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Date : ../../..
Page No. : .....

Experiment - 4.

Problem : We define f(X,Y) as number of different corresponding bits in binary representation of X and Y.

Eg -

Input - 1	Input = 2
N = 2.	N = 3
A = {2,4}	A = {1,3,5}
Output : - 4.	Output = 8.

Approach.

① Loop through 31 bits.

② for each bit :
count c1 = numbers with bit set.
count c2 = numbers with bit unset.

③ Add contribution.
(2 × c1 × c2).

④ Take mod.

} x >> b AND

Code :-

```
#include <bits/stdc++.h>
using namespace std;
int countbit(int N, vector<int> &A){
    const int MOD = 1000000007
    long long ans = 0
    for(int b=0; b<31; b++){

        long long ones = 0;
        for(int x : A){
            ones += (x >> b) & 1;
        }
```

```
        ans = (ans + (ones * (N - ones) << 1)) % MOD;
    }
    return ans;
}
int main(){
    int N;
    cin >> N;
    vector<int> v(N);
    for(int i = 0; i < N; i++) cin >> v[i];
    cout << count(N, v);

    return 0;
}
```

Time Complexity - O(31 * N)
Space Complexity - O(1).

Eg - A = {2, 4}

2 → 010 c1 = 1, c0 = 1 → 2.

4 → 100. c1 = 1, c0 → 1 → 2.

then. 2 AND 4 ≡ 010
100
000.