Function programs:

```c
#include<stdio.h>
#include<conio.h>
int reverse(int);
main()
{
        int n,r;
        printf("Enter number:");
        scanf("%d",&n);
        r=reverse(n);/*function call by passing argument n i.e value of n is passed */
        printf("Reverse number is %d",r);
        getch();
}
int reverse(int n)
{
        int rem,s=0;
        while(n!=0)
         {
                rem=n%10;/* remainder i.e last digit of n*/
                s=s*10+rem; /* multiplying previous sum by 10 i.e. shifiting its postion and
        remainder is added */
                n=n/10; /* quotient i.e to decrease number size by 1 digit */
}
return s;
}
```

/*WAp to count and find the sum of all numbers in the array which are exactly divisible by 7 but not by 5 */

```c
#include<stdio.h>

#include<conio.h>

int main()

{

   int a[20],n,s=0,c=0,i;
```

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```c
    printf("How many numbers do you have?:" );

    scanf("%d",&n);

    printf("Enter elements:");

    for(i=0;i<n;i++) /* loop for each element of array */

    {

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

       if(a[i]%7==0 && a[i]%5!=0)  /* checking whether number meets condtion or not */

       {

        s+=a[i];

        c++;

       }

    }

    printf("sum is : %d and count is : %d",s,c);

    getch();

    return 0;

}
```

/*WAP to print the Fibonacci series up to n using recursive function. */

```c
#include<stdio.h>

#include<conio.h>

void fibo(int,int,int);

int main()

{

   int n;

   printf("Enter number of terms:");

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

```c
    fibo(0,1,n);

    getch();

    return 0;

}

void fibo(int a,int b, int n)/*a =0 ,b=1, n=n initially */

{

if(n>0)/*terminating condition */

    {

        printf("%d\t",a); /* value  of a is displayed till n  becomes 0 */

        fibo(b,a+b,n-1); /*function call inside function fibo so recursive) */

    }

}
```

/*WAP to print the Fibonacci series until the term is less than 500 using recursive function. */

```c
#include<stdio.h>

#include<conio.h>

void fibo(int,int);

int main()

{

        int n;

        fibo(0,1);

        getch();

}

void fibo(int a,int b)  /*a =0 ,b=1 initially */

{
```

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```c
    if(a<500)  /*terminating condition*/

    {

        printf("%d\t",a); /* value  of a is displayed till a <500 */

        fibo(b,a+b); /*function call inside function fibo so recursive) */

    }

}
```

/*WAP to read two integers from the user.Pass it to functions that calculates the HCF and LCM .

Display the result form the main function.

-> to return more than one value use concept of pointer   */

```c
#include<stdio.h>

#include<conio.h>

void calc(int,int,int*,int*);

int main()

{

  int a,b,lcm,hcf;

  printf("Enter two numbers:");

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

  calc(a,b,&hcf,&lcm);

  printf("HCF is %d and LCM is %d.",hcf,lcm);

   getch();

}

void calc(int x,int y,int *h,int *l)

{

    int i;

    for(i=1;i<=x;i++)
```

```c
    {
       if(x%i==0 && y%i==0)

           *h=i;

    }

    *l=(x*y)/(*h);

}
```

/*WAP to display all the prime numbers within the ranges specified by the users using function */

```c
#include<stdio.h>

#include<conio.h>

int prime(int);

void main()

{

  int n1,n2,i,p;

  printf("Enter range:");

  scanf("%d%d",&n1,&n2);

  for(i=n1;i<=n2;i++)  /* loop to check that each number within range are prime or not */

  {

    p=prime(i); /* sending all numbers from n1 to n2 to function */

    if(p==0)  /* compares to return value and return 0 if number is prime */

    printf("%d\t",i);

  }

  getch();

}

int prime(int n) /*n=i value */
```

```c
{
    int i;

    for(i=2;i<n;i++) /*loop to check that each number n is prime or not so dividing by 2 upto n-1
*/
    {
        if(n%i==0) /* if number get divide by any number it is sure that it is not prime so break */
        break;
    }
    if(n==i)  /* if number is prime then n equals to i  and return 0 for such case*/
            return 0;
    else
            return 1;
}
```

/*WAP to find x^n using recursive function */

```c
#include<stdio.h>

#include<conio.h>

int power(int,int);

int main()

{
    int n,x;

    printf("Enter base number  and exponent:");

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

    printf("%d to the power %d is:%d",n,x,power(n,x));

    getch();

    return 0;
```

}

int power(int n,int x)

{

  if(x==0)

  return 1;

  else

  return n*power(n,x-1);

}

Practice questions:
1.WAP to read a number and call a function till "yes" is entered by the user. You should count and sum the numbers using static variables in the function and return the average to the main function.
2.WAP to find the sum of digits of an integer recursively.

3.WAP to read integer number and add the individual digits contained in it until the final sum is a single digit. Use recursion to do so.

4.WAP to find $\sum n^2$ using recursion. ($\sum n^2 = 1^2 + 2^2 + 3^2 + \cdots upto\ n\ terms.$)

5. WAP to evaluate the following series to n terms specified by the user. Here the factorial and x^y must be calculated by recursion.

$$\frac{x}{1!} - \frac{x^3}{3!} + \frac{x^5}{5!} - \cdots$$

6.WAP to check whether a positive integer greater than 3 is twin prime or not. A prime number is twin prime if the resulting number after altering (plus or minus)it by 2 also a prime number. Ex: 29 is twin prime because 29 itself is prime and 29+2 =31 is also a prime and 53 is not twin prime because 53 is prime but neither 51 nor 55 is prime.

[hint: make two function checktwinprime() and checkprime()]

7. WAP to read an integer number,count the even digits and odd digits present in the entered number.You must write a function for calculating the result and the result must be displayed in main function.

Array and string

/*WAP that takes string from the user and pass it to function. The function finds and returns the
number of words in the string.In the main program display the number of words.
->program logic:
    ->take string
    ->pass to function
    ->caculate number of words in function
    -> return number of words from functions as result is to display in main function */
#include<stdio.h>
#include<conio.h>
int wcount(char [])
void main()
{
    char s[[30];
    int l;
    gets(s);
    l=wcount(s);
    printf("NUMber of words %d",l+1);
    getch();
    return 0;
}
int wcount(char s[])
{
    int i,l=0;
    for(s=0;s[i]!='\0';i++)
    {
     if(s[i]==' ')
       l++;
    }
return l;
}

/* WAP in C to read a string and display it in reverse order.Use user defined

functions to count the number of characters in it and reverse it */

#include<stdio.h>

#include<conio.h>

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```c
void rev(char str[]);

int main()
{
    char str[30];
    printf("Enter any string");
    gets(str);
    rev(str);/*function call, giving argument str which is character array */
    printf("Reverse string is: %s",str);
    getch();
    return 0;
}
void rev(char str[]) /* no need to return string since it is an array */
{
    int len,i;
    char t;
    for(len=0;str[len]!='\0';len++);/* for loop terminate here so it gives length as it executes until null character is found */
    printf("Number of characters are: %d\n",len);
    for(i=0;i<len/2;i++) /*logic to reverse characters by swapping */
    {
        t=str[i];
        str[i]=str[len-1-i];
        str[len-1-i]=t;
    }
}
```

