WORKSHEET 3

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Semester: 5th **Date of Performance:1/08/24**

Subject Name: Design and Analysis of Algorithms **Subject Code: 22CSH-311**

1. **Aim**: Code to find frequency of elements in a given array in O(n) time complexity.

2. **Objectives:** Tofind frequency of elements in a given array in O(n) time complexity.

3. **Algorithm:**

- Input the number of elements of the array.
- Input the array elements.
- Create a hash table and update the element in one column and its frequency in the other column.
- Print the element along with its frequency.

4. **Implementation/Code:**

```
#include <iostream>
#include <map>
using namespace std;

int main() {
    int arr[] = {1, 2, 2, 3, 3, 3, 3,4, 4, 4, 4,4};
    int n = sizeof(arr)/sizeof(arr[0]);

    map<int, int> frequencyMap;

    for(int i = 0; i < n; i++) {
        frequencyMap[arr[i]]++;
    }
```

```
    cout << "Element Frequency" << endl;
    for(auto i : frequencyMap) {
        cout << i.first << " " << i.second << endl;
    }

    return 0;
}
```

5. Output:

```
Element Frequency
1 1
2 2
3 4
4 5
```

6. Time Complexity:

The time complexity is **O(n).**

7. Learning Outcome:

1) Learnt how to compute frequency of elements in an array.
2) Learnt implementing hash maps.