



Assignment -

(Functions of Pointers)

- Q.1 Write a C program that invokes a function power (a, b) to calculate and print the value of a raised to b . Do not use any library function/operator.

```
#include <stdio.h>
void pw (int a, int b){
    int power = 1;
    for (int i=1; i<=b; i++)
    {
        power = power * a;
    }
    printf (" Result is %.d", power);
}

int main()
{
    int a=2, b=3;
    pw(a,b);
    return 0;
}
```

Q.2 Write a C program that takes a positive integer from the user and invokes a function to compute and print the binary equivalent of the integer.

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

```
void bin(int a)
```

```
<
```

```
int rem, binary = 0, i = 1, num;
```

```
num = a;
```

```
while (a != 0)
```

```
<
```

```
rem = a % 2;
```

```
a = a / 2;
```

```
binary = binary + rem * i;
```

```
i = i * 10;
```

```
>
```

```
printf("Binary equivalent of %.d is %.d", num, binary);
```

```
>
```

```
int main()
```

```
<
```

```
int a;
```

```
printf("Enter a positive number :");
```

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

```
bin(a);
```

```
return 0;
```

```
>
```



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Q.3 Write a C program that takes a positive integer from the user and invokes a function to obtain the prime factors of this number.

```
#include <stdio.h>

void prime-factors (int num)
{
    printf(" Prime factors of %d are:",num);

    while (num % 2 == 0 )
    {
        printf("%d",2);
        num = num / 2;
    }

    for (int i=3; i*i <=num;i=i+2)
    {
        while (num % i == 0)
        {
            printf("%d",i);
            num = num / i;
        }
    }

    //If num is a prime number greater than 2
    if (num>2)
        printf("%d", num);
}
```

```

printf("\n");
}

int main(){
    int num;
    printf("Enter a positive integer : ");
    scanf("%d", &num);

    if (num <= 0){
        printf("Please enter a positive integer.\n");
    }
    else {
        prime-factors(num);
    }

    return 0;
}

```

Q.4 Write C program that invokes two functions for swapping the value of two variables. The first function (swap-by-value) should demonstrate call by value principle while the second function (swap-by-reference) should demonstrate call by reference principle. The program should print the following in the given order :-

(a). value of variables in main() before calling any function.



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- (b) Value of variables after swapping in swap-by-value function.
- (c) value of variables in main() after calling swap-by-value function.
- (d). value of variables after swapping in swap-by-reference function.
- (e). value of variables in main() after calling swap-by-reference function.

#include<stdio.h>

void swap(int var1, int var2)

```
<
    int temp = var1;
    var1 = var2;
    var2 = temp;
```

>

void swaps(int *var1, int *var2)

```
<
    int temp = *var1;
    *var1 = *var2;
    *var2 = temp;
```

>

int main()

```
<
    int var1 = 3, var2 = 2;
```



```
printf("Before swap value of varL and var2 is: %d,
      %d \n", var1, var2);
```

```
swap (varL, var2);
```

```
printf("After swap value of varL and var2 is: %d,
      %d \n", var1, var2);
```

```
Swaps (&varL, &var2);
```

```
printf(" After swap value of varL and var2 is:
      %d , %d ", var1, var2);
```

```
return 0;
```

```
}
```

Q.5 Given three variables x,y, z . Write a C program
 -that invokes a function to circularly shift their
 values to right . In other words if x=5, y=8 ,z=10,
 after circular shift x=10, y=5 ,z=8 , call the
 function will variables a,b,c. to circulate shift
 values . The new values of the variables should be
 printed in the main function after the function call.

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

```
void cyclicSwap(int *a, int *b, int *c);
```

```
int main()
```

```
int a, b, c;
```



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```
printf("Enter a , b and c respectively : ");
scanf("%d %d %d", &a, &b, &c);

printf ("values before swapping :\n");
printf ("a = %d \n b = %d \n c = %d \n", a, b, c);

cyclicSwap(&a, &b, &c);

printf ("value after swapping :\n");
printf ("a = %d \n b = %d \n c = %d \n", a, b, c);

return 0;
}

void cyclicSwap(int *n1, int *n2, int *n3)
{
    int temp;

    temp = *n2;
    *n2 = *n1;
    *n1 = *n3;
    *n3 = temp;
}
```

Q.6 A computer game to ascend a building with a specified number of floors. You have three different facilities for each floor to reach the top: the elevator (1), the escalator (2) and walking up the stairs (3).

Each facility has its own scoring rule. Assume the initial score is zero.

- Elevator (1): Score increments to the next even number.
- Escalator (2): Score increments to the next odd number.
- Walk (3): Score increments to the next prime number.

Write a C program to display the score to ascend a building. Create different functions for incrementing score according to the facility.

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

