

Ques 1:-

A :- Selection Sort

```
1  #include<iostream>
2  using namespace std;
3  void selectionSort(int arr[], int n){
4      for(int i = 0; i < n-1; i++){
5          int minIndex = i;
6          for(int j = i+1; j < n; j++){
7              if(arr[j] < arr[minIndex]){
8                  minIndex = j;
9              }
10         }
11         int temp = arr[i];
12         arr[i] = arr[minIndex];
13         arr[minIndex] = temp;
14     }
15 }
16 int main(){
17     int n;
18     cout << "Enter size of array:" << endl;
19     cin >> n;
20     int arr[n];
21     cout << "Enter elements:" << endl;
22     for(int i=0; i<n; i++){
23         cin >> arr[i];
24     }
25     selectionSort(arr, n);
26     cout << "Sorted Array:" << endl;
27     for(int i=0; i<n; i++){
28         cout << arr[i] << " ";
29     }
30 }
31
```

B:- Insertion Sort

```
1  #include<iostream>
2  using namespace std;
3  void insertionSort(int arr[], int n){
4      for(int i=1; i<n; i++){
5          int temp = arr[i];
6          int j = i-1;
7          while(j >= 0 && arr[j] > temp){
8              arr[j+1] = arr[j];
9              j--;
10         }
11         arr[j+1] = temp;
12     }
13 }
14 int main(){
15     int n;
16     cout << "Enter size of array:" << endl;
17     cin >> n;
18     int arr[n];
19     cout << "Enter elements:" << endl;
20     for(int i=0; i<n; i++){
21         cin >> arr[i];
22     }
23     insertionSort(arr, n);
24     cout << "Sorted Array:" << endl;
25     for(int i=0; i<n; i++){
26         cout << arr[i] << " ";
27     }
28 }
29
30
```

C:- Bubble Sort:-

```
1  #include<iostream>
2  using namespace std;
3  void bubbleSort(int arr[], int n){
4      for(int i=0; i<n-1; i++){
5          for(int j=0; j<n-i-1; j++){
6              if(arr[j] > arr[j+1]){
7                  int temp = arr[j];
8                  arr[j] = arr[j+1];
9                  arr[j+1] = temp;
10             }
11         }
12     }
13 }
14 int main(){
15     int n;
16     cout << "Enter size of array:" << endl;
17     cin >> n;
18     int arr[n];
19     cout << "Enter elements:" << endl;
20     for(int i=0; i<n; i++){
21         cin >> arr[i];
22     }
23     bubbleSort(arr, n);
24     cout << "Sorted Array:" << endl;
25     for(int i=0; i<n; i++){
26         cout << arr[i] << " ";
27     }
28 }
```

D:- Merge Sort

```
1  #include<iostream>
2  using namespace std;
3  void mergeArray(int arr[], int s, int mid, int e){
4      int n1 = mid - s + 1;
5      int n2 = e - mid;
6      int a[n1];
7      int b[n2];
8      for(int i=0; i<n1; i++) a[i] = arr[s + i];
9      for(int i=0; i<n2; i++) b[i] = arr[mid + 1 + i];
10     int i=0, j=0, k=s;
11     while(i < n1 && j < n2){
12         if(a[i] < b[j]){
13             arr[k++] = a[i++];
14         } else {
15             arr[k++] = b[j++];
16         }
17     }
18     while(i < n1) arr[k++] = a[i++];
19     while(j < n2) arr[k++] = b[j++];
20 }
21 void mergeSort(int arr[], int s, int e){
22     if(s >= e) return;
23     int mid = (s + e)/2;
24     mergeSort(arr, s, mid);
25     mergeSort(arr, mid+1, e);
26     mergeArray(arr, s, mid, e);
27 }
28 int main(){
29     int n;
30     cout << "Enter size of array:" << endl;
31     cin >> n;
32     int arr[n];
33     cout << "Enter elements:" << endl;
34     for(int i=0; i<n; i++){
35         cin >> arr[i];
36     }
37     mergeSort(arr, 0, n-1);
38     cout << "Sorted Array:" << endl;
39     for(int i=0; i<n; i++){
40         cout << arr[i] << " ";
41     }
42 }
```

E:- Quick Sort

```
1  #include<iostream>
2  using namespace std;
3  int partitionFunc(int arr[], int s, int e){
4      int pivot = arr[s];
5      int count = 0;
6      for(int i=s+1; i<=e; i++){
7          if(arr[i] <= pivot) count++;
8      }
9      int pivotIndex = s + count;
10     swap(arr[pivotIndex], arr[s]);
11     int i = s, j = e;
12     while(i < pivotIndex && j > pivotIndex){
13         while(arr[i] <= pivot) i++;
14         while(arr[j] > pivot) j--;
15         if(i < pivotIndex && j > pivotIndex)
16             swap(arr[i++], arr[j--]);
17     }
18     return pivotIndex;
19 }
20 void quickSort(int arr[], int s, int e){
21     if(s >= e) return;
22     int p = partitionFunc(arr, s, e);
23     quickSort(arr, s, p-1);
24     quickSort(arr, p+1, e);
25 }
26 int main(){
27     int n;
28     cout << "Enter size of array:" << endl;
29     cin >> n;
30     int arr[n];
31     cout << "Enter elements:" << endl;
32     for(int i=0; i<n; i++){
33         cin >> arr[i];
34     }
35     quickSort(arr, 0, n-1);
36     cout << "Sorted Array:" << endl;
37     for(int i=0; i<n; i++){
38         cout << arr[i] << " ";
39     }
40 }
41
```

Ques 2:-

```
1  #include<iostream>
2  using namespace std;
3  void improvedSelectionSort(int arr[], int n){
4      int left = 0, right = n-1;
5      while(left < right){
6          int minIndex = left;
7          int maxIndex = right;
8          for(int i=left; i<=right; i++){
9              if(arr[i] < arr[minIndex]) minIndex = i;
10             if(arr[i] > arr[maxIndex]) maxIndex = i;
11         }
12         // swap min with left
13         swap(arr[left], arr[minIndex]);
14         // if max was at left, update its index after swap
15         if(maxIndex == left) maxIndex = minIndex;
16         // swap max with right
17         swap(arr[right], arr[maxIndex]);
18         left++;
19         right--;
20     }
21 }
22 int main(){
23     int n;
24     cout << "Enter size of array:" << endl;
25     cin >> n;
26     int arr[n];
27     cout << "Enter elements:" << endl;
28     for(int i=0; i<n; i++){
29         cin >> arr[i];
30     }
31     improvedSelectionSort(arr, n);
32     cout << "Sorted Array:" << endl;
33     for(int i=0; i<n; i++){
34         cout << arr[i] << " ";
35     }
36 }
```