/* WAp that reads string form user and uses a user defined function to copy the contents of the read string into another character array changing lower case letters to upper case and upper case letters to lower case*/

```c
#include<stdio.h>

#include<conio.h>

void process(char [],char []);

int main()

{

    char a[50],b[50];

    printf("Enter string:");

    gets(a);

    process(a,b);/*function doesnot return value but changes are seen in main as both a and b are arrays */

    printf("The changed string is: %s",b);

    getch();

    return 0;

}

void process(char a[],char b[])

{

    int i;

    for(i=0;a[i]!='\0';i++)

      {

            if(a[i]>='A' && a[i]<='Z')

            b[i]=a[i]+32; /*content of a is copied to b by changing to lowercase*/

            else if(a[i]>='a' && a[i]<='z')
```

b[i]=a[i]-32; /*content of a is copied to b by changing to uppercase*/

else

b[i]=a[i]; /*characters of a is copied to b if space,numbers,other symbols are encountered*/

}

b[i]='\0';

}

/* WAp that reads string form user and uses a user defined function to copy the contents of the read string into

another character array changing lower case letters to upper case and upper case letters to lower case. USe pointer to process string*/

// just change a[i] to *(a+i)

#include<stdio.h>

#include<conio.h>

void process(char *,char *);

int main()

{

   char a[50],b[50];

   printf("Enter string:");

   scanf("%[^\n]",a); /*takes input until next line is entered by user */

   process(a,b);/*function doesnot return value but changes are seen in main as both a and b are arrays */

   printf("The changed string is: %s",b);

   getch();

   return 0;

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```
}
void process(char *a,char *b)
{
    int i;
    for(i=0;*(a+i)!='\0';i++)
      {

          if(*(a+i)>='A' &&*(a+i)<='Z')
        *(b+i)=*(a+i)+32; /*content of a is copied to b by changing to lowercase*/
          else if(*(a+i)>='a' && *(a+i)<='z')
        *(b+i)=*(a+i)-32; /*content of a is copied to b by changing to uppercase*/
          else
        *(b+i)=*(a+i); /*characters of a is copied to b if space,numbers,other symbols are
encountered*/
      }
    *(b+i)='\0';
}
```

/*WAP to generate the following pattern using unformatted output function

   k

  ok

  wok

 hwok

 chwok

lchwok

```c
#include<stdio.h>

#include<conio.h>

int main()

{

   int i,j,k;

   char a[]="pulchowk";

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

   {

      for(j=1;j<8-i;j++)

      putchar(' '); /* single quote */

      for(k=7-i;k<8;k++)

      {

      putchar(a[k]);

      }

      putchar('\n'); /*single quote for character */

   }

 getch();

 return 0;

}
```

/*WAP in c to re-arrange the alphabets of a given string in alphabetical order using user defined function. USe pointer to process tha string .Your program should convert the string"cOmpUtEr into cEmOprtU"   */

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```c
#include<stdio.h>

#include<conio.h>

#include<string.h>

#include<ctype.h>

//void ascending(char s[40])

void ascending(char *s)

{
    int i,j,n;

    char t;

    n=strlen(s);

    for(i=0;i<n-1;i++)

    {

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

    {

    /* if(toupper(s[i])>toupper(s[j])) //using array notation

     { t=s[i];

      s[i]=s[j];

      s[j]=t;}  */

      if(toupper(*(s+i))>toupper(*(s+j))) //using pointer notation

     {

     t=*(s+i);

     *(s+i)=*(s+j);

     *(s+j)=t;

     }

     }
```

```
    }

}

int main()

{

    char str[40];

    gets(str);

    ascending(str);

    printf("The rearranged alphabets are: %s",str);

    getch();

    return 0;

}
```

/*Write a function that takes a string as the input and counts the number of vowels,consonants,numeric character and other characters.The calling fucntion should read the string and pass it to function.After the fucntion call, the count of vowels,consonants ,numeric character and othercharacter AND other character should be displayed in the calling fucntion .*/

/* ->more than one value cannot be returned from function so using pointer will be effective*/

```
#include<stdio.h>

#include<conio.h>

#include<ctype.h>

void count(char[],int *,int *,int *,int *);

int main()

{

    char str[50];

    int vc=0,cc=0,nc=0,oc=0;
```

```c
    printf("Enter string:");

    gets(str);

    count(str,&vc,&cc,&nc,&oc);

    printf("vowels:%d \t consonants: %d \t numeric character:%d\t others:%d ",vc,cc,nc,oc);

    getch();

    return 0;

}

void count(char s[],int *v,int *c,int *n,int *o)

{

    int i;

    for(i=0;s[i]!='\0';i++)

    {

        if(toupper(s[i])=='A'    ||    toupper(s[i])=='E'||    toupper(s[i])=='I'||    toupper(s[i])=='O'||
toupper(s[i])=='U')

        *v=*v+1;

        else if(toupper(s[i])>='A' && toupper(s[i])<='Z')

        *c=*c+1;

        else if(s[i]>='0' && s[i]<='9')

        *n=*n+1;

        else

        *o=*o+1;

    }

}
```

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/*WAP to insert a string into another string in the location specified by the user. Read the string in the main program and pass them to function along with the inserting position and return the resulting string */

```c
#include<stdio.h>

#include<conio.h>

void insert(char *,char *,int);

//void insert(char [],char [],int);

 main()

{

   char m[50],s[50];

   int n;

   printf("Enter main string: ");

   gets(m);

   printf("Enter string to insert :");

   gets(s);


    printf("Enter position:");

    scanf("%d",&n);

    insert(m,s,n);

    printf("New string:");

    puts(m);

    getch();

    return 0;

    }

void insert(char *m,char *s,int p)

//void insert(char m[],char s[],int p)
```

```c
{
    int i,j;

    char temp[50];
    for(i=p-1,j=0;m[i]!='\0';i++,j++)
    temp[j]=m[i];
    temp[j]='\0';
    for(i=p-1,j=0;s[j]!='\0';i++,j++)
    m[i]=s[j];

    for(j=0;temp[j]!='\0';i++,j++)
    m[i]=temp[j];
    m[i]='\0';
}
```

/*WAP to read 5 names of students and sort them alphabetically. The process must be done by the user defined function */

```c
#include<stdio.h>
#include<conio.h>
#include<string.h>
void sort(char [][10]);
int main()
{
    int i;
    char name[5][10];
```

```c
printf("Enter name of five persons:");

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

gets(name[i]);

sort(name);


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

  printf("%s\t",name[i]);  //puts(name[i]);


    getch();

}
void sort(char name[][10])

{

   int i,j;

   char temp[10];


    for(i=0;i<4;i++)

{

    for(j=i+1;j<5;j++)

       {

       if(strcmp(name[i],name[j])>0)

        {

           strcpy(temp,name[j]);

           strcpy(name[j],name[i]);

           strcpy(name[i],temp);

        }
```

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```c
       }

 }

}
```

/*WAP that passes array to a function and print the largest and smallest element */

```c
#include<stdio.h>

#include<conio.h>

void func(int[],int);

int main()

{

    int i,a[20],n;

    printf("Enter elements number:");

    scanf("%d",&n);

    printf("Enter elements:");

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

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

    func(a,n);//function call passing array and element number

    getch();

}

void func(int a[],int n)

{

    int max=a[0],min=a[0],i;

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

    {

      if(max<a[i])

      max=a[i];
```

```c
        if(min>a[i])

         min=a[i];

      }

     printf("max is:%d\n",max);

     printf("min is:%d",min);

}
```

/*WAP that passes array to a function and print the largest and smallest element */

//using pointer notation

```c
#include<stdio.h>

#include<conio.h>

void func(int*,int);

int main()

{

   int i,a[20],n;

   printf("Enter elements number:");

   scanf("%d",&n);

   printf("Enter elements:");

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

   scanf("%d",a+i);

   func(a,n);//function call passing array and element number

   getch();

}

void func(int *a,int n)

{

    int max=a[0],min=a[0],i;
```

```c
    for(i=1;i<n;i++)
     {
      if(max<*(a+i))
      max=*(a+i);
      if(min>*(a+i))
      min=*(a+i);
     }
    printf("max is:%d\n",max);
    printf("min is:%d",min);
}
```

/*WAP that passes array to a function and print the largest and smallest element */

//without function

