(base, exp));

return 0;

}

46) Write a C program to count the occurrences of a character in a string.

Ans: #include <stdio.h>

int main() {

char str[100], ch;

int count = 0;

printf("Enter a string: ");

gets(str);

printf("Enter a character to find its frequency: ");

scanf("%c", &ch);

for (int i = 0; str[i] != '\0'; ++i) {

if (str[i] == ch) {

++count;

}

}

printf("Frequency of %c = %d\n", ch, count);

return 0;

}

47)Write a C program to remove all whitespaces from a string.

Ans: #include <stdio.h>

int main() {

char str[100], newStr[100];

int j = 0;

printf("Enter a string: ");

gets(str);

for (int i = 0; str[i] != '\0'; ++i) {

if (str[i] != ' ') {

newStr[j++] = str[i];

}

}

newStr[j] = '\0';

printf("String without whitespaces: %s\n", newStr);

return 0;

}

48)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**

Ans: 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

i = 8

49)Question 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' ;

Ans: (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.

50)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 = Max(Red/255, Green/255, Blue/255)

Cyan = (White-Red/255)

Magenta 255) White-Green/255 m/255

White

Yellow = (White-Blue/255)

Black1-White

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

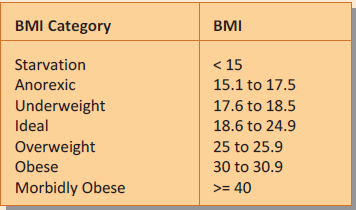
Grade is 7 if conditions (i) and (iii) are met

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:



Ans: (a) #include <stdio.h>

int main() {

float side1, side2, side3;

printf("Enter the lengths of three sides of the triangle: ");

scanf("%f %f %f", &side1, &side2, &side3);

if ((side1 \* side1 == side2 \* side2 + side3 \* side3) ||

(side2 \* side2 == side1 \* side1 + side3 \* side3) ||

(side3 \* side3 == side1 \* side1 + side2 \* side2)) {

printf("It is a right-angled triangle.\n");

}

else if (side1 == side2 && side2 == side3) {

printf("It is an equilateral triangle.\n");

}

else if (side1 == side2 || side1 == side3 || side2 == side3) {

printf("It is an isosceles triangle.\n");

}

else {

printf("It is a scalene triangle.\n");

}

return 0;

}

(b) #include <stdio.h>

int main() {

int red, green, blue;

float white, cyan, magenta, yellow, black;

printf("Enter the values of Red, Green, Blue (0-255): ");

scanf("%d %d %d", &red, &green, &blue);

white = (red > green ? (red > blue ? red : blue) : (green > blue ? green : blue)) / 255.0;

cyan = (white - red / 255.0) / white;

magenta = (white - green / 255.0) / white;

yellow = (white - blue / 255.0) / white;

black = 1 - white;

printf("CMYK values: C=%.2f, M=%.2f, Y=%.2f, K=%.2f\n", cyan, magenta, yellow, black);

return 0;

}

(c) #include <stdio.h>

int main() {

float hardness, carbon\_content, tensile\_strength;

int grade;

printf("Enter the values of hardness, carbon content, and tensile strength: ");

scanf("%f %f %f", &hardness, &carbon\_content, &tensile\_strength);

if (hardness > 50 && carbon\_content < 0.7 && tensile\_strength > 5600)

grade = 10;

else if (hardness > 50 && carbon\_content < 0.7)

grade = 9;

else if (carbon\_content < 0.7 && tensile\_strength > 5600)

grade = 8;

else if (hardness > 50 && tensile\_strength > 5600)

grade = 7;

else if (hardness > 50 || carbon\_content < 0.7 || tensile\_strength > 5600)

grade = 6;

else

grade = 5;

printf("Grade of steel: %d\n", grade);

return 0;

}

(d) #include <stdio.h>

int main() {

float weight, height, bmi;

printf("Enter weight (in kilograms): ");

scanf("%f", &weight);

printf("Enter height (in meters): ");

scanf("%f", &height);

bmi = weight / (height \* height);

printf("BMI: %.2f\n", bmi);

if (bmi < 15)

printf("BMI Category: Starvation\n");

else if (bmi >= 15.1 && bmi <= 17.5)

printf("BMI Category: Anorexic\n");

else if (bmi >= 17.6 && bmi <= 18.5)

printf("BMI Category: Underweight\n");

else if (bmi >= 18.6 && bmi <= 24.9)

printf("BMI Category: Ideal\n");

else if (bmi >= 25 && bmi <= 25.9)

printf("BMI Category: Overweight\n");

else if (bmi >= 30 && bmi <= 30.9)

printf("BMI Category: Obese\n");

else

printf("BMI Category: Morbidly Obese\n");

return 0;

}