```
int isPrime(int num)
{
    if (num <= 1)
        return 0;
    for (int i = 2; i + i <= num; i++)
    {
        if (num % i == 0)
            return 0;
    }
    return 1;
}
```

```
int nextPrime(int num)
```

```
while (!isPrime(num)) <
```



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```
num++;
}
return num;
}

int incrementElevator(int score)
{
    return (score % 2 == 0) ? score + 2 : score + 1;
}

int incrementEscalator(int score)
{
    return (score % 2 == 0) ? score + 1 : score + 2;
}

int incrementWalk(int score)
{
    return nextPrime(score + 1);
}

int main()
{
    int numFloors, score = 0;
    int choice;

    printf("%d", &
    printf(" Enter the number of floors:");
    scanf("%d", &numFloors);
```

```
for (int i=1; i<=numFloors; i++) {
    printf("choose facility for floor %.d (1:Elevator,
    2: Escalator / 3:Walk): ", i);
    scanf ("%d", &choice);
```

```
switch(choice) {
```

```
case 1:
```

```
    score = incrementElevator(score);
    break;
```

```
case 2:
```

```
    score = incrementEscalator(score);
    break;
```

```
case 3:
```

```
    score = incrementWalk(score);
    break;
```

```
default:
```

```
    printf(" Invalid choice:\n");
    i--; //Repeat floor
```

```
}
```

```
}
```

```
printf("Final score : %.d\n", score);
```

```
return 0;
```

```
}
```



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ASSIGNMENT-3

Program-1: Write a C program using nested if else statement to check the following conditions.

If number is even and also divisible by 3
print "number is even and also divisible by 3."

If number is even but not divisible by 3.

print "number is even but not divisible by 3."

Otherwise print "odd number".

```
#include <stdio.h>
int main()
{
    int num;
    printf("Enter a number:");
    scanf("%d", &d);
    if (num % 2 == 0)
    {
        if (num % 3 == 0)
            printf("number is even and also divisible by 3");
        else
            printf("number is even but not divisible by 3");
    }
    else
        printf("odd number");
    return 0;
}
```

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PAPER SAMPLE QUESTION PAPER

Program - 2: Write a program to print the result of student for 5 different subjects scored out of 50 marks on following condition:

I). If percentage (%) is greater than 75 and score more than 65% marks in any subject.

Result : Merit with Distinction

II). If percentage (%) is between 65 and 75 and score more than 65% marks in at least one subject.

Result : First Division with Distinction

III). If percentage (%) is between 55 and 65.

Result : Second Division

IV). If percentage (%) is less than 55 but score minimum 35% marks in each subject.

Result : Pass with Grace

V). If percentage (%) is less than 55 but score less than 35% marks in any subject.

Result : Fail

#include <stdio.h>

int main ()

{

float s1, s2, s3, s4, s5, per;

// take the percentage/marks of student subjectwise

printf ("Enter the marks of subject 1 : ");

scanf ("%f", &s1);

printf ("Enter the marks of subject 2 : ");

scanf ("%f", &s2);

printf ("\nEnter the marks of subject 3 : ");

scanf ("%f", &s3);



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```
printf("\n Enter the marks of subject 4 : ");
scanf("%f", &s4);
printf("\n Enter the marks of subject 5 : ");
scanf("%f", &s5);

if (s1 <= 50 && s2 <= 50 && s3 <= 50 && s4 <= 50 && s5 <= 50)
{
    per = ((s1+s2+s3+s4+s5)/250)*100;
    float s11, s22, s33, s44, s55;
    s11 = (s1/50)*100;
    s22 = (s2/50)*100;
    s33 = (s3/50)*100;
    s44 = (s4/50)*100;
    s55 = (s5/50)*100;

    // compute the result
    if (per > 75)
    {
        if (s11 > 65 || s22 > 65 || s33 > 65 || s44 > 65 || s55 > 65)
            printf("\n Result: Merit with Distinction");
    }
    else if (65 < per < 75)
    {
        if (s11 > 65 || s22 > 65 || s33 > 65 || s44 > 65 || s55 > 65)
            printf("\n Result: first division with distinction");
    }
    else if (55 < per < 65)
        printf("\n Result: Second Division");
    else if (per < 55)
    {
    }
```

```

if (s11 >= 35 && s22 >= 35 && s33 >= 35 && s44 >= 35 && s55 >=
    printf("\n Result : Pass with grace");
}
else if (per < 55)
{
    if (s11 < 35 || s22 < 35 || s33 < 35 || s44 < 35 || s55 < 35)
        printf("\n Result : fail");
}
return 0;
}

```

Program - 3: Write a computer program to find Armstrong numbers less than 1000 and except 0 and 1.