```c
#include<stdio.h>
#include<conio.h>
int main()
{
   int i,a[20],n,max,min;
   printf("Enter elements number:");
   scanf("%d",&n);
   printf("Enter elements:");
   for(i=0;i<n;i++)
   scanf("%d",&a[i]);
   max=a[0];
   min=a[0];
```

```c
    for(i=1;i<n;i++)

     {

      if(max<a[i])

      max=a[i];

      if(min>a[i])

      min=a[i];

     }

     printf("max is:%d\n",max);

     printf("min is:%d",min);

    getch();

}
```

/*WAP that passes array to a function and returns the sum and difference of the largest and smallest elements

of the array to the main function*/

//-> to return more than one value form function use pointer ,here sum and difference must be return

```c
#include<stdio.h>

#include<conio.h>

void sumdiff(int [],int *,int *,int);

int main()

{

   int i,a[20],n,sum,diff;

   printf("Enter elements number:");

   scanf("%d",&n);

   printf("Enter elements:");

   for(i=0;i<n;i++)
```

```c
    scanf("%d",&a[i]);

    sumdiff(a,&sum,&diff,n);

    printf("sum  is:%d\n",sum);

     printf("diff is:%d",diff);

    getch();

}

void sumdiff(int a[],int *s,int *d,int n)

{

    int max=a[0],min=a[0],i;

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

    {

     if(max<a[i])

     max=a[i];

     if(min>a[i])

     min=a[i];

    }

    *s=max+min;

    *d=max-min;

}

  /*program for ascending order.both in array notation and pointer notation
comments are for array notation .you can do any one notation if not specified in question
->element in n-2 position is second largest in ascending order
->element in 1 position is second smallest in ascending order */
#include<stdio.h>

#include<conio.h>
```

```c
//void sort(int []);

//void readArray(int []);

//void displayArray(int []);

void sort(int *);

void readArray(int *);

void displayArray(int *);

int i,n;

int main()

{

    int j,p[10];

    int *nums;

    nums=p;

    printf("How many numbers are there:");

    scanf("%d",&n);

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

    readArray(nums);

    sort(nums);

    displayArray(nums);

    printf("second largest is:%d",nums[n-2]);

    printf("second smallest is:%d",nums[1]);

    getch();

    return 0;

}

//void sort(int num[])

void sort(int *num)
```

```c
{
    int j,temp;
    for(i=0;i<n-1;i++)
    for(j=i+1;j<n;j++)
    {    if(*(num+i)>*(num+j))  //simply change > to < for descending order
    /* if(num[i]>num[j])
        {
        temp=num[i];
        num[i]=num[j];
        num[j]=temp
        }           */
    {    temp=*(num+i);
        *(num+i)=*(num+j);
        *(num+j)=temp;
        }
    }
}
//void readArray(int nums[])
void readArray(int *nums)
{
    for(i=0;i<n;i++)
            scanf("%d",nums+i); //scanf("%d",&nums[i]);
}
void displayArray(int *nums)
{
```

```c
    for(i=0;i<n;i++)

            printf("%d   " ,*(nums+i));

}
```

/* WAP to multiply two matrix. Use user defined function to read matrix elements,process it and display result.*/

```c
#include<stdio.h>

#include<conio.h>

void read_matrix(float [][10],int ,int );

void display_matrix(float [][10],int ,int );

void mul_matrix(float [][10],float [][10],float [][10],int,int,int);

int main()

{


        int k,l,m,n;

        float a[10][10],b[10][10],pro[10][10];

        printf("Enter first matrix order:(<10)");

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

        printf("Enter order of second matrix:(<10):");

        scanf("%d%d",&k,&l);

        if(n!=k)

        {

                printf("Cannot multiplied");

        }

        else
```

```c
    {
        printf("Enter first matrix elements:");

        read_matrix(a,m,n);/* passing array and size of first matrix m,n */

        printf("Enter second matrix elementS:");

        read_matrix(b,n,l);/* passing array and size of second matrix n,l */

        mul_matrix(a,b,pro,m,n,l);

        printf("product is:");

        display_matrix(pro,m,l);
    }
    getch();

    return 0;
}

void read_matrix(float mat[][10],int m,int n)

{


    int i,j;
    for(i=0;i<m;i++)
        for(j=0;j<n;j++)
            scanf("%f",&mat[i][j]);
}


void display_matrix(float mat[][10],int m,int n)

{
    int i,j;
        for(i=0;i<m;i++)
```

```c
    {

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

            printf(" %.4f ",mat[i][j]);

        printf("\n");

    }

}

void mul_matrix(float a[][10],float b[][10],float pro[][10],int m,int n,int l)

{ /*product of two matrix calculation starts */

    int i,j,k;

    for(i=0;i<m;i++)

    {

        for(j=0;j<l;j++)

        {

            pro[i][j]=0;

            for(k=0;k<n;k++)

                pro[i][j]+=a[i][k]*b[k][j];

        }

    }/* product calculation  ends here  */

}
```

   /* WAP to multiply two matrix without using user defined function.i.e. read from main,process in main and display from main */

/*compare and know the difference in with & without function*/

```c
#include<stdio.h>

#include<conio.h>

int main()
```

```c
{
    int i,j,k,l,m,n;
    float a[10][10],b[10][10],pro[10][10];
    printf("Enter first matrix order:(<10)");
    scanf("%d%d",&m,&n);
    printf("Enter order of second matrix:(<10):");
    scanf("%d%d",&k,&l);
if(n!=k)
{
    printf("Cannot multiplied");
}
else
{
    printf("Enter first matrix elements:");
    for(i=0;i<m;i++)
    for(j=0;j<n;j++)
    scanf("%f",&a[i][j]);
    printf("Enter second matrix elementS:");
    for(i=0;i<k;i++)
    for(j=0;j<l;j++)
    scanf("%f",&b[i][j]);
    for(i=0;i<m;i++)  /* product calculation  starts here  */
    {
        for(j=0;j<l;j++)
        {
```

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```c
                pro[i][j]=0;

                for(k=0;k<n;k++)

                        pro[i][j]+=a[i][k]*b[k][j];

        }

    }/* product calculation  ends here  */

    printf("product is:");

    for(i=0;i<m;i++) /* To display matrix  */

        {

        for(j=0;j<l;j++)

        printf(" %.4f ",pro[i][j]);

        printf("\n");

        }

}


    getch();

    return 0;

}



/* Program to calculate transpose of a matrix */

#include<stdio.h>

#include<conio.h>

int main()

{

        int a[10][10],b[10][10],i,j,m,n;

        printf("Enter row and column of matrix:");
```

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

        printf("Enter elements of A:");

   for(i=0;i<m;i++)

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

            scanf("%d",&a[i][j]);
//rows and columns are interchanged:transpose

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

     for(j=0;j<m;j++)

             b[i][j]=a[j][i];


   printf("Transpose matrix is:");

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

   {

     for(j=0;j<m;j++)

             printf("%d\t",b[i][j]);

     printf("\n");

   }

   getch();

}
```

/* program to find norm and trace of 3*3 matrix using separate function

 trace and norm and display result in main   */

```c
#include<stdio.h>

#include<conio.h>

#include<math.h>

void read_matrix(float [][3]);
```

```c
float trace(float [][3]);

float  norm(float [][3]);

int main()

{


    float a[3][3],t,n;

    printf("Enter matrix elements:");

    read_matrix(a);

    t=trace(a);

    n=norm(a);

    printf("trace: %f and norm: %f ",t,n);

    getch();

    return 0;

