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AIM: **TO IMPLEMENT SUM OF SUBSET PROBLEM**

THEORY:

SUBSET PROBLEM

- Subset sum problem is to find subset of elements that are selected from a given set whose sum adds up to a given number K.
- We are considering the set contains non-negative values.
- It is assumed that the input set is unique (no duplicates are presented).
- **Algorithm:**

```
Let, S = {S1 .... Sn} be a set of n positive integers, then we have to find a subset whose sum is equal to given positive integer d. It is always convenient to sort the set's elements in ascending order. That is, S1 ≤ S2 ≤.... ≤ Sn
Algorithm:
Let, S is a set of elements and m is the expected sum of subsets. Then:
1. Start with an empty set.
2. Add to the subset, the next element from the list.
3. If the subset is having sum m then stop with that subset as solution.
4. If the subset is not feasible or if we have reached the end of the set then backtrack through the subset until we find the most suitable value.
5. If the subset is feasible then repeat step 2.
6. If we have visited all the elements without finding a suitable subset and if no backtracking is possible then stop without solution.
```

CODE:

```
#include <stdio.h>
int m, n, arr[100], x[100] = {0};
int SumOfSubsets(int s, int k, int r)
{
    x[k] = 1;
    if (s + arr[k] == m)
    {
        for (int j = k + 1; j < n; j++)
        {
            x[j] = 0;
        }
        printf("Answer is\n");
        for (int i = 0; i < n; i++)
```

```
        {
            printf("%d ", x[i]);
        }
        printf("\n");
    }
    else if (s + arr[k] + arr[k + 1] <= m)
    {
        SumOfSubsets(s + arr[k], k + 1, r - arr[k]);
    }
    if (s + r - arr[k] >= m && s + arr[k + 1] <= m)
    {
        x[k] = 0;
        SumOfSubsets(s, k + 1, r - arr[k]);
    }
}
int main()
{
    int s = 0;
    printf("Sum of Subsets\nEnter the number of elements: ");
    scanf("%d", &n);
    printf("Enter %d elements:\n", n);
    for (int i = 0; i < n; i++)
    {
        scanf("%d", &arr[i]);
        s += arr[i];
    }
    printf("Enter the sum needed: ");
    scanf("%d", &m);
    SumOfSubsets(0, 0, s);
    return 0;
}
```

OUTPUT:

```
exe' '--interpreter=mi'
Sum of Subsets
Enter the number of elements: 4
Enter 4 elements:
2
4
56
7
Enter the sum needed: 60
Answer is
0 1 1 0
PS C:\Users\Jadhav\Desktop\BTech\4th sem\AOA\Prac\Code>
```

CONCLUSION:

- Thus, we implemented the code to solve Sum of subset problem.