```

#include<stdio.h>
int main()
{
    int a,b,c,n1,n2,sum;
    printf("Enter a number:");
    int num;
    scanf("%d",&num);

    if (1<num<1000)
    {
        a = num%10;
        n1 = num/10;
        b = n1%10;
        n2 = n1/10;
        c = n2%10;
    }
}

```



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```
sum = (a*a*a) + (b*b*b) + (c*c*c);  
if (sum == num)  
{  
    printf ("Entered number is -Armstrong number");  
}  
else {  
    printf ("Not -Armstrong number");  
}  
else {  
    printf ("Condition not satisfied");  
}  
return 0;  
}
```

Program-4: Write a C program to print the reverse
of a 3-digit number.

```
// reverse a number  
#include <stdio.h>  
int main ()  
{  
    int num, n1, n2, n3, a, b ;  
    printf ("Enter a number :");  
    scanf ("%d", &num);  
  
    if (num > 99 && num < 1000)  
    {  
        n1 = num / 100 ;  
        n3 = num % 10 ;
```

```
a = num/10;  
n2 = a%10;  
b = (n3*100) + (n2*10)+n1;  
printf("After reversing : the number is %d", b);  
>  
else {  
    printf("condition not satisfied");  
>  
return 0;  
>
```

scribbling at margin is not allowed
in examination hall



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Assignment - 4 (Decision Control)

Program-1 Write a C program that calculates the absolute difference between an input number and 50, if the input number is greater than 20, double the absolute difference.

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

    if (num <= 20) {
        printf("result is %d", 50-num);
    }
    else if (num>20)
    {
        if (num<=50)
            printf("result is %d", 2*(50-num));
        else
            printf("result is %d", 2*(num-50));
    }
    else
        printf("invalid output");
}

return 0;
```

Program-2 Write a C program that verifies an input number is divisible by 3 or 7 and falls between 100 and 500. If the condition is satisfied the program should print 1 otherwise it should print 0.

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

    if (100 < num < 500) {
        if (num % 3 == 0 || num % 7 == 0)
            printf("1");
        else
            printf("0");
    }
    else
        printf("The number is not between 100 and 500");

    return 0;
}
```

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Program-3 Write a C program that takes three numbers as input. If all numbers are distinct, output the difference between the second highest and lowest. If all the numbers are equal, output the sum of all. If any two numbers are equal, print the sum of the lowest and highest.

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

```
int main ()
```

```
{
```

```
    int a, b, c, r;
```

```
    printf ("Enter three numbers :");
```

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

```
    if (a!=b && b!=c)
```

```
{
```

```
    if (a>b) {
```

```
        if (a>c && b>c) {
```

```
            r = b - c;
```

```
}
```

```
        else if (c>a && c>b) {
```

```
            r = a - b;
```

```
}
```

```
        else if (a>c && c>b) {
```

```
            r = c - b;
```

```
}
```

```
}
```

```
    else if (a<b) {
```

```
        if (b>c && c>a) {
```

```
            r = c - a;
```

```
}
```

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```

else if (b > c && a > c) {
    r = a - c;
}
else if (c > b && c > a) {
    r = b - a;
}
printf("Result is %d", r);
}

else if (a == b == c) {
    r = a + b + c;
    printf("result is %d", r);
}

else if (a == b || b == c || a == c) {
    if (a == b) {
        r = a + c;
    }
    else if (b == c) {
        r = a + c;
    }
    else if (a == c) {
        r = a + b;
    }
    printf("Result is %d", r);
}

return 0;
}

```

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Program-4 Write a C program that takes the following inputs from a gym member: Scheduled Sessions , Attended Sessions, Any outstanding Payments(1-for Yes, 0-for No), No. of months as a member

The program should then display the following message if the member is eligible for discount:-

Congratulations! You qualify for the special discount on membership renewal.

or if the member is not eligible for discount, then the program should display the following message:-

Print Sorry, you do not qualify for the special discount on membership renewal.

(Reason for not qualifying should also be printed.)

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