}

void read_matrix(float a[][3])

{

    int i,j;

    for(i=0;i<3;i++)

      for(j=0;j<3;j++)

          scanf("%f",&a[i][j]);

}

float norm(float a[][3])

{

    int i,j;

    float n=0.0;
```

```
    for(i=0;i<3;i++)

      for(j=0;j<3;j++)

        n=n+a[i][j]*a[i][j];

    return(sqrt(n));

 }

float trace(float a[][3])

 {

    int i,j;

    float t=0.0;

    for(i=0;i<3;i++)

    {

      for(j=0;j<3;j++)

     {

        t+=a[i][i];

     }

    }

    return t;

 }
```

Practice questions:(practice for both in array and pointer notation for all questions)

1.WAP that read two different strings. Pass these to a function which reverse the second string and then appends it at the end of the first string. Print the new string from calling function.

2. WAP to read 20 names of students and sort them alphabetically. The process must be done by the user defined function.

3.WAP to compare 2 strings using user defined function. And print message whether strings are equal or not.

4.WAP to find norm of matrix using function. Pass matrix to function and display value of norm in main.[The norm of matrix is square root of sum of square of elements of matrix]

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5.WAP to find the sum and difference of the largest and smallest element of 2 Dimensional array of size m by n.Call for two separate function for finding largest and smallest element.

6.WAp that find the longest word in given string.

7.WAP using function that takes an array of size n and finds the largest adjacent sum and display it in main function. For eg: if given array is {1,2,-3,-1,6}, then called function must return 5.

8.WAP that reads members of an array of size n. pass it to function that finds the biggest difference between any two values of the array and return it to main().

Structure:

Enumeration

Enumerated Types are a special way of creating your own Type in C. The type is a "list of key words".An enumeration is a user-defined data type consists of integral constants and each integral constant is give a name. Keyword enum is used to defined enumerated data type.

```
enum type_name{ value1, value2,...,valueN };/*semicolon here */
```

Here, type_name is the name of enumerated data type or tag.
And value1, value2,....,valueN are values of type type_name.

By default, value1 will be equal to 0, value2 will be 1 and so on but, the programmer can change the default value.

Example of enumerated type

```
#include <stdio.h>

enum week{ sunday, monday, tuesday, wednesday, thursday, friday, saturday};

int main(){

    enum week today;

    today=wednesday;

    printf("%d day",today+1);
```

```
    return 0;

  }
```

Output

4 day

You can write any program in C language without the help of enumerations but, enumerations helps in writing clear codes and simplify programming.

/* Create a structur student containing name,symbol number and name of 6 subjets,mark of each subject and total mark as its members.WAP that uses this structure and reads data for a student and gives the total marks as the output.

*/

#include<stdio.h>

#include<conio.h>

struct STU

   {

        char name[50];

        int sym;

        char sname[6][20];   /*for name of 6 subject.each subject name maximum length is 20 including null */

        float marks[6];

        float total;

   };

int main()

```c
{
    struct STU s;

    int i;

    s.total=0;

    printf("Enter name");

    gets(s.name);

    printf("Enter symbol number: ");

    scanf("%d",&s.sym);

    for(i=0;i<6;i++)

    {

        fflush(stdin);

        printf("Enter subject name: ");

        scanf("%s",s.sname[i]);

        printf("Enter corresponding marks: ");

        scanf("%f",&s.marks[i]);

        s.total=s.total+s.marks[i];

    }

    printf("\n Total = %f",s.total);

    getch();

}
```

/*Wap to manipulate complex numbers using structures. The structure should contain real and imaginary part. Write separate functions to add and substract complex numbers. Display result from main */

```c
#include<stdio.h>

#include<conio.h>

typedef struct
```

```c
{
    float real;
    float imag;
}complex;//using typedef so complex is new data type
complex add( complex,complex);
complex sub(complex,complex);
int main()
{
    complex n1,n2,ad,sb;
    printf("Enter real and imaginart part of first complex number:");
    scanf("%f%f",&n1.real,&n1.imag);
    printf("Enter real and imag part of second complex number:");
    scanf("%f%f",&n2.real,&n2.imag);
    ad=add(n1,n2);
    sb=sub(n1,n2);
    printf("The sum is:%.2f+%.2fi\n",ad.real,ad.imag);
    printf("The difference is:%.2f+(%.2f)i",sb.real,sb.imag);
    getch();
    return 0;
}

complex add(complex num1,complex num2)
{
        struct complex a;
        a.real=num1.real+num2.real;
```

```
        a.imag=num1.imag+num2.imag;

        return a;


}
 complex sub(complex num1, complex num2)

{

        struct complex b;

        b.real=num1.real-num2.real;

        b.imag=num1.imag-num2.imag;

        return b;

  }
```

/*WAp to manipulate complex numbers using structure. Create function that add and substract complex number.*/

/*-> to return more than one value from function use concept of pointer.

You can create two fucntion and return two values of sum and difference to main()

or you can create single function and display result of sum and difference from main() by using pointer concept*/


```
#include<stdio.h>

#include<conio.h>

typedef struct complexnum

{

    float real;

    float imag;

}complex;
```

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```c
void sumdiff( complex,complex,complex*,complex*);

int main()
{
        complex n1,n2,ad,sb;
        printf("Enter real and imaginart part of first complex number:");
        scanf("%f%f",&n1.real,&n1.imag);
        printf("Enter real and imag part of second complex number:");
        scanf("%f%f",&n2.real,&n2.imag);
        sumdiff(n1,n2,&ad,&sb);
        printf("The sum is:%.2f+%.2fi\n",ad.real,ad.imag);
        printf("The difference is:%.2f+(%.2f)i",sb.real,sb.imag);
        getch();
        return 0;
}


void sumdiff(complex num1,complex num2,complex *s,complex *d)
{
        s->real=num1.real+num2.real;
        s->imag=num1.imag+num2.imag;
        d->real=num1.real-num2.real;
        d->imag=num1.imag-num2.imag;
    }
```

/*Define a structure to hold the roll no. of a student and marks obtained by him in 5 subjects.

Declare an array to hold the data of 20 students.pass it to a function that displays the marks

of student who has a highest total marks */

```c
#include<stdio.h>

#include<conio.h>

struct student

{

    int roll;

    float mark[5];

};

void decl(struct student[]);

int main()

{

  int i,j;

  struct student list[20];

  /*Entering data*/

  for(i=0;i<20;i++)

  {

      printf("Enter roll number:");

      scanf("%d",&list[i].roll);

      printf("Enter marks in 5 different subjects:");

    for(j=0;j<5;j++)

      {

            scanf("%f",&list[i].mark[j]);

      }

  }

  decl(list);
```

```c
    getch();

  return 0;

}


void decl(struct student list[])

{

    float total[20],max;

    struct student s;

    int i,j;

    for(i=0;i<20;i++) /*20 students ko lagi.    */

    {

        total[i]=0;

        for(j=0;j<5;j++)/*each student ko 5 subject   */

          {

                total[i]=total[i]+list[i].mark[j];

          }

    }

      max=total[0];

      s=list[0];

      for(i=1;i<20;i++)

      {

              if(total[i]>max)

              {

                      max=total[i];

                      s=list[i];
```

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```
                    }

              }

      printf("Roll no:%d has highest total.\n",s.roll);

      printf("Marks of student having highest total:");

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

            printf("%.2f\t",s.mark[i]);

   }
```

/*Define a structure to hold the roll no. of a student ,marks obtained by him in 5 subjects and total of 5 subjects.Declare an array to hold the data of 20 students.Pass it to a function that displays the marks of student who has a highest total marks */

```
#include<stdio.h>

#include<conio.h>

struct student

{

      int roll;

      float mark[5];

      float total;

