DAY 12 – QUICK SORT & MERGE SORT

15. Write a menu driven C program to implement (i) Quick sort.

(ii) Merge sort

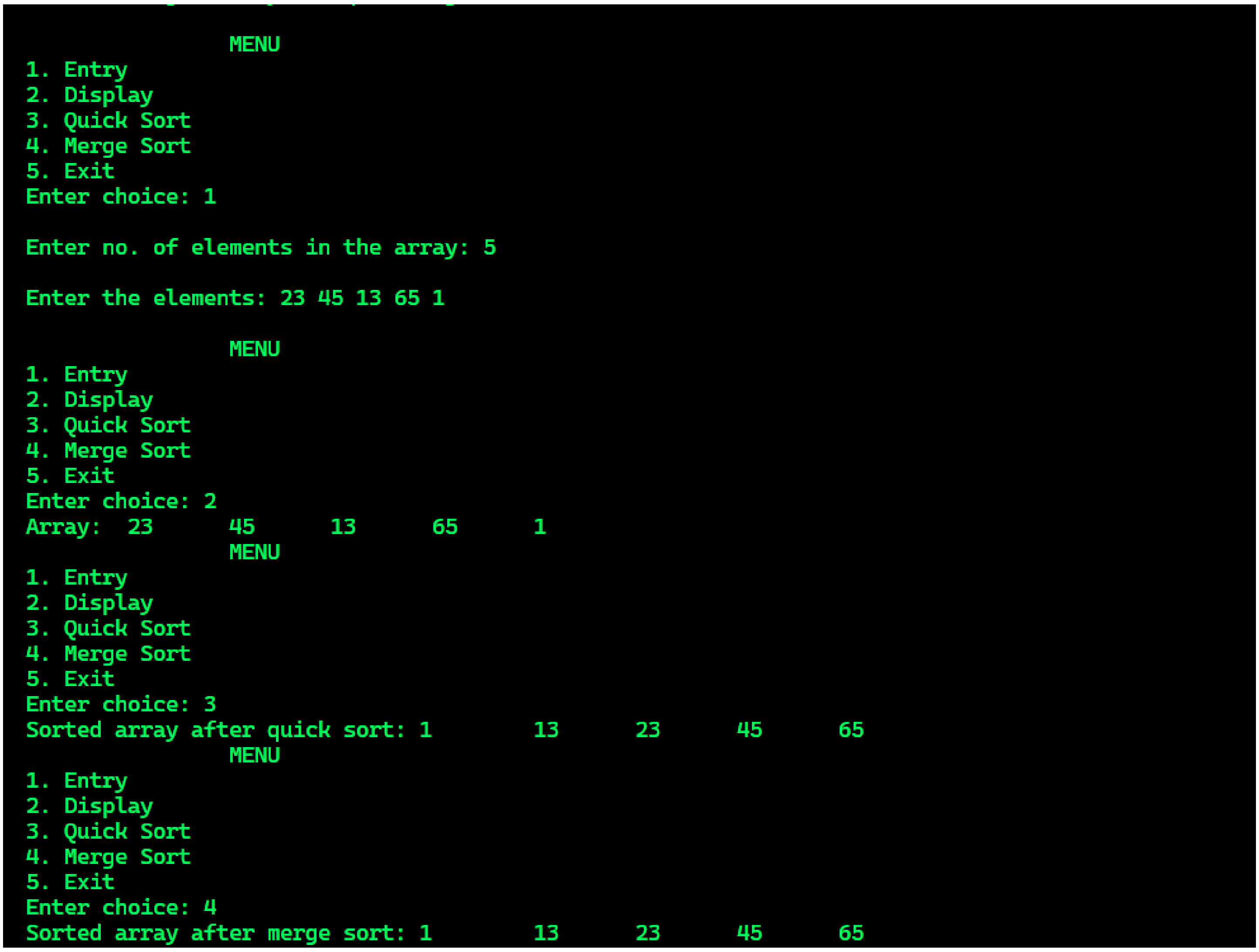
PROGRAM

```c
#include<stdio.h>
#define MAX 10
int i, j, n, a[MAX];
void read()
{
    printf("\nEnter no. of elements in the array: ");
    scanf("%d", &n);
    printf("\nEnter the elements: ");
    for(i = 0; i < n; i++)
        scanf("%d", &a[i]);
}
void display()
{
 for(i = 0; i < n; i++)
    printf("%d\t", a[i]);
}
int partition(int beg, int end)
{
    int left, right, temp, loc, flag;
    loc = left = beg;
    right = end;
    flag = 0;

    while(flag != 1)
    {
        while((a[loc] <= a[right]) && (loc != right))
        right--;
        if(loc == right)
        flag = 1;
        else if(a[loc] > a[right])
        {
            temp = a[loc];
            a[loc] = a[right];
            a[right] = temp;
            loc = right;
        }
        if(flag != 1)
        {
            while((a[loc] >= a[left]) && (loc != left))
                left++;
            if(loc == left)
                flag = 1;
            else if(a[loc] < a[left])
            {
                temp = a[loc];
                a[loc] = a[left];
                a[left] = temp;
                loc = left;
            }
        }
    }
    return loc;
}
void quick_sort(int beg, int end)
{
    int loc;
    if(beg<end)
    {
        loc = partition(beg, end);
        quick_sort(beg, loc - 1);
        quick_sort(loc + 1, end);
    }
}
void merge(int beg, int mid, int end)
{
    int index = beg, temp[MAX],k;
    i = beg, j = mid + 1;
    while((i <= mid) && (j <= end))
    {
        if(a[i] < a[j])
        {
            temp[index] = a[i];
            i++;
        }
        else
        {
            temp[index] = a[j];
            j++;
        }
        index++;
    }
    if(i > mid)
    {
        while(j <= end)