```
int main()
```

```
{
```

```
    int ss, as, op, mm, att;
```

```
    printf("Enter the scheduled_sessions:");
```

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

```
    printf("Enter the attended_sessions:");
```

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

```
    printf("Enter 1 for outstanding payment and 0 for no dues:");
```

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

```
    printf("Enter the month as a member:");
```

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

```
    att = (as / ss) * 100;
```

```
    if (mm >= 6 && att >= 80 && op == 0) <
```

```
        printf("Congratulations! You qualify for the special  
discount on membership renewal.");
```

else <

printf("Sorry, you do not qualify for the
special discount on membership renewal.");

if (att < 80) <

printf("(attendance < 80%)");

>

else if (op == 1) <

printf("(outstanding payments or dues)");

>

else if (mm < 6) <

printf("(member less than 6 months)");

>

else if (att < 80 && op == 1) <

printf("(attendance < 80% and outstanding payment
or dues)");

>

else if (op == 1 && mm < 6) <

printf("(outstanding payments or dues and
member less than 6 months)");

>

else if (mm < 6 && att < 80) <

printf("(attendance < 80% and member less than
6 months)");

>

else if (att < 80 && mm < 6 && op == 1) <

printf("(attendance < 80% and outstanding payment
and or dues and member less than 6 months)");

>

return 0;

>

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Program-5. Write a C program to calculate the electricity bill (accept number of units from the user) according to the following criteria:

- First 50 units Rs. 0.00 per unit and service charge Rs. 0.30 per unit.
- Next 50 units Rs. 1.50 per unit and service charge Rs. 0.40 per unit.
- Next 100 units Rs. 2.50 per unit and service charge Rs. 0.50 per unit.
- After 200 units Rs. 3.75 per unit and service charge Rs. 0.60 per unit.

```
#include<stdio.h>
int main()
{
    float u, bill, a, b, c;
    printf("Enter the units:");
    scanf("%f", &u);
    a = (50 * 0.0 + 50 * 0.30);
    b = a + (50 * 1.50 + 50 * 0.40);
    c = b + (100 * 2.50 + 100 * 0.50);

    if (u <= 50)
        bill = (u + 0.6) + (u * 0.30);
    else if (50 < u <= 100)
        bill = a + ((u - 50) * 1.50) + ((u - 50) * 0.40);
    else
        bill = c + ((u - 100) * 3.75) + ((u - 100) * 0.60);
    printf("Bill = %f", bill);
}
```

```

else if (100 < u <= 200) {
    bill = b + ((u-100) * 2.50) + ((u-100) * 0.50);
}
else if (u > 200) {
    bill = c + ((u-200) * 3.75) + ((u-200) * 0.60);
}

printf("Electricity bill is : %.f", bill);

return 0;
}

```

Program-6 Write a C program that takes the number of workouts completed in a week, the calories burned in a workout, and whether the user has logged a workout everyday for a month as inputs. The program should then determine which badges the user has earned and display the results accordingly.

```

#include<stdio.h>
int main()
{
    int win, cb, wm;
    printf("Enter the workouts per week : ");
    scanf("%d", &ww);
    printf("Enter the calories burned : ");
    scanf("%d", &cb);
    printf("Enter the workouts per month : ");
    scanf("%d", &wm);
}

```

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```
if (ww >= 5) <
printf("Congratulations! You've earned the 'Week
Warrior' badge.");
}

else if (cb > 500) <
printf("Congratulations! You've earned the
'Calorie Crusher' badge.");
}

else if (wm >= 28) <
printf("Congratulations! You've earned the
'Monthly Streak' badge.");
}

else if (ww >= 88 & cb > 500) <
printf("Congratulations! You've earned the
'Fitness Champion' badge.");
}

return 0;
```

ASSIGNMENT - 6

P.1 Write a C program to print the reverse a 'n' digit number. Also check whether the number is palindrome or not.

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

```
int main ()
```

```
{
```

```
    int num, rem, reverse, original;
```

```
    printf ("Enter a number :");
```

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

```
    original = num;
```

```
    reverse = 0;
```

```
    // Reverse the number
```

```
    while (num != 0)
```

```
{
```

```
        rem = num % 10;
```

```
        reverse = reverse * 10 + rem;
```

```
        num = num / 10;
```

```
}
```

```
    printf ("Reversed number = %d", reverse);
```

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

```
    // Check for palindrome
```

```

if (original == reverse) {
    printf ("%d is a palindrome.", original);
}
else {
    printf ("%d is not a palindrome.", original);
}
return 0;
}

```

Output:- Enter a number : 253647

Reversed number = 746352

253647 is not a palindrome.

