

Week 3 solution

- ① The worst case of Quick sort is when the array is sorted or reverse sorted.

Ans → (c)

- ② Auxiliary space complexity of randomized quick sort — is $O(\log n)$ which is used for storing call stack formed due to recursion.

Ans — (c)

- ③ to sort 1024 elements → $1024 \log 1024$ comparisons
= 10240.
to sort 512 elements = $512 \log 512$ comparisons
= 4608
∴ 10240 comparisons in 200 sec
4608 comparisons in $\frac{200 \times 4608}{10240}$ sec = 90 sec

Ans → (a)

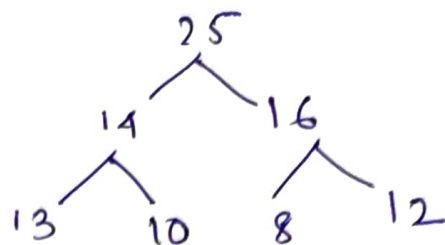
- ④ R-Quick sort takes $O(n^2)$ time for identical elements.
R-quick sort is in place.
∴ only statement 2 is correct

Ans → (c)

- ⑤ Time complexity of build heap is $O(n)$

Ans → (b)

(6) 25, 14, 16, 13, 10, 8, 12 \rightarrow



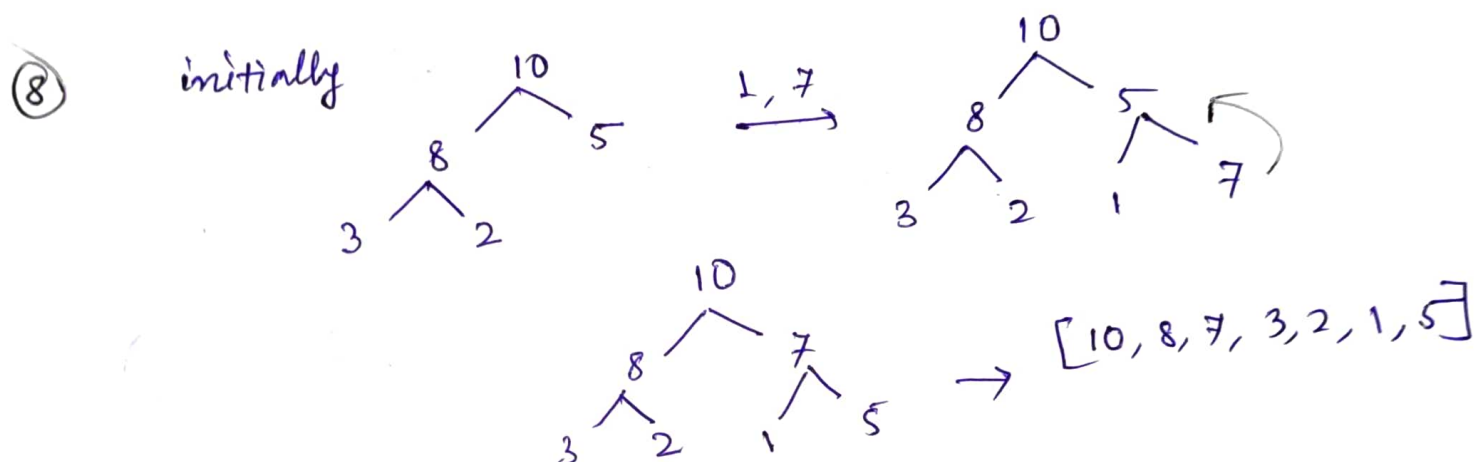
which is a max heap

Ans \rightarrow (C)

(7) In a max heap containing n elements, the smallest element can be found in $O(n)$.

Since smallest element are present in leaf node so in worst case all the leaf nodes are to be checked.

Ans \rightarrow (A)



Ans \rightarrow (A)

(9) Any decision tree that can sort n elements must have height $\Omega(n \log n)$

Ans \rightarrow (b) false

(10) parent of a node at index i is in the position $\lfloor i/2 \rfloor$

ans \rightarrow (d)