ADA LAB-1 TEST

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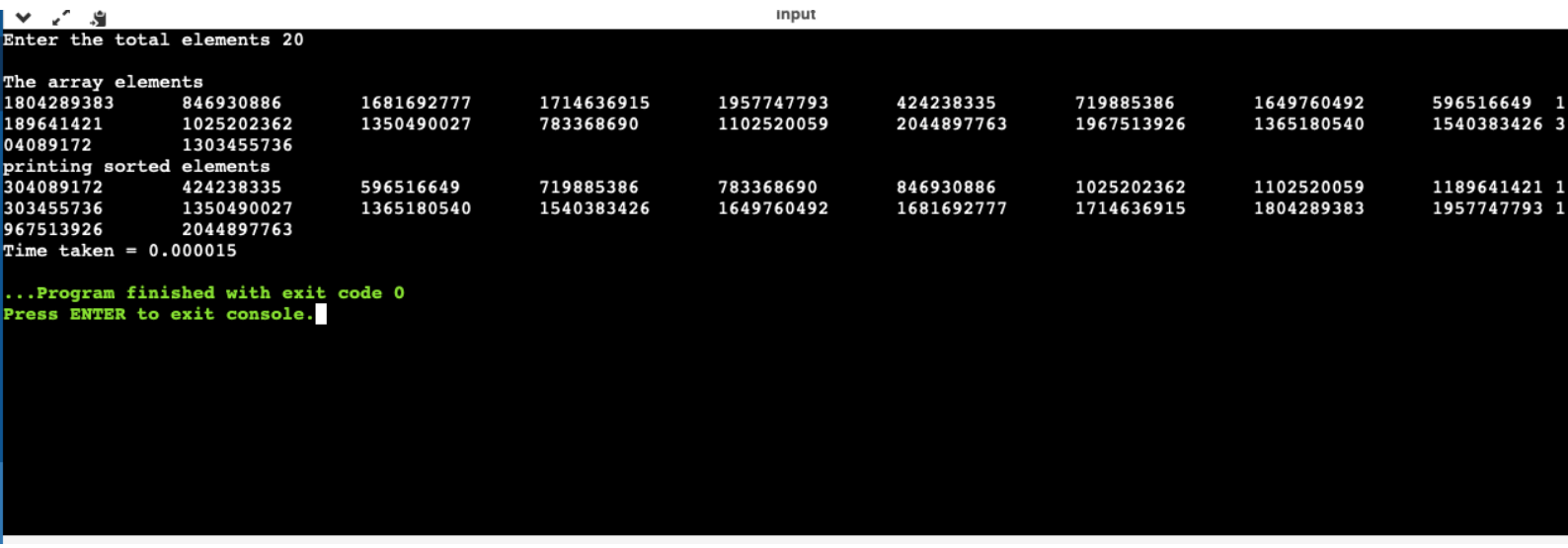
4-D
D3 BATCH

Q) Sort a given set of N integer elements using Heap Sort technique and compute its time taken.

```
#include <stdio.h>
#include <time.h>
int temp;

void heapify(int arr[], int size, int i)
{
int largest = i;
int left = 2*i + 1;
int right = 2*i + 2;

if (left < size && arr[left] >arr[largest])
largest = left;

if (right < size && arr[right] > arr[largest])
largest = right;

if (largest != i)
{
    temp = arr[i];
    arr[i]= arr[largest];
    arr[largest] = temp;
heapify(arr, size, largest);
}
}

void heapSort(int arr[], int size)
```

```
{
int i;
for (i = size / 2 - 1; i >= 0; i--)
heapify(arr, size, i);
for (i=size-1; i>=0; i--)
{
temp = arr[0];
    arr[0]= arr[i];
    arr[i] = temp;
heapify(arr, i, 0);
}
}

int main()
{
    clock_t start,end;
    double timetaken;
    int rand(void);

    int n,i;
    printf("Enter the total elements ");
    scanf("%d", &n);
    int arr[n];
    printf("\nThe array elements\n");
    for (i = 0; i < n; i++)
    {
        arr[i]=rand();
        printf("%d\t",arr[i]);
    }
    start=clock();
        heapSort(arr, n);

    printf("\n");
        printf("printing sorted elements\n");
        for (i=0; i<n; ++i)
        printf("%d\t",arr[i]);

        end=clock();
        timetaken=((double)(end-start))/CLOCKS_PER_SEC;
        printf("\nTime taken = %f",timetaken);
```

```
        return 0;
}
```



Q) Minheap modified

```
#include <stdio.h>
#include <time.h>
int temp;

void delay(){
        for (int i=0;i<10000000;i++){
        }
}

void heapify(int arr[], int size, int i)
{
int smallest = i;
int left = 2*i + 1;
int right = 2*i + 2;

if (left < size && arr[left] <arr[smallest])
smallest = left;

if (right < size && arr[right] < arr[smallest])
```

```
smallest= right;

if (smallest != i)
{
    temp = arr[i];
    arr[i]= arr[smallest];
    arr[smallest] = temp;
heapify(arr, size, smallest);
}
}

void heapSort(int arr[], int size)
{
int i;
for (i = size / 2 - 1; i >= 0; i--)
heapify(arr, size, i);
for (i=size-1; i>=0; i--)
{
temp = arr[0];
    arr[0]= arr[i];
    arr[i] = temp;
heapify(arr, i, 0);
}
delay();
}

int main()
{
    clock_t start,end;
    double timetaken;
    int rand(void);

    int n,i;
    printf("Enter the total elements ");
    scanf("%d", &n);
    int arr[n];
    printf("\nThe array elements\n");
    for (i = 0; i < n; i++)
    {
        arr[i]=rand();
```

```
        printf("%d\t",arr[i]);
    }
    start=clock();
        heapSort(arr, n);

    printf("\n");
        printf("printing sorted elements\n");
        for (i=0; i<n; ++i)
        printf("%d\t",arr[i]);

        end=clock();
        timetaken=((double)(end-start))/CLOCKS_PER_SEC;
        printf("\nTime taken = %f",timetaken);
        return 0;
}
```