Labset1:

2. Write a program to divide the message into variable length frames and sort them and display the message at the receiving side.

Program:

```cpp
#include<iostream>
#include<cmath>
#include<stdlib.h>
using namespace std;

typedef struct
{
    string data;
    int randNo;
    int seqNo;
    int size;
}frame;

void insertSort(frame f[],int n,char ch)
{
    int i,j;
    frame v;
    for(i=1;i<n;i++)
    {
        v=f[i];
        j=i-1;

            while(j>=0 && ((f[j].randNo>v.randNo &&ch=='r') ||(f[j].seqNo>v.seqNo &&ch=='s')))
            {
                f[j+1]=f[j];
                j--;
            }
            f[j+1]=v;
    }
}

void display(frame f[],int n)
{
    int i;
    cout<<"-----------------------------------------------------------------"<<endl;
    cout<<"Sequence_No\tRandom_No\tLength\t\tPacket"<<endl;
    for(i=0;i<n;i++)
    {
        cout<<f[i].seqNo<<"\t\t"<<f[i].randNo<<"\t\t"<<f[i].size<<"\t\t"<<f[i].data<<endl;
    }
}
```

```cpp
int main()
{
    string msg,res="";
    int maxFrLen;
    int i=0,j=0,n=0;

        cout<<"Enter msg : ";cin>>msg;
        cout<<"Enter len : ";cin>>maxFrLen;

    frame f[msg.length()];

    while(j<msg.length())
    {
        f[n].randNo=rand()%100;
        f[n].seqNo=n+1;
        f[n].size=rand()%maxFrLen+1;
        f[n].data=msg.substr(j,f[n].size);
        j+=f[n].size;
        n++;
    }

        cout<<"Frames Created are:"<<endl;
        display(f,n);

        insertSort(f,n,'r');

        cout<<"Frames Received as :"<<endl;
        display(f,n);

        insertSort(f,n,'s');

        cout<<"Frames re-constructed\nReceiver End :"<<endl;
        display(f,n);

        for(i=0;i<n;i++)
                res.append(f[i].data);
        cout<<"\nReceived message = "<<res<<endl;
    return 0;
}
```

Output:

Enter msg : helloworld
Enter len : 3
Frames Created are:

Sequence_No	Random_No	Length	Packet
1	83	2	he
2	77	2	ll
3	93	2	ow
4	86	1	o
5	49	2	rl
6	62	2	d

Frames Received as :

Sequence_No	Random_No	Length	Packet
5	49	2	rl
6	62	2	d
2	77	2	ll
1	83	2	he
4	86	1	o
3	93	2	ow

Frames re-constructed
Receiver End :

Sequence_No	Random_No	Length	Packet
1	83	2	he
2	77	2	ll
3	93	2	ow
4	86	1	o
5	49	2	rl
6	62	2	d

Received message = helloworld