16. sort the following elements using merge sort divide and conquer stage by [38,27,43,3,9,82,10,15,88,52,60,5] using and analyze time complexity of algorithm

A. Given array & merge sort

38|27|43|3|9|82|10|15|88|52|60|5

38|27|43|39|82 10|15|88|52|60|5

38|27|43 3|9|82 10|15|88 52|60|5

27|38|43 3|9|82 10|15 52|88 5|60

3|27|38|43 9|10|15|82 5|52|60|88

3|5|9|10|15|27|38|43|82

3|5|9|10|15|27|38|43|52|60|82|88

sorted list |3,5,9,10,15,27,38,43,52,60,82,88)

Time complexity:- O(n).

17. sort the array by 64 34 25 12 22 11 90 using bubble sort what is the time complexity of selection sort in best, worst and average case.

A. Given array = 64 34 25 12 22 11 90

In bubble sort we doing from smallest element in these correct position continue this until each element reach these

correct position

64 34 25 12 11 22 90
64 34 11 12 22 22 90
64 34 11 25 12 22 90
11 64 34 25 12 22 90
11 64 34 12 22 25 90
11 12 64 34 25 22 90
11 12 64 34 22 25 90
11 12 64 22 34 25 90
11 12 22 64 34 25 90
11 12 22 64 25 34 90
11 12 22 25 34 64 90

18. sort the array 64, 25, 12, 22, 11 using selection sort. what is time complexity of selection sort in the best worst and average case.

A. 64 25 12 22 11

in the selection we will fix that from largest elemen in there correct position first so

25 64 12 22 11
25 12 64 22 11
25 12 22 64 11
25 12 22 11 64
12 25 22 11 64
12 22 25 11 64
12 22 11 25 64

12 11 22 25 64

11 12 22 25 64

The sorted list is 11, 12, 22, 25, 64

Time complexity:- selection sort is another simple comparison sorted algorithm.

Best case = $O(n^2)$

Average case = worst case = $O(n^2)$

19. Given an array of [4, -2, -5, 3, 10, -5, 2, 8, -3, 6, 7, -4, 1, 9, -1, 0, -6, 11, -9] integers sort the following elements using insertion sort using Brute Force algorithm strategy analyze time complexity.

A. Given array is 4, -2, 5, 3, 10, -5, 2, 8, -3, 6, 7, -4, 1, 9, -1, 0, -6

insert 4, -2

-2, 4

insert 5

-2, 4, 5

insert 3

-2 3 4 5

insert -10

-2 3 4 5 10

insert -5

-5 -2 3 4 5 10

insert 2

-5 -2 2 3 4 5 10

insert -3

-5 -3 -2 2 3 4 5 8 10

insert 6

-5 -3 -2 2 3 4 5 6 8 10

insert 7

-5 -3 -2 2 3 4 5 6 7 8 10

insert 1

-5 -4 -3 -2 0 1 2 3 4 5 6 7 8 9 10

insert 9

-5 -4 -3 -2 0 1 2 3 4 5 6 7 8 9 10

insert -1

-5 -4 -3 -2 -1 1 2 3 4 5 6 7 8 9 10

insert 0

-5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

insert 6

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

insert 8

-8 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

insert 11

-8 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 11

insert -9

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 11

20. sort the following elements using insertion sort using Brute force approach [38, 27, 43, 3, 9, 8, 2, 10, 15, 88] and analyze complexity of algorithm

insert 38, 27 — 27 38

insert 43 — 27 38 43

insert 3 — 3 27 38 43

insert 9 — 3 9 27 38 43

insert 82 — 3 9 27 38 43 82

insert 10 — 3 9 10 27 38 43 82

insert 15 — 3 9 10 15 27 38 43 82

insert 88 — 3 9 10 15 27 38 43 82 88

insert 52 — 3 9 10 15 27 38 43 52 82 88

insert 60 — 3 9 10 15 27 38 43 52 60 82 88

Time complexity :— Best case = $O(n)$

Average-case = worst case = $O(n^2)$