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## DATA STRUCTURES

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Mid-Term Assignment  
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15453  
Csc-201

Q#1. (a)

Let the size of A [ ] be 15654 and the lower bound be 36767, calculate the upper bound.

**ANS TO Q1 (A):**

GIVEN:

$$\begin{aligned}\text{Size of A[]} &= 15654 \\ \text{Lb} &= 36767\end{aligned}$$

REQUIRED:

$$\text{Ub} = ?$$

SOL:

$$\begin{aligned}\text{Size of A[]} &= \text{ub} - \text{lb} + 1 \\ 15654 &= \text{ub} - 36767 + 1 \\ \text{Ub} &= 15654 + 36767 - 1 \\ \text{Ub} &= 52420\end{aligned}$$

Q#1. (b)

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

- i. Total Number of Passes (01)
- ii. Total Number of Steps (01)
- iii. Number of Steps in Pass# 137 (01)
- iv. Number of Steps in Pass# 193 (01)

**ANS TO Q1 (B):**

GIVEN:

$$n = 350$$

REQUIRED:

- i. Total Number of Passes
- ii. Total Number of Steps

- iii. Number of Steps in Pass# 137
- iv. Number of Steps in Pass# 193

SOL:

i.

$$\begin{aligned} \text{Total Number of Passes} &= n-1 \\ \text{Total Number of Passes} &= 350 - 1 \\ \text{Total Number of Passes} &= 349 \end{aligned}$$

ii.

$$\begin{aligned} \text{Total Number of Steps} &= \frac{n(n-1)}{2} \\ \text{Total Number of Steps} &= \frac{350(350-1)}{2} \\ \text{Total Number of Steps} &= \frac{350(349)}{2} \\ \text{Total Number of Steps} &= \frac{122150}{2} \\ \text{Total Number of Steps} &= 61075 \end{aligned}$$

iii.

$$\begin{aligned} \text{Number of Steps in each pass} &= n - i \\ \text{Number of Steps in pass\# 137} &= 350 - 137 \\ \text{Number of Steps in pass\# 137} &= 213 \end{aligned}$$

iv.

$$\begin{aligned} \text{Number of Steps in each pass} &= n - i \\ \text{Number of Steps in pass\# 137} &= 350 - 193 \\ \text{Number of Steps in pass\# 137} &= 153 \end{aligned}$$

Q#2. Sort the given list using Selection Sort. (10) 10, 15, 0, 7, 8, 6

**ANS TO Q2:**

GIVEN:

$$A[] = [10, 15, 0, 7, 8, 6]$$

REQUIRED:

Sort A[] using selection sort

SOL:

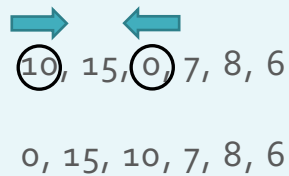
$$N = 6$$

$$\text{Steps} = n - 1$$

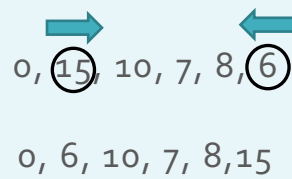
$$\text{Steps} = 6 - 1$$

$$\text{Steps} = 5$$

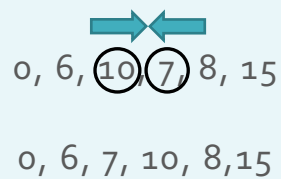
Step# 1, Element = 10:



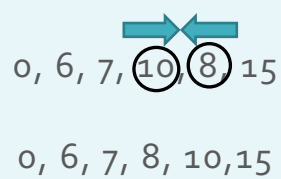
Step# 2, Element = 15:



Step# 3, Element = 10:



Step# 4, Element = 10:



Step# 5, Element = 10:

0, 6, 7, 8, 10, 15

10 is at its proper position

Hence  $A[] = [0, 6, 7, 8, 10, 15]$  is the sorted list

Q#3. Fill in the blanks.

**ANS TO Q3:**

- i. Physical Data Structure may deal with only a single value.
- ii. Logical Data Structure may deal with multiple values.
- iii. The logical / mathematical organization of data is called Data Structure Programming.
- iv. A Tree is a Non-Linear Data Structure.
- v. An Array is a Linear Data Structure.
- vi. List must be sorted for Binary Searching.
- vii.  $17 \text{ int-div } 2 = 8$ .
- viii. An investigation parade of criminals is an example of Linear search.
- ix. Number of Fields in a Record is called Degree of record.
- x. Number of Records in a Block is called Blocking factor.