09

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MIT, MORADABAD

CT-I/II/III..... I ..... DATE 28-11-23

Course B.tech ..... Branch CSE .....

Semester 3rd ..... Section C .....

Subject Code BCS 301 Subject Name Data Structure

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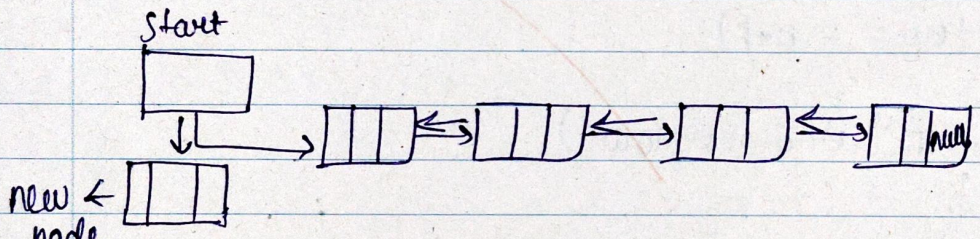
Ans- 1(b) Insert an element at the beginning of a doubly linked list.




```
void insert_beg dLL ( int data )
{
  Struct node * * temp
  temp = (struct node *) malloc (sizeof ( struct node))
  temp → info = data;
  temp → Prev = NULL;

  if (start == NULL)
  {
    temp → next = NULL;
    start = temp;
    return;
  }
```

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```
temp → next = start;
start → Prev = temp;
start = temp;
}
```

Ans- 2) Stack works on the ~~prip~~ principle of LIFO.
Stack is a linear data structure.
Two operations of stack

1) Push
2) POP.

when stack is stored using array.

Push operation.

```
void_Push (int data)
{
if (top == n-1)
{
Printf(" ~~und~~ overflow");
}
return;
top ++;
stack [a] = top;
}
```

PoP operation.

