Lab Assignment: Maximum Activity Points using Priority Queue

Objective

To implement a C program to determine the maximum number of activity points that can be earned by participating in at most k events using a **min-heap (priority queue)**.

Problem Statement

The CSE department is organizing a tech fest with several exciting events. Each event `i` offers `A[i]` activity points. A student is allowed to participate in at most `k` events. The goal is to find the **maximum total activity points** that can be earned.

Function Signature

```
int maxActivityPoints(int A[], int n, int k);
```

Concept

- A **min-heap** (priority queue) is used to efficiently track the top `k` highest values.

- Traverse through the array:

    1. Insert the current element into the heap.
    2. If the heap size exceeds `k`, remove the smallest element.

- After processing all elements, the heap contains the largest `k` activity points.

- Sum all elements in the heap to obtain the result.

Example Walkthrough

$$A = [10, 40, 20, 30, 50], \quad k = 3$$

1. Insert 10 Heap $= [10]$

2. Insert 40 Heap $= [10, 40]$

3. Insert 20 Heap $= [10, 40, 20]$

4. Insert 30 Heap $= [20, 40, 30]$ (Remove 10)

5. Insert 50 Heap $= [30, 40, 50]$ (Remove 20)

Sum of heap elements $= 30 + 40 + 50 = 120$

$$\boxed{\text{Maximum Activity Points} = 120}$$

Expected Output

The program should correctly compute the maximum achievable activity points when participating in at most `k` events.