

**Data Structures and Algorithms**  
**Spring-2020 Mid-Semester Assignment**  
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**DEGREE: BS (SOFTWARE ENGINEERING)**

**Q#1. (a) Let the size of A [ ] be 15654 and the lower bound be 36767, calculate the upper Bound?**

**ANSWER:**

$$\text{Size of A[]} = \text{ub} - \text{lb} + 1$$

$$\text{Ub} = \text{size of a[]} + \text{lb} - 1$$

$$\text{Ub} = 15654 + 36767 - 1$$

$$\text{Ub} = 52420.$$

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

i. Total Number of Passes

ii. Total Number of Steps

iii. Number of Steps in Pass# 137

iv. Number of Steps in Pass# 193

**ANSWER:**

**Solution:-**

$$n = 350$$

**Total number of passes** =  $n - 1$

$$= 350 - 1 = 349$$

$$\text{Total number of steps} = \frac{n(n-1)}{2} = \frac{350(350-1)}{2}$$

$$= 175 \times 349$$

$$= 43625$$

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

$$= 350 - 137$$

$$= 213$$

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

$$= 350 - 193$$

$$= 152.$$

**Q#2. Sort the given list using Selection Sort. (10)**

**10, 15, 0, 7, 8, 6**

**ANSWER:**

$$n = 6$$

$$\text{Steps} = n - 1 = 6 - 1 = 5$$

**Step # 1** Element= 10

(10) 15, (0) 7, 8, 6.

0, 15, 10, 7, 8, 6.

**Step # 2** Element= 15

0, (15) 10, 7, 8, (6).

0, 6, 10, 7, 8, 15.

**Step # 3** Element= 10

0, 6, (10) (7), 8, 15.

0, 6, 7, 10, 8, 15

**Step # 4** Element= 10

0, 6, 7, (10) (8), 15.

**Step # 5** Element= 10

0, 6, 7, 8, (10) 15.

10 is at its proper position

0, 6, 7, 8, 10, 15

**List is sorted.**

**Q#3. Fill in the blanks. (10)**

- 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 Structures**.
- 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.  $17 \text{ int-div } 2 = \underline{8}$ .
- 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 **block factor** .