};

void decl(struct student[]);

int main()

{

   int i,j;

   struct student list[20];

   /*Entering data*/

   for(i=0;i<20;i++)

   {
```

```c
        printf("Enter roll number:");

        scanf("%d",&list[i].roll);

        printf("Enter marks in 5 different subjects:");

        list[i].total=0;

        for(j=0;j<5;j++)

          {

                    scanf("%f",&list[i].mark[j]);

                    list[i].total+=list[i].mark[j];

          }

   }

  decl(list);

  getch();

  return 0;

}


void decl(struct student list[])

{

    int i;

    float tot=list[0].total;

    struct student max;

    max=list[0];


    for(i=1;i<20;i++) /*20 students ko lagi.   */

    {
```

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```c
        if(list[i].total>tot)

                {

                        tot=list[i].total;

                        max=list[i];

                }

    }

    printf("Roll no:%d has highest total.\n",max.roll);

    printf("Marks of student having highest total:");

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

                printf("%.2f\t",max.mark[i]);


}
```

/*WAP that uses structure to read employee id,name,age and salary.Sort them on the basis of salary in descending order.The program should display unsorted data followed by sorted data. Pass whole structure array to function and sort data in fucntion and display result from main */

```c
#include<stdio.h>

#include<conio.h>

#include<string.h>

struct employee

  {

        int emp_id;

        char name[25];

        int age;

        float salary;

};

void sort(struct employee [],int);
```

```c
int main()
{
    struct employee e[50];
    int i,j,n;
    printf("How many employee?");
    scanf("%d",&n);
    for(i=0;i<n;i++)
    {
    printf("\nEnter data for employee:%d\n",i+1);
    printf("Employee ID: ");
    scanf("%d",&e[i].emp_id);
    printf("Name: ");
    fflush(stdin);
    scanf("%s",e[i].name);
    printf("Age: ");
    scanf("%d",&e[i].age);
    printf("Salary: ");
    scanf("%f",&e[i].salary);
}
printf("Unsorted data On eMployee:");
    for(i=0;i<n;i++)
    {
                printf("\n%d",e[i].emp_id);
                printf("\t%s",e[i].name);
                printf("\t%d",e[i].age);
```

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```c
              printf("\t%.2f",e[i].salary);

}


   sort(e,n);        //function call

printf("\nSorted data is:");

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

   {

              printf("\n%d",e[i].emp_id);

              printf("\t%s",e[i].name);

              printf("\t%d",e[i].age);

              printf("\t%.2f",e[i].salary);

}

getch();

return 0;


}

void sort(struct employee e[],int n)

{

   int i,j;

   struct employee temp;

for(i=0;i<n-1;i++)

{

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

      {

         if(e[i].salary<e[j].salary)
```

```c
        {

            temp=e[i];//swapping whole structure

            e[i]=e[j];

            e[j]=temp;

        }


        /*  if(strcmp(e[i].name,e[j].name)>0) //for sorting in alphabetical order

        {

            temp=e[i];

            e[i]=e[j];

            e[j]=temp;

        }  */

        }

    }

}
```

/*WAP in C to read a set of names,roll number ,date of birth and date of admission of the students in the college form the keyboardwhere the date of birth and date of admission consist of three members such as day ,month and year as a separate structure and sort them in ascending order of date of birth.   */

```c
#include<stdio.h>

#include<conio.h>

struct date{

    int day,month,year;

    };

struct student

{
```

```c
    char name[10];

    int rollno;

    struct date dob,doa;

    };

int main()

{

  struct student s[20],temp;

  int i,j,n;

  printf("How many students:");

  scanf("%d",&n);

/*Read n data   */

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

  {

     printf("Enter data of student:%d",i+1);

     printf("\nName: ");

     scanf("%s",s[i].name);

     printf("Roll number:");

     scanf("%d",&s[i].rollno);

     printf("Enter DOB (day month yr): ");

     scanf("%d%d%d",&s[i].dob.day,&s[i].dob.month,&s[i].dob.year);

     printf("Enter date of admission(day month yr):");

     scanf("%d%d%d",&s[i].doa.day,&s[i].doa.month,&s[i].doa.year);

  }

  /*    sorting data */

  for(i=0;i<n-1;i++)
```

```
    {

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

    {   /*if one year is greater than other then months and days need not be compared. If one
month is greater than

    other when years are equal   then days not need to be compared. Days are to be compared
when both year and month are equal */

    if(s[i].dob.year>s[j].dob.year || (s[i].dob.year == s[j].dob.year &&
s[i].dob.month>s[j].dob.month)||

    (s[i].dob.year==s[j].dob.year && s[i].dob.month==s[j].dob.month &&
s[i].dob.day>s[j].dob.day))

    {

                temp=s[i];//swapping whole structure

                s[i]=s[j];

                s[j]=temp;

    }

    }

    }

    /* displaying data    */

    printf("Sorted data of students:");

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

    {

        printf("\n%s",s[i].name);

        printf("\t%d",s[i].rollno);

        printf("\t%d/%d/%d",s[i].dob.day,s[i].dob.month,s[i].dob.year);

        printf("\t%d/%d/%d",s[i].doa.day,s[i].doa.month,s[i].doa.year);

    }

    getch();
```

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```
    return 0;

}
```

/*WAP to compute any two instant hop distances in a format(feet:inches) using structure. Build functions to add and substract given hop distances and display the results in the main function */

/*(This program mainly illustrates the concept of returning structures form called function to calling function)*/

```c
#include<stdio.h>

#include<conio.h>

struct distan

{

    int ft;

    int in;

};


struct distan sumd( struct distan,struct distan);

struct distan diffd( struct distan,struct distan);

int main()

{

        struct distan d1,d2,sum,diff;

        printf("Enter first distance:");

        scanf("%d%d",&d1.ft,&d1.in);

        printf("Enter second distance:");

        scanf("%d%d",&d2.ft,&d2.in);

        sum=sumd(d1,d2);

        diff=diffd(d1,d2);

        printf("The sum is:%d+%di\n",sum.ft,sum.in);
```

```c
        printf("The difference is:%d+(%.d)i",diff.ft,diff.in);

        getch();

        return 0;

}


struct distan sumd( struct distan d1,struct distan d2)

 {

    struct distan s;

     long int t1,t2,t;

    t1=d1.ft*12+d1.in;

    t2=d2.ft*12+d2.in;

    t=t1+t2;

    s.ft=t/12;

    s.in=t%12;

    return s;

}

struct distan diffd( struct distan d1,struct distan d2)

 {

    struct distan d;

    long int t1,t2,t;

    t1=d1.ft*12+d1.in;

    t2=d2.ft*12+d2.in;

    t=t2-t1;

    d.ft=t/12;

    d.in=t%12;
```

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```c
    return d;

}
```

/*WAP to compute any two instant hop distances in a format(feet:inches) using structure. Build single function that add and substract given hop distances and display the result in the main function */

```c
#include<stdio.h>

#include<conio.h>

struct distan

{

    int ft;

    int in;

};


void sumdiff( struct distan,struct distan,struct distan*,struct distan*);

int main()

{

    struct distan d1,d2,sum,diff;

    printf("Enter first distance:");

    scanf("%d%d",&d1.ft,&d1.in);

    printf("Enter second distance:");

    scanf("%d%d",&d2.ft,&d2.in);

    sumdiff(d1,d2,&sum,&diff);

    printf("The sum is:%d+%di\n",sum.ft,sum.in);

    printf("The difference is:%d+(%.d)i",diff.ft,diff.in);
```

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```
        getch();

        return 0;

}


void sumdiff( struct distan d1,struct distan d2,struct distan *s,struct distan *d)

 {

    long int t1,t2,t;

    t1=d1.ft*12+d1.in;

    t2=d2.ft*12+d2.in;

    t=t1+t2;

    s->ft=t/12;

    s->in=t%12;

    t=t2-t1;

    d->ft=t/12;

    d->in=t%12;

}
```

