Final term Examination

Spring 2021

CSE-210 Data structure and algorithms

Submitted by: **Ashfaq Ahmad**
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Class Section: **B**

"On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work."

Student Signature: _____

Submitted to:
Prof: Nasruminullah
July 30, 2021

Department of Computer Systems Engineering
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NAME: ASHFAQ AHMAD
Reg NO: 19PWCSE1795

MONDAY TUESDAY WEDNESDAY THURSDAY FRIDAY SATURDAY H/W C/W Dated: ...../...../20.....

(Q 1 - 4)

Question No #

Application and limitation of all data structure:

→ Important application of all Data Structure:

→ Data structure help in efficient storage of Data in storage device.
→ Data structure usage provide convenience while retrieving the data from storage device.
→ usage of proper data structure can help programmer save lots of time or processing time while operation such as storage retrieval or processing of Data.
→ Data structure usage can simply encourage reusability in long run as well.

→ manipulation of large amount of data can be carried out easily with the use good data structure approach.

P T O

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Limitation of All Data Structure:

→ An application using data structure Requires highly qualified professional resource to manage the operation related to data structure

→ Bigger the application or data structure involved in creating and maintaining application more is the requirement of man power. This can increase maintining of Data structure

→ Designing your own Data structure may involve complex algorithm and may require lot of time and testing to conclude they are fool-proof and ready to use for organization purpose. This again will come with internal cost.

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Question No# 2:

Complexities of Insertion function for Array:

i) Worst case - O(N):

if we

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want to insert an element to Index 0, Then we need to shift all element to right.

→ In general if we have n - element then we have need to shift all n elements

So

Time Complexity = O(N)

→ Best Case: O(1)

if position value equal to size of array then below for loop will not work as the pos == size

```
for (i = size  i > pos; i++)
    arr[i] = arr[i-1];
```

→ we can directly place the element in arr[size]

→ so best case is O(1).

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⊗ ✂

* Time Complexities of Insertion function of linklist:

→ Insertion at bagining:

if we want to Insert an node at the begining

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of linklist then time Complexity O(1)

→ Insertion in middle O(1):

if we want to insert in middle then Time Complexity is O(1) with iterator O(n).

→ Insertion at the END:

```
void Ins (int* list, int val, int in)
{  int n=In;
     int *t;
   for (int i=0; i<n; i++)
{   t= list;
    list = list -> next;
   }
 Int *a = new node;
 node -> value = val;
 nod -> next = list -> next;
 t -> next = node;
```

Time Complexity is O(N).

—xx —xx —xx —xv

END of Question 2.

MULTIDISCIPLINES H/W C/W Dated:...../...../20.....

(Question No # 3)

Error Finding = ?

a)

~~list -> last = -1;~~ last

list -> last = -1;

b)

```
Inorder (tree -> left, n+1);
Inorder (tree -> right, n+1);
```

—xx —— xx —— xx — xxx

(Question No 4)

& main drive routine &

~~FIND~~

```
WINDOW-TYPE  W;
ELEMEN_TYPE  e;
LIST_TYPE    list;
int          i;
empty (& list);
print (& list);

assign_element_values (&e, 1, "Syed");
W= find (& list);
Insert (e, w, &list);
print (&list);
```

P + T + 0

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```
assign_element_values (&e, 2,
                       "Ashfaq");
Insert (e, w, &list);
print (&list);

