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Program: BS Software Engineering

Course Title: Data Structures and Algorithms

Q.1: a)

Ans: Let the size of A[] be 15654 and the lower bound be 36767, calculating the upper bound:

Given Data:

Size of array A[] = 15654

Lower bound = 36767

Required Upper bound = ?

As we know that size of A[] = $ub - lb + 1$

$$15654 = ub - 36767 + 1$$

$$-ub = -15654 - 36767 + 1$$

Take minus common to right side and divide

$$ub = 15654 + 36767 - 1$$

$$ub = 52420$$

Upper Bound = 52420

Q1: b)

Ans: Suppose a list of 350 elements is to be sorted using Bubble Sort, then find the following:

1) Total number of passes = Total no of elements - 1

$$\text{Total no of Passes} = 350 - 1 = \mathbf{349}.$$

2) Total number of Steps = $n(n-1)/2$

$$\text{As } n = 350$$

$$\text{Total no of steps} = 350 (350-1)/2$$

$$= 122150/2$$

$$\text{Total no of steps} = \mathbf{61075}$$

3) Number of steps in pass #137 = $N - \text{Pass\#}$

$$\text{As } N = 350 \text{ and Pass\#} = 137$$

$$\text{Number of steps in pass \#137} = 350 - 137$$

$$\text{Number of steps in pass \#137} = \mathbf{213}$$

4) Number of steps in pass #193 = $N - \text{Pass\#}$

$$\text{As } N = 350 \text{ and Pass\#} = 193$$

$$\text{Number of steps in pass \#193} = 350 - 193$$

$$\text{Number of steps in pass \#193} = \mathbf{157}$$

Q.2:

Q2 Sort the given list using Selection Sort
10, 15, 0, 7, 8, 6

Solution
While sorting by using selection sort we need to find the number of steps and then implement the steps for each element in order to order and arrange the above or given list.

$$\begin{aligned} \text{Steps} &= N - 1 & \because N &= \text{number of elements} \\ &= 6 - 1 = 5 \end{aligned}$$

We need to sort the list in 5 steps

elements of the list 10, 15, 0, 7, 8, 6

Step 1 - For element 10

10, 15, 0, 7, 8, 6

Here we underlined circled the 10' element with respect to the smallest element in the list and we should interchange their position

R = 0, 15, 10, 7, 8, 6

Step 2 = For element 15

0, 15, 10, 7, 8, 6

We do the same as explained in step 1

R = 0, 6, 10, 7, 8, 15

Step 3 for element 10

0, 6, 10, 7, 8, 15

R = 0, 6, 7, 10, 8, 15

Step 4 for element 10

0, 6, 7, 10, 8, 15

R = 0, 6, 7, 8, 10, 15

Step 5 0, 6, 7, 8, 10, 15

Now 10 is on proper position that's why list sorting is also complete and the sorted list is 0, 6, 7, 8, 10, 15.

Q.3: Fill in the blanks

1. Physical Data Structure may deal with only a single value.
2. Logical Data Structure may deal with multiple values.
3. The logical / mathematical organization of data is called Data Structure.
4. A Tree is a Non-linear Data Structure.
5. An Array is a Linear Data Structure.
6. List must be sorted for Binary Searching.
7. $17 \text{ int-div } 2 = \underline{8}$.
8. An investigation parade of criminals is an example of File.
9. Number of Fields in a Record is called Degree of Record.
10. Number of Records in a Block is called Blocking Factor.