```
void_PoP (int data)
{
if (top == -1)
{
Printf(" underflow");
```

```
}
return;
top--;
}
```

3

Ans-3.) Tail recursion is the recursion in which the ~~fatla~~ function calling statement calls the f^n at the end of the statement.

☆ Tail recursion is better than Recursion because tail recursion store memory in less area as compared to recesion.

3

☆ Tail recursion execute faster than Recursion.

Ans-4 A [-2:3, 0:4, 1:3]

a) $L = UB - LB + 1$

$= 3 - (-2) + 1$

$= 6$ (m)

0, 4

$= 4 - 0 + 1$

$= 5$ (n)

1, 3

$= 3 - 1 + 1$

$= 3$ (o)

b) No of elements in A = $6 \times 5 \times 3$

$= 90$

c) row major = [Base(a) + w[(i - LBi) * o * n + (j - LBj) * o + (k - LBk)]

A [2, 1, 3] (i, j, k)

$= 400 + 4[(2 - (-2)) \times 3 \times 5 + (1 - 0) \times 3 + (3 - 1)]$

$= 400 + 4[60 + 3 + 2]$

$= 660$

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d) Column major = [Base(a) + ω[(K - LBi) × m × n + (j - LBj) × m + (i - LBi)]

= 400 + 4[(4 - 1) × 6 × 5 + (2 - 0) × 6 + (1 - (-2)]

= 400 + 4[90 + 12 + 3]

= 400 + 420 = 820.

Ans- 5. (10 + 2 * (20/5)) + (5 * 4/2 + 3))

Symbol	Stack	Postfix
	(	
(	((	
10	((	10
+	((+	10
2	((+	10, 2
*	((+*	10, 2
(	((+*(	10, 2
20	((+*(	10, 2, 20
/	((+*(/	10, 2, 20,
5	((+*(/	10, 2, 20, 5,
)	((+*	10, 2, 20, 5, /
)	(	10, 2, 20, 5, /, * +
+	(+	10, 2, 20, 5, /, * +,
(	(+(	10, 2, 20, 5, / *, +
5	(+(	10, 2, 20, 5, / *, + 5
*	(+(*	10, 2, 20, 5, /, *, +, 5
4	(+(*	10, 2, 20, 5, /, * +, 5, 4
/	(+(/	10, 2, 20, 5, /, *, +, 5, 4, *
2	(+(/	10, 2, 20, 5, /, *, +, 5, 4, * 2

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+	(+(+	10, 2, 20, 5, /, *, +, 5, 4 * 2 /
3	(+(+	10, 2, 20, 5, /, *, +, 5, 4 * 2 /, 3
)	(+	10, 2, 20, 5, /, *, +, 5, 4, *2, /, +,
)		10, 2, 20, 5, /, *, +, 5, 4, *2, /, +, +

10, 2, 20, 5 / *, + 5, 4, * 2 / 3 + +

Symbol	stack	operation.
10	10	
2	10, 2	
20	10, 2, 20	
5	10, 2, 20, 5	
/	10, 2 4	A=5, B=20 B/A=20/5
*	10, 8	A=4, B=2, B×A=2×4
+	18	A=8, B=10, B+A=10+8
5	18, 5	
4	18, 5, 4	
*	18, 20	A=4, B=5, B×A=5×4
2	18, 20, 2	
/	18, 10	A=2, B=20, B/A=20/2
3	18, 16, 3	
+	18, 13	A=3, B=10, B+A=10+3
+	18 31	A=13, B=18, B+A=18+13=31

(4)

Ans = 31

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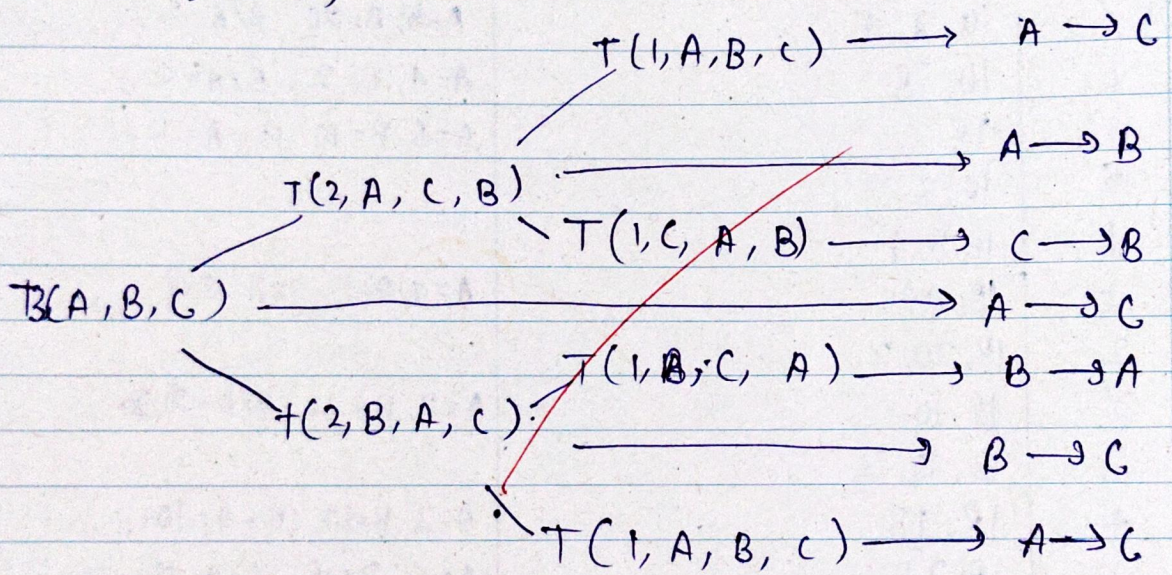
6) Tower of Hanoi problem.

Acc to Tower of Hanoi we change the tower from one to another without changing any change in formation of disks of tower. It works on the formula $2^n - 1$ ∵ where n = no of disks.

Algorithm for Tower of Hanoi

1) Call Tower
2) write → beg → end
3) call tower (Beg → End, Aux)
4) Call tower (Aux , Beg , End)
5) call tower (Beg , Aux , End)

return;



n = 3

1) A → C
2) A → B
3) C → B
4) A → C
5) B → A
6) B → C
7) A → C

$2^n - 1 = 2^3 - 1 = 8 - 1 = 7$

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1(a)

```
void func()
{ int a, i, j, n;          ——— 1
  scanf("%d", &n);         ——— 2
  a = 1;                   ——— 3
  for( i=0; i<n; i++)      ——> n
   {
   for(j=1; j<n; j=j*2)    ——> log2n
    {
    a = a+i;
    Printf("%d", a);       } ——— 2
    }
  }
}
```

$= 3 + 2 * n * \log_2 n$

$= n \log_2 n$

$= O(n \log_2 n)$

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