assign_element_values (&e, 3,
                       "Ahmad");
Insert (e, last (&list), &list);
print (&list);
```

Output:

Syed Ashfaq Ahmad

——xx ——xx —— xx —— xx

(Question NO (8))

(a) BST by Inserting Alphabits of full name.

Ans

my full name is

ASHFAQ AHMAD

P T O

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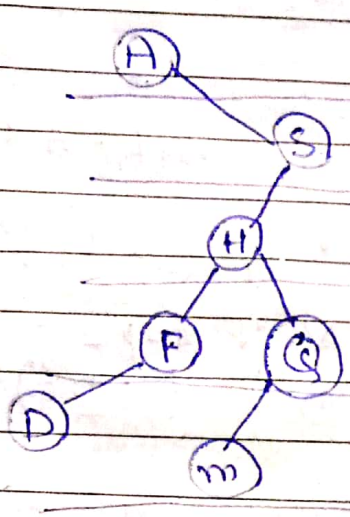
BST



level 0
level 1
level 2
level 3
level 4

Some elements are Repeating in my name So I ignored it.

(b)

no of Internal node = 4 (S, H, F, Q)
no of external node = 2 (D, m)
level of tree = 4
height of tree = 4

(c)

Right Complete binary tree.

(d)

Pre order (A, D, F, H, m, Q, S)
Post order (D, F, H, m, Q, S, A)
In order (A, D, F, H, m, Q, S)

— XX — XX — XX — XX

MTWTFS H/W -C/W Dated:

Question # 5

Ans

my name is ASHFA Q.

Push ('A');

if (top() == 'C' || top() == 'O'
|| top == 'V' || top == 'I' ||
top == 'D') POP();

Push ('S');

→ Same if Statement will used as used in case of Push ('A')

Push('H');

→ Same case

Push('F');

→ Same case

Push ('A');

→ Same case

Push ('Q');

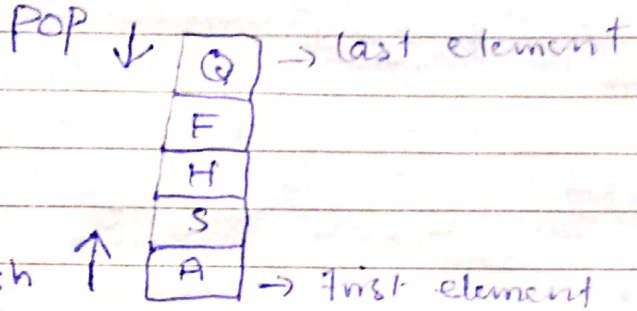
→ Same case

→ i will not use this Push function b/c A is already used before.

P φ I f O

M T W T F S H/W C/W Dated: ... / ... /20...

Diagram:



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Answer No : 6

Ans

my Reg No = 19pwcse1795

So

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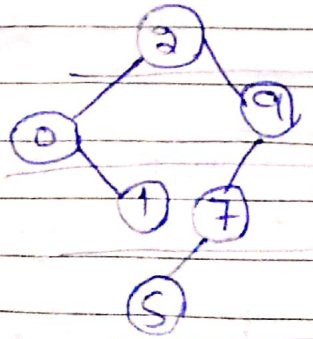
(b) BST Tree:



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(c)

no of Internal node = 3 (0, 9, 7)
no of external node = 2 (1, 5)
level of tree = 3
height of tree = 3

(d) the tree generated is neither perfect nor complete since not all level are filled. it is degenerated tree in which each internal node has exactly child.

(e)

Inorder (0, 1, 2, 5, 7, 9)

Preorder (2, 0, 1, 9, 7, 5)

Post order (1, 0, 5, 7, 9, 2)

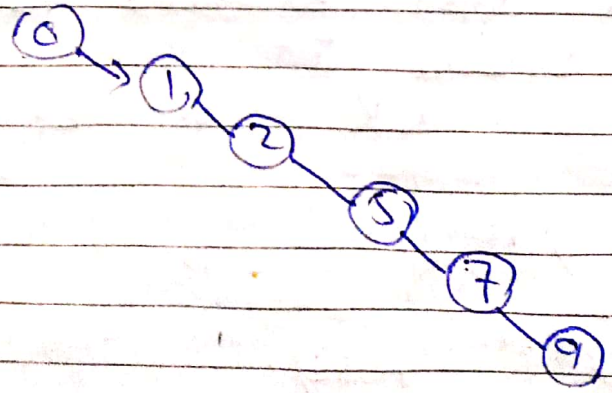
Question NO # 7:

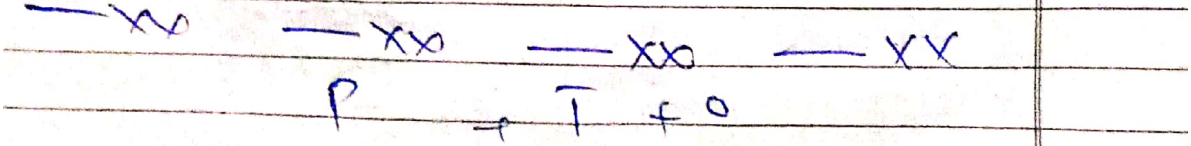
Ans

```
Struct node ( int val;
              Node * left, right)

Insert ( Node * tree, int Val )
{
   if (*tree == NULL)
   {
      p
```

M T W T F S H/W C/W Dated: ...../...../20.....

