ADS - Lab 2.

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Batch - B1.

ques: Insertion, deletion, Searching in skip list.

```
// declaring skip list and skip node structure.

Struct Skipnode
{
      int value ;
      Skipnode ** for_arr ;
    // any node at level i will contain i forward
      pointers .
   // initialise this for_arr with 0 .

     ~ Skipnode ()
    {
       delete [] for_arr ;
    }
};

Struct skiplist
{
      Skipnode *header ;
      int value, level ;

   // add function declarations

   void display nodes() ;
   void search Element (int &) ;
   void delete Element ( int &) ;
   void insert Element (int &) ;
};
```

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// Inserting an element :-

void SkipList :: insertElement (int & val)
{
    Skipnode *curr = header ;
    // create an update array of size [Max_level +1]
    & initialize it with 0 .

    iterate from current level to 0 and
    ~~Check~~ run a nested loop until
    for_arr points to NULL & ~~or~~ &
    for_arr point to value lesser than
    that to be inserted
        update ~~fo~~ curr as
        curr → for_arr[i]

// after the inner loop exits, update [i]
    = curr ;

// curr = curr → for_arr[0] ;

if (curr == NULL || curr → val != val)
{
    // generate a random level .

    if level generated is greater than
    current ~~list~~ level, we initialise

    update [i] = header .

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```
x = create new node with new level generated
    & update pointers as:

    for i → 0 to newlevel :

            x → for [i] = update [i] → for [i];
            update [i] → for [i] = x .
}.

// deleting an element :

void SkipList :: delete element (int &val)
{
        Skipnode *x = header ;
        Skipnode * update [Max_level +1 ] ;
      // initialise it to 0 .

     for (int i = level ; i>=0 ; i--)
      {
            while (x → for_arr [i] ! = NULL &&
                   x → for_arr [i] → value < val)

                      x = x → for_arr [i]

            update [i] = x ;
     }
     x = x → for_arr [0] ;

     if (x → value = = val)
     {
```

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```
        for (int i=0 ; i<= level ; i++)
        {
            if (update [i] → for_arr [i]  != x)
                break ;

            update [i] → for_arr [i] = x → for_arr
                                           [i];

        }
        delete x;

        while (level >0 && header → for_arr [
               level] == NULL )
                 level -- ;

    }

}

// Searching an element :

bool Skiplist :: searchElement (int & s_value )
{
    Skipnode *x = header ;
    for ( int i = level ; i>=0 ; i--)
     {
        while (x → for_arr [i]!= NULL &&
         x → for_arr [i] → value < s_value )

              x = x → for-arr [i]
     }
        x = x → for_arr [0] ;
    return  x!= NULL  && x → value == s_value;
}
```