/*Create a structure time containing hour,minutes and seconds as its member using typedef.WAP that uses this structure to input start time and stop time to a function. Create two user defined functions which returns the sum and difference of the start time and stop time

-> 2 functions: sumfunc to sum time and diff to calculate difference */

```
#include<stdio.h>

#include<conio.h>

typedef struct {//using typedef in structure

    int hr;

    int min;
```

```c
    int sec;

    }time; //time is new user defined data type name


time sumfunc(time,time);

time diff(time,time);

int main()

{

    time start,stop,sum,difference;

    printf("enter start time: ");

    scanf("%d%d%d",&start.hr,&start.min,&start.sec); //taking input start time. Using dot
operator for accessing structure members

    printf("Enter stop time: ");

    scanf("%d%d%d",&stop.hr,&stop.min,&stop.sec);// taking input stop time

    sum=sumfunc(start,stop);//functions returns time data type value

    difference=diff(start,stop);

    printf("Sum is :%d hr %d min %d sec",sum.hr,sum.min,sum.sec);

    printf("Difference is : %d hr %d min %d sec",difference.hr,difference.min,difference.sec);

    getch();

    return 0;

}


time sumfunc(time start,time stop)

{

    time sum;

    long int t1,t2,t;
```

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```c
    t1=start.hr*3600+start.min*60+start.sec;

    t2=stop.hr*3600+stop.min*60+stop.sec;

    t=t1+t2;

    sum.hr=t/3600;

    sum.min=(t%3600)/60;

    sum.sec=(t%3600)%60;

    return sum; // returns sum that is of struct time type

}


time diff(time start,time stop)

{

    time d;

    long int t1,t2,t;

    t1=start.hr*3600+start.min*60+start.sec;

    t2=stop.hr*3600+stop.min*60+stop.sec;

    t=t2-t1;

    d.hr=t/3600;

    d.min=(t%3600)/60;

    d.sec=(t%3600)%60;

    return d;

}



/*Create a structure  time containing hour,minutes and seconds as its member.WAP that uses this
structure to input start time and stop time to a function which returns the sum and difference of
the start time and stop time in the main program

 -> making single function and returning sum and difference so using pointer */
```

Prepared by: Er. Prakash Kafle

```c
#include<stdio.h>
#include<conio.h>
struct time{
    int hr;
    int min;
    int sec;
    };
void sumfunc(struct time,struct time,struct time*,struct time*);
int main()
{   struct time start,stop,sum,difference;
    printf("enter start time: ");
    scanf("%d%d%d",&start.hr,&start.min,&start.sec);
    printf("Enter stop time: ");
    scanf("%d%d%d",&stop.hr,&stop.min,&stop.sec);
    sumfunc(start,stop,&sum,&difference);
    printf("Sum is :%d hr %d min %d sec",sum.hr,sum.min,sum.sec);
    printf("Difference is : %d hr %d min %d sec",difference.hr,difference.min,difference.sec);
    getch();
    return 0;}
void  sumfunc(struct time start,struct time stop,struct time *s,struct time *d)
{
    long int t1,t2,t;
    t1=start.hr*3600+start.min*60+start.sec;
    t2=stop.hr*3600+stop.min*60+stop.sec;
    t=t1+t2;
```

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```
    s->hr=t/3600;  //or (*s).hr=t/3600;

    s->min=(t%3600)/60;

    s->sec=(t%3600)%60;

    t=t2-t1;

    d->hr=t/3600;

    d->min=(t%3600)/60;

    d->sec=(t%3600)%60;

}
```

Practice questions:

1.WAp using structure and passing the structure to the function that returns the result which convert the date (in format YY/MM/DD) in BS to A.D.

2.WAP to compute any two instant memory spaces in a format(kilobytes:bytes:Bits) using structure.build functions to add and substract given memory spaces where 1KB=1024 B and 1B=8 bits and display the result in main function

3. WAP to compute any 2 instant hop distances In a format(feet:inches) using structure. Build fucntions to add and substract given hop distances and display the results in the main function.

4.WAP to input name,post and salary of 10 employee, from main() function and pass to structure type user defined function (arguments of this function should also be a structure type). This function returns the structure variable which keeps the record of only those employees whose salary is greater than 10,000. This modified record is also displayed from main() function.

5.Create a structure in C to store the name of a batsman,runs scored and no. of times the batsman is dismissed. In the program ,read the data of 5 players and display the batting average of the player whose name is entered by the user. Batting average is given by total_runs/total_dismissals.

Files

/*WAP to read array of 10 numbers form user.Write it to file. Again rewind the file &

read contents of file and display only even numbers   */

#include<stdio.h>

```c
#include<conio.h>

int main()

{

 FILE *f;

 int n[10],i,a[10];

 f=fopen("nums","w+b");

 printf("Enter 10 numbers :");

 for(i=0;i<10;i++)

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

 fwrite(&n,sizeof(n),1,f);//writing to file ,1 whole array n

 rewind(f);

 fread(&a,sizeof(a),1,f);//reading whole array from file

 for(i=0;i<10;i++)

 if((a[i]%2)==0)

 printf("%d ",a[i]);

 getch();

 return 0;

}
```

/* WAP to open a new file ,read roll number, name,address and phone number of students until the user says "no" after reading the data,write it to the file then display the content of the file */

```c
#include<stdio.h>

#include<conio.h>

#include<string.h>

#include<stdlib.h>

int main()
```

Prepared by: Er. Prakash Kafle

```c
{
    struct student
    {
        char name[20];

        char address[20];

        char phoneno[25];

        int rollno;

    }s;

    int i;

    char next[3];

    FILE *fp;

    fp=fopen("students.dat","wb");

    if(fp==NULL)

    {

    printf("FIle Cannot be opened");

    exit(1);

    }

    do{

        fflush(stdin);

        printf("\nEnter name:");

        gets(s.name);

        fflush(stdin);

        printf("\nEnter address");

        gets(s.address);

        fflush(stdin);
```

Prepared by: Er. Prakash Kafle

```c
        printf("\nenter phone no");

        gets(s.phoneno);

        printf("\nEnter roll no");

        scanf("%d",&s.rollno);

        fwrite(&s,sizeof(s),1,fp);

        printf("IF you donot have next data enter no \n else press any key.");

        scanf("%s",next);

    }while(strcmp("no",next));//takes input until user enters no

    fclose(fp);

    fp=fopen("students.dat","rb");

    if(fp==NULL)

    {

        printf("\n file cannot be opened.");

        exit(1);

    }

    while(fread(&s,sizeof(s),1,fp)==1)

    {

    printf("\n Name=%s \t Roll=%d \t Address = %s \t Phone =
%s",s.name,s.rollno,s.address,s.phoneno);

    }

    fclose(fp);

    getch();

    return 0;

    }
```

