

Data Structures
Data Structures and Algorithms
Spring-2020
Mid-Semester Assignment
Faculty: Asst: Prof. Muhammad Adil

Attempt All Tasks.

Q#1. (a) Let the size of A [] be 15654 and the lower bound be 36767, calculate the upper bound. (06)

- (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)

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

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

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

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COURSE TITLE

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Question NO 1

Answer

Part (A)

⇒ Given data :-

$$\text{Size of } A[] = 15654$$

$$\text{Lower bound} = 36767$$

⇒ Required = ?

$$\text{Upper bound} = ?$$

Therefore,

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

$$\text{ub} = \text{size of } A[] + \text{lb} - 1 \rightarrow \textcircled{1}$$

Putting the values in eq (1)

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

$$\boxed{\text{ub} = 52420}$$

Ans

Question No 1Part (B)

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

⇒ Given data:-

$n = 350$ elements

⇒ Required =?

i) Total number of passes?

Therefore,

$$n = 1 \text{ eq - (1)}$$

Putting the value in eq (1)

$$350 - 1$$

349

So then total number of passes is

$$\boxed{349}$$

Ans

ii) Total number of steps = ?

$$n(n-1)/2 \rightarrow \text{eqn (1)}$$

putting values in eqn (1)

$$350(350-1)/2$$

$$175 \cdot 350(349)/2$$

$$(175)(349)$$

$$\boxed{61,075}$$

The total number of steps is

$$\boxed{61,075}$$

Ans

iii) Number of steps in pass # 137 = ?

now,

n-pass number

$$n=350$$

$$\text{pass number} = 137$$

Kisamatullah (4)

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So

$$350 - 137$$

213

Now

Number of steps in pass
#137 is

213

ans

iv) Number of steps in pass #193 = ?

Therefore

n-pass number

$$n = 350$$

$$\text{Pass number} = 193$$

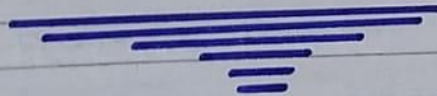
$$350 - 193$$

157

So the number of steps in pass is
#193 as

157

ans



Question No 2Answer

⇒ Given data :-

10 , 15 , 0 , 7 , 8 , 6

Solution :-

$$n = 6$$

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

$$6 - 1$$

$$5$$

so

$$\boxed{n = 5}$$

⇒ Step # 1

Element = 10

(10) → 15 ← (0) , 7 , 8 , 6

10 and 0 interchange

0 , 15 , 10 , 7 , 8 , 6

⇒ Step # 2

Element = 15

0 , (15) → 10 , 7 , 8 ← (6)

15 and 6 interchange

So,

0, 6, 10, 7, 8, 15

⇒ Step #3

Element = 10

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

10 and 7 interchange

0, 6, 7, 10, 8, 15

⇒ Step #4

Element = 10

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

10 and 8 interchange

0, 6, 7, 8, 10, 15

⇒ Step #5

Element = 10

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

10 is at its proper position

0, 6, 7, 8, 10, 15

So,

list is sorted.

Ans

Question NO 3Fill in the blanks

- 1) Physical Data structures may deal with only a single value.
- 2) Logical Data structures 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 Linear search.

9) Number of Fields in a Record is called Degree of record.

10) Number of records in a block is called "Blocking Factor".

THE END