**PROGRAM 6**

**AIM:-Write an algorithm and program to sort n numbers using Merge sort technique.**

**i) Using normal approach i.e. recursion illustrating Divide and Conquer**

**ii) Without using recursion**

#include<stdio.h>

#include<conio.h>

#include<stdlib.h>

int a[10];

void merge(int p,int q,int r)

{

int n1,n2,i,j,k,m;

int L[10],R[10];

n1=(q-p)+1;

n2=r-q;

for(i=0;i<=n1;i++)

{

L[i]=a[(p+i)-1];

}

for(j=0;j<=n2;j++)

{

R[j]=a[q+j];

}

L[n1+1]=100;

R[n2+1]=200;

i=1;

j=1;

for(k=p;k<=r;k++)

{

if(L[i]<=R[j])

{

a[k]=L[i];

i++;

}

else

{

a[k]=R[j];

j++;

}

}

printf("\n");

for(k=1;k<=10;k++)

printf("%d\t",a[k]);

getch();

}

void mergesort(int p,int r)

{

int q;

if(p<r)

{

q=(p+r)/2;

mergesort(p,q);

mergesort(q+1,r);

merge(p,q,r);

}

}

void main()

{

int i,p,r;

p=0;

r=9;

clrscr();

printf("\n 10 no. to input:\n");

for(i=1;i<=10;i++)

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

mergesort(p,r);

getch();

}

ii) Without using recursion

#include <stdio.h>

#include<conio.h>

void main()

{

clrscr();

int arr[5],temp[5],i,j,k,n=5,size,l1,r1,l2,r2;

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

{

printf("Enter element %d : ",i+1);

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

}

printf("Unsorted list is : ");

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

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

for(size=1; size < n; size=size\*2 )

{

l1=0;

k=0;

while( l1+size < n)

{

r1=l1+size-1;

l2=r1+1;

r2=l2+size-1;

if( r2>=n )

r2=n-1;

i=l1;

j=l2;

while(i<=r1 && j<=r2 )

{

if( arr[i] <= arr[j] )

temp[k++]=arr[i++];

else

temp[k++]=arr[j++];

}

while(i<=r1)

temp[k++]=arr[i++];

while(j<=r2)

temp[k++]=arr[j++];

l1=r2+1;

}

for(i=l1; k<n; i++)

temp[k++]=arr[i];

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

arr[i]=temp[i];

}

printf("\n Sorted list is:");

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

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

printf("\n");

getch();

}