P.2 Write a C program to convert and print equivalent binary number of a given positive integer number.

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

```
int main()
```

```
<
```

```
int num, binary = 0, rem, i=1;
```

```
printf ("Enter an integer:");
```

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

```
while (num != 0)
```

```
<
```

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```
rem = num % 2;  
binary = binary + remainder * i;  
i = i * 10;  
num = num / 2;  
}  
printf("Equivalent binary number is %d", binary);  
return 0;  
}
```

Output:- Enter an integer : 12
Equivalent binary number : 1100

P.3 Write a C program to print the following pattern:-

a). Inverted half pyramid of *.

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

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

```
int main ()
```

```
{  
    for (int i=5 ; i>=1 ; i--)
```

```

for(int j=i; j>=1; j--)
{
    printf("*");
}
printf("\n");
return 0;
}

```

⑥ A full pyramid. of *.

```

*
**
* *
* * *
* * * *
* * * * *

```

```

#include<stdio.h>
int main()
{
    int rows, i, j, space;
    printf("Enter the number of rows:");
    scanf("%d", &rows);

    for(i=1; i<=rows; i++)
    {
        for(space=1; space<=(rows-i); space++)
        {
            printf(" ");
        }

```

```
for (j = 1 ; j <=(2 * i) - 1 ; ++j)
```

1

```
printf ("*")
```

1

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

1

return 0;

۲

the six terms support a Δ^2 (Dyadic) model.

P.4 Given a railway seat number, the task is to check whether it is valid seat number or not. Also, print its berth type i.e. lower berth, middle berth, upper berth, side lower berth, side upper berth as per the figure below:-

per berth	3	6	11	14	19	22	27	30	35	38	43	46
berth	2	5	10	13	18	21	26	29	34	37	42	45
lower berth	1	4	9	12	17	20	25	28	33	36	41	44
berth	3	6	11	14	19	22	27	30	35	38	43	46

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

```
//function to print berth type
```

```
void berth-type (int s) {
```

```
if (s > 0 && s < 73) {
```

```
if (s % 8 == 1 || s % 8 == 4) {
```

```
printf ("%d is lower berth \n", s);
```

```
}
```

```
else if (s % 8 == 2 || s % 8 == 5) {
```

```
printf ("%d is middle berth \n", s);
```

```
}
```

```
else if (s % 8 == 3 || s % 8 == 6) {
```

```
printf ("%d is upper berth \n", s);
```

```
}
```

```
else if (s % 8 == 7) {
```

```
printf ("%d is side lower berth \n", s);
```

```
}
```

```
else {
```

```
printf ("%d is side upper berth \n", s);
```

```
}
```

```
if (s
```

```
else {
```

```
printf ("%d invalid seat number \n", s);
```

```
}
```

~~for (j=1; j <= (2*i)-1; ++j)~~

int main ()

{

int s=10;

berth-type(s);

s=7;

berth-type(s);

s=0

berth-type(s);

return 0;

}

Output :-

10 is middle berth

7 is side lower berth

0 invalid seat number.

P.S Write a C program that takes a positive integer from the user and invokes a function to obtain the prime factors of this number.

#include <stdio.h>

void prime-factors (int n)

{

```

if (n==1) {
    printf("1/n");
    return;
}

```

```

while (n % 2 == 0) {
    printf("2");
    n /= 2;
}

```

// n must be odd at this point.

// Now check for all odd numbers up to sqrt(n)

```

for (int i=3; i*i <=n; i+=2) {
    while (n % i == 0) {
        printf("%d", i);
        n /= i;
    }
}

```

```

if (n > 2) {
    printf("%d", n);
}

```

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

```
}
```

Bhopal

University,
Roll No. 246045 Scholar No.....

```
int main ()  
{  
    int num;  
  
    printf("Enter a positive integer:");  
    scanf("%d", &num);  
  
    if (num <= 0)  
    {  
        printf("Invalid input. Please enter a positive  
               integer. \n");  
    }  
    else  
    {  
        printf ("Prime factors of %d are: ", num);  
        prime-factors (num);  
    }  
  
    return 0;  
}
```