/* WAP in C to read the following information of n students. Student name, student roll number marks obtained(in 100) . Record all data in kec.txt file and program should print roll number and name of student who have obtained greater than or equal to 40 marks. */

```c
#include<stdio.h>
#include<conio.h>
struct student
{
    char name[20];
    int roll;
    float marks;
    }s;
int main()
{
    int i,n;
    float a;
    FILE *fp;
    fp=fopen("kec.txt","wb");
    if(fp==NULL)
    {
        printf("File cannot be opened.");
    }
    else
    {
    printf("Enter number of students:");
    scanf("%d",&n);
```

```c
    for(i=0;i<n;i++) // for n students
    {
        fflush(stdin);

        printf("Enter name ");

        gets(s.name);

        printf("enter roll number:");

        scanf("%d",&s.roll);

        printf("Enter marks:");

        scanf("%f",&a);

        s.marks=a;

        fwrite(&s,sizeof(s),1,fp);//reading information of 1 student and writing it to file
immediately.

        fflush(stdin);

    }


    fclose(fp);

    fp=fopen("kec.txt","rb");

    while(fread(&s,sizeof(s),1,fp)==1)
    {
        if(s.marks>=40)
        {
            printf("%s\t %d \n",s.name,s.roll);
        }
    }
    fclose(fp);
```

```
    }

    getch();

    }
```

/*WAP to read name ,location and phone number of colleges until user is not satisfied and write data to a file.If file already exist your program should add new data at the end of file. Search the record by college name and display location and number of searched college. Use structure for college name,location and number . USe typedef in structure.*/

```c
#include<stdio.h>

#include<conio.h>

#include<stdlib.h>

#include<string.h>

typedef struct

{

    char name[30];

    char location[10];

    double number;

}college;

int main()

{

    college a;

    int checkdata=0;

    char ch,cname[30];

    FILE *f;

    f=fopen("college","a+b"); // append mode

    if(f==NULL)

    {
```

```c
        printf("file cannot be opened");

        exit(1);

        }

        do

        {


        printf("Enter college name:");

        gets(a.name);

        fflush(stdin);

        printf("Enter college location:");

        gets(a.location);

        printf("Enter phone number: ");

        scanf("%lf",&a.number);

        fflush(stdin);

        fwrite(&a,sizeof(a),1,f);

        printf("Enter y if you do want to enter other data otherwise enter any character to stop:");

        ch=getche();

         fflush(stdin);

}while(ch=='Y' || ch=='y');// user le y press garun jel samma data read garcha

        rewind(f);

        printf("Enter college name to search ");

        gets(cname);

        while(fread(&a,sizeof(a),1,f)==1)

        {

            if(strcmp(cname,a.name)==0)
```

```c
        {
            printf("Location: %s and number :%.0lf ",a.location,a.number);

            checkdata=1;

        }

    }

    if(checkdata==0)

    printf("Data not found:");

    fclose(f);

    getch();

    return 0;


}
```

/*WAP that allows user to enter name,age sex and number of songs recorded for duet singers using a file. The program should also have the provision for editing,searching,deleting and lisitng the details of singer.The program should be menu driven */

```c
#include<stdio.h>

#include<conio.h>

#include<string.h>

int main()

{

    struct singer

    {

        char name[20];

        int age;

        char sex;

        int noofsongs;
```

```c
};
    struct singer si;
    FILE *fptr,*fptrtemp;
    char yes_no,singer_name[15];
    char choice,fileName[30]="C:\\Dev-Cpp\\bin\\singer.txt";
    int dataFound=0,recordNo=0;
    fptr=fopen(fileName,"r+b");
    if(fptr == NULL)
    {
        fptr=fopen(fileName,"w+b");
        if(fptr==NULL)
        {
                printf("FIle cannot be created!!!");
                return 0;
        }


    }
    while(1)
    {
        printf("\n 1.ADD record");
        printf("\n2.List record");
        printf("\n3.MOdify Record.");
        printf("\n4.Search record.");
        printf("\n5.DElete record");
```

```c
printf("\n 6.Exit");

printf("Enter your choice: ");

fflush(stdin);

choice=getchar();

printf("\n");

switch(choice)

{

   case '1':

       fseek(fptr,0,SEEK_END);

       printf("Singer's name:\t");

       fflush(stdin);

       gets(si.name);

       printf("\n AGe: \t");

       scanf("%d",&si.age);

       printf("SEx of singer: \t");

       fflush(stdin);

       si.sex=getchar();

       printf("\nNUmber of songs: \t ");

       scanf("%d",&si.noofsongs);

       fwrite(&si,sizeof(si),1,fptr);

       break;


   case '2':

           fseek(fptr,0,SEEK_SET);

           printf("Name\tAge\tsex\t songs \n");
```

```c
        while(fread(&si,sizeof(si),1,fptr)==1)

        {

            printf("%s\t%d\t%c\t%d\n",si.name,si.age,si.sex,si.noofsongs);

        }

        break;

case '3':

    printf("Enter name of singer to be modified!!!\t");

    fflush(stdin);

    gets(singer_name);

    rewind(fptr);

    dataFound=0;

    recordNo=0;

    while(fread(&si,sizeof(si),1,fptr)==1)

    {

        if(strcmp(si.name,singer_name)==0)

        {

            dataFound=1;

            printf("old record is: \t");

            printf("%s\t%d\t%c\t%d",si.name,si.age,si.sex,si.noofsongs);

            printf("Enter new name,age,sex,and number of songs:");

            gets(si.name);

            scanf("%d",&si.age);

            fflush(stdin);

            si.sex=getchar();

            fflush(stdin);
```

Prepared by: Er. Prakash Kafle

```c
            scanf("%d",&si.noofsongs);

            fseek(fptr,sizeof(si)*(recordNo),SEEK_SET);

            if(fwrite(&si,sizeof(si),1,fptr)==1)

            {

              printf("Modified");

              break;

            }

          }

          recordNo++;

      }

      if(dataFound==0)

      printf("\n Matching data not found..");

      break;


  case '4':

    dataFound=0;

    printf("enter name of singer to search: ");

    fflush(stdin);

    gets(singer_name);

    fseek(fptr,0,SEEK_SET);

    while(fread(&si,sizeof(si),1,fptr)==1)

    {

    if(strcmp(si.name,singer_name)==0)

    {

       dataFound=1;
```

Prepared by: Er. Prakash Kafle

```c
            printf("%s\t%d\t%c\t%d\n",si.name, si.age,si.sex,si.noofsongs);
        }
    }
    if(dataFound==0)
    printf("NOT FOOUND");
    break;


case '5':
    printf("Enter name to be deleted: ");
    scanf("%s",singer_name);
    dataFound=0;
    fptrtemp=fopen("C:\\Dev-Cpp\\bin\\temp.dat","wb");
    rewind(fptr);
    while(fread(&si,sizeof(si),1,fptr)==1)
    {
        if(strcmp(si.name,singer_name)!=0)
        {
            fwrite(&si,sizeof(si),1,fptrtemp);
        }
        else
        dataFound=1;
    }
    fclose(fptr);
    fclose(fptrtemp);
    remove(fileName);
```

```
        rename("C:\\Dev-Cpp\\bin\\temp.dat",fileName);

        fptr=fopen(fileName,"r+b");

        if(dataFound==1){

        printf("DELeTed");

        }

        else

        printf("Not found");

         break;

    case '6':

        fclose(fptr);

            getch();

            return 0;

        default:

            printf("Invalid character!!!!!!!!!!");

        }

        }

    }
```

Practice question:

1.WAP to input and save record like name,roll,address and obtained mark of 48 students in a
binary file and search and display the record of a student whose obtained mark is highest. The
information should be organized in a structure.

2.WAP to read integers from user until user says "no". After reading the data write all the odd
numbers to a file name ODD and all the even number to the file named EVEN.

3.WAP to read the details of book authors and write it to a file, until the user confirms to
end.Then read and display nth record in the file ,where n is read from the user . The data for
authors must be represented by structure that contain name,nationality and number of books
published.

4. WAP to display the records in sorted order sorting is performed in ascending order with respect to name using data files concept.

5.WAP in C to store the employee details in a text file. Read data from the text file ,sort them in ascending order of salary and store the sorted record to a binary file. Display the details and rank of employee given by the user.