```
Node *b = new Node;
b->left = NULL;
b->Right = NULL;
b->val = val
tree = b;
return ;
}
if (val < tree->val)
    Insert (tree->left, val);
else
  if (val, tree->val);
    Insert (tree->right, val);
}

Int main () {
  Node *tree;
  Insert (tree, 0);
  Insert (tree, 1);
  Insert (tree, 2);
  Insert (tree, 5);
  Insert (tree, 7);
  Insert (tree, 9);
};
```





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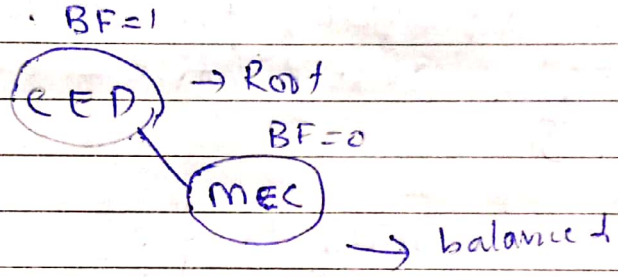
(Question No # 9)

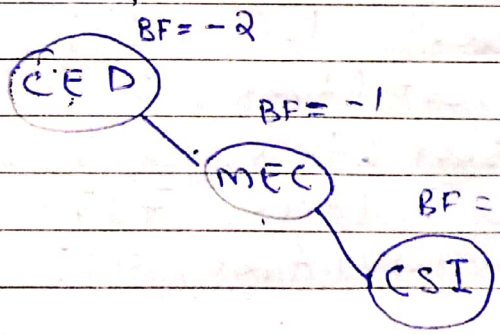
Ans:

let I Suppose given 10 departments.

CED, MEC, CSI, EPE, MIN EOE, SED, TEC, RSD, AID.

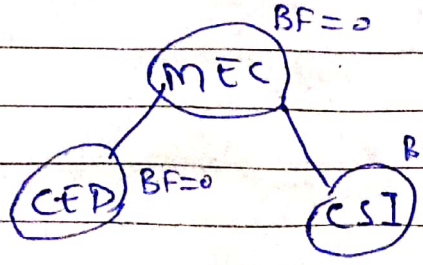


Insert CSI



it is not balanced So first we balance it

it is RR So left rotate



balanced

P & T ✓

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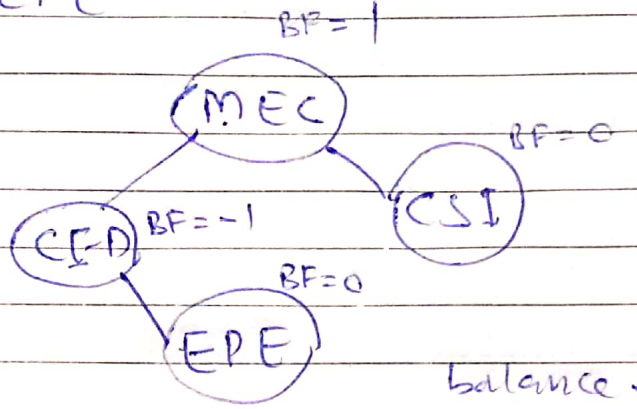
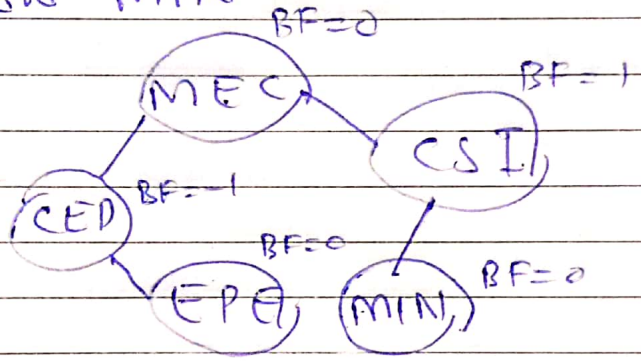
EPE

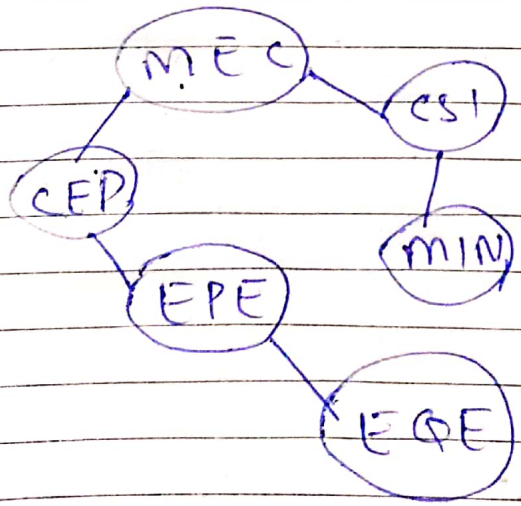


balance ✓

Now MIN



Now EQE



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