

Birla Institute of Technology and Science, Pilani
Mid-semester examination March 2023 - Answer sheet

Course name: Data Structures & Algorithmic thinking
Time: 4:00 PM – 5:30 PM (1.5 hours)

Course code: MPBAG537
Total marks: 25

Attempt all the questions

1. B (Queue)
2. D (A & C)
- 3.

Pass-through	Bubble sort	Selection sort	Insertion sort
1	[4, 1, 2, 6, 4, 5, 3, 9]	[1, 9, 4, 2, 6, 4, 5, 3]	[4, 9, 1, 2, 6, 4, 5, 3]
2	[1, 2, 4, 4, 5, 3, 6, 9]	[1, 2, 4, 9, 6, 4, 5, 3]	[1, 4, 9, 2, 6, 4, 5, 3]
3	[1, 2, 4, 4, 3, 5, 6, 9]	[1, 2, 3, 9, 6, 4, 5, 4]	[1, 2, 4, 9, 6, 4, 5, 3]
4	[1, 2, 4, 3, 4, 5, 6, 9]	[1, 2, 3, 4, 6, 9, 5, 4]	[1, 2, 4, 6, 9, 4, 5, 3]
5	[1, 2, 3, 4, 4, 5, 6, 9]	[1, 2, 3, 4, 4, 9, 5, 6]	[1, 2, 4, 4, 6, 9, 5, 3]
6	[1, 2, 3, 4, 4, 5, 6, 9]	[1, 2, 3, 4, 4, 5, 9, 6]	[1, 2, 4, 4, 5, 6, 9, 3]
7	[1, 2, 3, 4, 4, 5, 6, 9]	[1, 2, 3, 4, 4, 5, 6, 9]	[1, 2, 3, 4, 4, 5, 6, 9]

4.
 - a. $O(n^2)$
 - b. $O(n^2)$
 - c. $O(n^2)$
5. $(N*(N-1)) / 2$
6.
 - a. Selection sort performs 5 swap operations
 - b. Bubble sort performs 15 swap operations
7.
 - a. 1
 - b. $\log N$
 - c. $2N+1$
 - d. N
 - e. $N+1$
8. **True**; In only two swaps, the array gets sorted as the middle element is already at its correct position
9. 5 or $(\log N)+1$ for $N = 16$
10. $O(n \log n)$