ASSIGNMENT-5

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Q1) Build a min heap from array and make sure that heap order property is maintained after every input. The input is checked if it is greater than it’s parent, if it’s not, it is swapped. You can take the sample array as: arr= [1,5,6,8,9,7,3] Write a generalized program so that user can input any set of values. Your insertion function should take O(n) time as compared to O(n log n) time. Q2) Write a delete\_max function to delete the element with the maximum key in a min-max heap. It should take O (log n). Q3) Write a program to implement Heap sort by building a heap for the given set of elements and then deleting one element at a time. Show the complexity of your cod

*#include* <stdio.h>

*void* *print*(*int* a*[]*, *int* n)

{

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

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

*printf*("\n");

}

*void* *swap*(*int* *\**a, *int* *\**b)

{

*int* *temp* *=* *\**a;

*\**a *=* *\**b;

*\**b *=* *temp*;

}

*// minheapify*

*void* *heapify*(*int* a*[]*, *int* n, *int* i)

{

*int* *smallest* *=* i;

*int* *l* *=* 2 *\** i *+* 1;

*int* *r* *=* 2 *\** i *+* 2;

*if* (*l* *<* n *&&* a[*l*] *<* a[*smallest*])

    {

*smallest* *=* *l*;

    }

*if* (*r* *<* n *&&* a[*r*] *<* a[*smallest*])

    {

*smallest* *=* *r*;

    }

*if* (*smallest* *!=* i)

    {

*swap*(*&*a[*smallest*], *&*a[i]);

*heapify*(a, n, *smallest*);

    }

}

*//for deleting the root-node*

*void* *deleting*(*int* a*[]*,*int* n)

{

*int* *x* *=* a[1];

    a[1]*=*a[n];

*int* *i* *=* 1;

*int* *j* *=* 2*\*i*;

*while*(*j<*n*-*1)

    {

*if*(a[*j+*1]*<*a[*j*])

        {

*j+=*1;

        }

*if*(a[*j*]*<*a[*i*])

        {

*swap*(a[*j*],a[*i*]);

*i=j*;

*j\*=*2;

        }

*else* *break*;

    }

    a[n] *=* *x*;

}

*void* *heapsort*(*int* a*[]*, *int* n)

{

*for* (*int* *i* *=* (n */* 2) *-* 1; *i* *>=* 0; *i--*)

    {

*heapify*(a, n, *i*);

    }

*printf*("min heap : ");

*print*(a, n);

*//deleting root and inserting at end to sort*

*for* (*int* *i* *=* n *-* 1; *i* *>* 0; *i--*)

    {

*//printf("%d ", a[0]);*

*swap*(*&*a[0], *&*a[*i*]);

*heapify*(a, *i*, 0);

    }

*//printf("%d ", a[0]);*

*printf*("\n");

}

*int* *main*()

{

*int* *n*;

*printf*("enter n : ");

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

*int* *a*[*n*];

*printf*("enter n elements : ");

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

    {

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

    }

*heapsort*(*a*, *n*);

*printf*("sorted array in descending order : ");

*print*(*a*, *n*);

*return* 0;

}

OUTPUT :