6.WAP to open a new file ,read roll number ,name ,address and phone number of students until user says "no". After reading the data ,write it to a file then display the content of the file.

7.WAp to read name,roll number and marks obtained by students in 5 subjects and store the result in file until user is not satisfied. The program should have another portion to read all information . Your pogram should ask the user to read from or write to the file and call the specific functions.

10.FORTRAN

!   program to convet binay number to a decimal number
     integer decimal,rem,binary
     decimal=0
     i=0
     write(*,*)'Enter the binary number: '
     read(*,*)binary
1   if(binary.eq.0) goto 2
     rem=mod(binary,10)
     decimal=decimal+rem*2**i
     binary=binary/10
     i=i+1
     goto 1
2   write(*,*)'The decimal equivalent is',decimal
     end

program to solve quadratic equation
     real r1,r2,d,rp,ip,a,c,b
     write(*,*)'Type a,b,c'
     read(*,*)a,b,c
     d=b*b-4*a*c
     if(d) 10,20,30
10 rp=-b/(2*a)

```fortran
      ip=sqrt(abs(d))/(2.0*a)
      write(*,*)'imaginary roots are:',rp,'+i',ip,'and',rp,'-i',ip
      pause
      stop        !goto 100
 20   r1=-b/(2.0*a)
      write(*,*)'real andd equal',r1,r1
      pause
      goto 100    !stop
 30   r1=(-b+sqrt(d))/(2*a)
      r2=(-b-sqrt(d))/(2*a)
      write(*,*)'Roots are real and unequal',r1,r2
100pause

      stop
      end
```

```fortran
!program to find HCF of 2 numbers
      integer a,b,i,hcf
      write(*,*)'Enter two numbers'
      read(*,*)a,b
      do 100 i=1,a,1
        if(mod(a,i).eq.0 .and. mod(b,i).eq.0)then
          hcf=i
        endif
100   continue
      write(*,*)'HCF is',hcf
      pause
      end
```

```fortran
   !Write a program in fortran to evaluate the following series: \

!    1/1^2+1/2^2+1/3^2+...... + 1/n^2

      write(*,*)'enter number of terms'

      read(*,*)n

      sum=0

      do 100 i=1,n
```

```fortran
      sum=sum+1.0/(i**2)
100   continue
      write(*,*)'sum= ',sum
      pause
      end




      !program to display prime number within the range specified by the user
      integer f,s,k,check
      write(*,*)'enter first and second number'
      read(*,*)f,s
      if(f.lt.2)then
      f=2
      endif
      do 1 k=f,s,1
        check=1
        do 2 j=2,k/2,1

          if(mod(k,j).eq.0)then
            check=0
          endif


2     continue

        if(check.eq.1)then
```

```fortran
        write(*,*)k
        end if
1   continue
    pause
    end

!   program to sum 1+x+x^2+x^3
    write(*,*)'Type x,n'
    read(*,*)x,n
    i=1
    sum=1
10  sum=sum+x**i
    if(i.lt.n)then
    i=i+1
    goto 10
    end if
    write(*,3)sum
3   format(1x,f10.4)
    pause
    stop
    end

! sum of cos series - fixed number of terms
    write(*,*)'Enter values of x(degree) and number of terms : '
    read(*,*)x,n
    pi=3.1415
    x=x*pi/180
```

Prepared by: Er. Prakash Kafle

```fortran
      term=1

      sum=1

      do 2 i=1,n-1

       term=-term*x*x/((2*i-1)*(2*i))

        sum=sum+term

2     continue

      write(*,20)x,sum

20    format (1x, 'X=',F10.3 ,3x , 'COSX =',F10.3)

      pause

      end
```

```fortran
   !write a fortran program to display the greatest and
! smallest number from the list of tem elements
      integer a(10),g,s
      write(*,*)'Enter ten numbers '
      read(*,*)(a(i),i=1,10)
      g=a(1)
      s=a(1)
      do 111 i=2,10
      if(g.lt.a(i)) g=a(i)
      if(s.gt.a(i)) s=a(i)
111   continue
      write(*,*)'Greatest number is',g
      write(*,*)'Smallest number is',s
      pause
      end
```

```fortran
!Write a fortran program to read ten integer numbers store them in array and
!arrange them in ascending order and display the sorted list.
      integer A(10)
      write(*,*)'Enter array elements'
      read(*,*)(A(i),i=1,10)
      do 100 i=1,9
        do 100 j=i+1,10
          if(A(i).gt.A(j))then
```

Prepared by: Er. Prakash Kafle

```fortran
         m=A(i)
         A(i)=A(j)
         A(j)=m
       end if
100    continue
    write(*,*)'Sorted ARRAY '
    do 200 i=1,10
    write(*,*)A(i)
200  continue
    pause
    end
```

program to add 2 matrices
```fortran
    integer a(3,3),b(3,3),c(3,3)
    write(*,*)'Enter matrix  A elemets(3*3)'
     read(*,*)((A(i,j),j=1,3),I=1,3)
     write(*,*)'Enter matrix  B elemets(3*3)'
     read(*,*)((B(i,j),j=1,3),I=1,3)
    do 40 i=1,3
      do 40 j=1,3
       c(i,j)=a(i,j)+b(i,j)
40    continue
    print*,'The matrix addition is'
    do 70 i=1,3
    write(*,*)(c(i,j),j=1,3)
70  continue
    pause
    end
  !Write a fortran program to read m*n matrix ,transpose it and display both
!the matrices
    integer matrix(3,3),transpose(3,3)
    print*,'Enter matrix elemets'
    do 20 irow=1,3,1
      do 20 icol=1,3,1
       read(*,*)matrix(irow,icol)
20    continue
    do 40 m=1,3
      do 40 n=1,3
       transpose(n,m)=matrix(m,n)
```

Prepared by: Er. Prakash Kafle

```fortran
40    continue
      print*,'The matrix you entered was'
      do 60 n=1,3
      write(*,*)(matrix(n,m),m=1,3)
60    continue
      print*,'Transpose of entered matrix is'
      do 70 n=1,3
      write(*,*)(transpose(n,m),m=1,3)
70    continue
      pause
      end
```

!program to multiply 2 matrices of any order enterd by user

```fortran
      real a(10,10),b(10,10),c(10,10)

100   write(*,*)'Order of matrix A'

      read(*,*)ma,na

      write(*,*)'Order of matrix B'

      read(*,*)mb,nb

      if(na.ne.mb) then

      write(*,*)'order mismatch '

      goto 100

      end if

      write(*,*)'Enter matrix A elements :'

      read(*,*)((a(i,j),j=1,na),i=1,ma)

      write(*,*)'Enter matrix B elements :'

      read(*,*)((b(i,j),j=1,nb),i=1,mb)

      do 10 i=1,ma

        do 20 j=1,nb

          c(i,j)=0
```

```
        do 30 k=1,na

        c(i,j)=c(i,j)+a(i,k)*b(k,j)

30   continue

20   continue

10   continue

     do 40 i=1,ma

     write(*,*) (c(i,j),j=1,nb)

40   continue

     pause

     stop

     end
```

Practice questions:

1. wap in fortran to check whether the positive integer entered entered from the keyboard is a palindrome or not .

2. WAP in fortran to test whether the accepted year is leap year or not.

3. WAP in fortran to evaluate :

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \cdots \frac{(-1)^{(n-1)}x^{2n-1}}{(2n-1)!}, n=1,2,3\ldots$$

4. WAP in fortran to evaluate following series upto n terms.

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots + \frac{x^n}{n!}, n = 0,1,2,3 \ldots.$$

5. WAP in fortran to find the mean and standard deviation of N numbers.

6. WAp on fortran to take a position and a number and insert this number on this position inside an array containing n elements