        {
            temp[index] = a[j];
            j++;
            index++;
        }
    }
    else
    {
        while(i <= mid)
        {
            temp[index] = a[i];
            i++;
            index++;
```

```c
        }
    }
    for(k = beg; k < index; k++)
        a[k] = temp[k];
}
void merge_sort(int beg, int end)
{
    int mid;
    if(beg < end)
    {
        mid = (beg + end) / 2;
        merge_sort(beg, mid);
        merge_sort(mid + 1, end);
        merge(beg, mid, end);
    }
}
int main()
{
    int ch;
    do
    {
        printf("\n\t\tMENU\n");
        printf("1. Entry\n2. Display\n3. Quick Sort\n4. Merge Sort\n5. Exit\n");
        printf("Enter choice: ");
        scanf("%d", &ch);
        switch(ch)
        {
        case 1: read();
                break;
        case 2: printf("Array:\t");
                display();
                break;
        case 3: quick_sort(0, n - 1);
                printf("Sorted array after quick sort: ");
                display();
                break;
        case 4: merge_sort(0, n - 1);
                printf("Sorted array after merge sort: ");
                display();
                break;
        }
    } while (ch >= 1 && ch <= 4);
}
```

OUTPUT



```
                MENU
1. Entry
2. Display
3. Quick Sort
4. Merge Sort
5. Exit
Enter choice: 1

Enter no. of elements in the array: 5

Enter the elements: 23 45 13 65 1

                MENU
1. Entry
2. Display
3. Quick Sort
4. Merge Sort
5. Exit
Enter choice: 2
Array:  23      45      13      65      1
                MENU
1. Entry
2. Display
3. Quick Sort
4. Merge Sort
5. Exit
Enter choice: 3
Sorted array after quick sort: 1        13      23      45      65
                MENU
1. Entry
2. Display
3. Quick Sort
4. Merge Sort
5. Exit
Enter choice: 4
Sorted array after merge sort: 1        13      23      45      65
```