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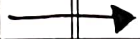
Roll No. : 26

Subject : IS LAB

Batch : T-2

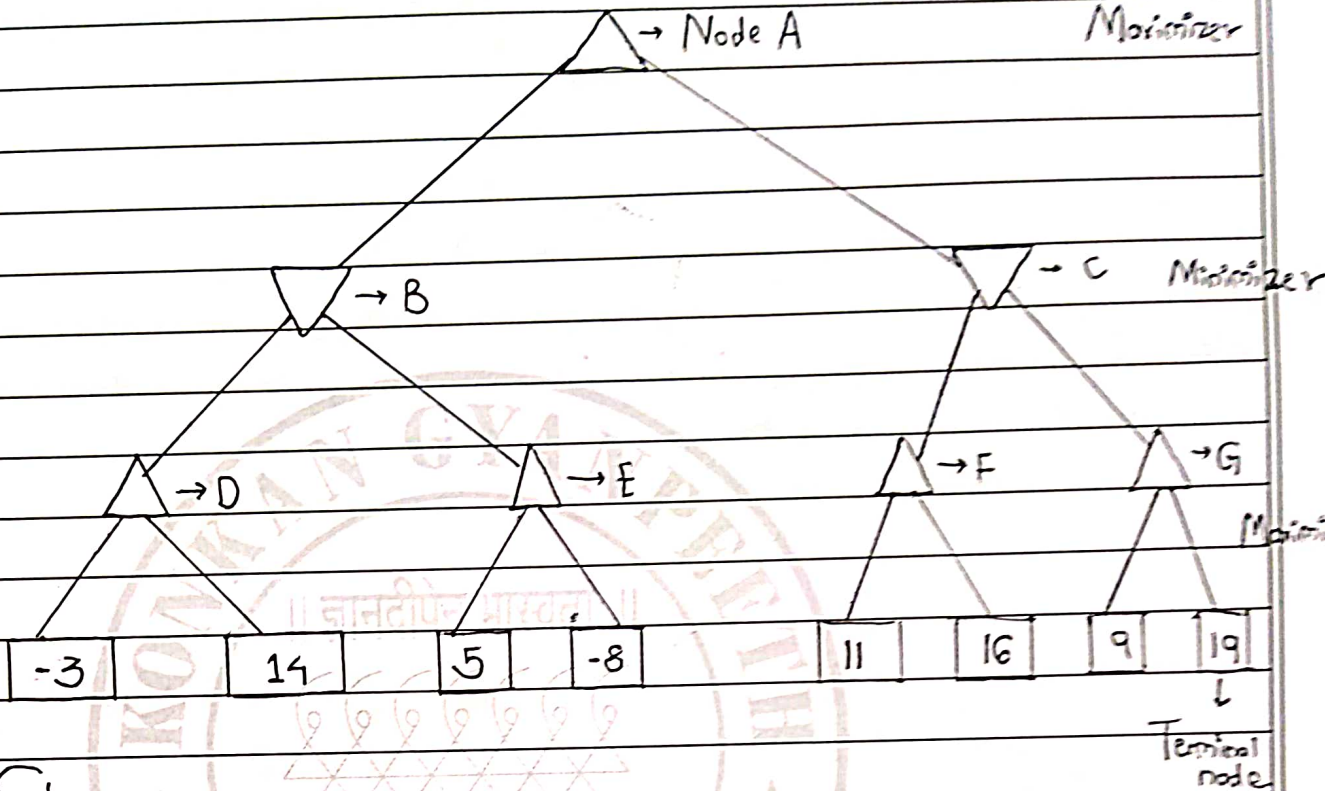| DOP	DOA	Marks	Sign	

Min-Max Algorithm :

→

Min Max algorithm :

Min-max algorithm is a recursive or back-tracking algorithm which is used in decision making and game theory. It provides an optimal move for the player assuming that opponent is also playing optimally.

- Min max algorithm uses recurssion to search through the game tree.
- In this algorithm two players play the game, one is called as MAX and the other one is called as MIN.
- Min-Max algorithm is mostly used for game playing in AI.

* Step 1 :
Lets take A is the initial value state of the tree. Suppose maximizer takes first turn (when or) which has worst-case initial value = -infinity and minimizer will take next turn which has worst-case initial value = +infinity

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→ Node A   Maximizer

→ B   Minimizer → C

→ D   →E   →F   →G

Maxi...

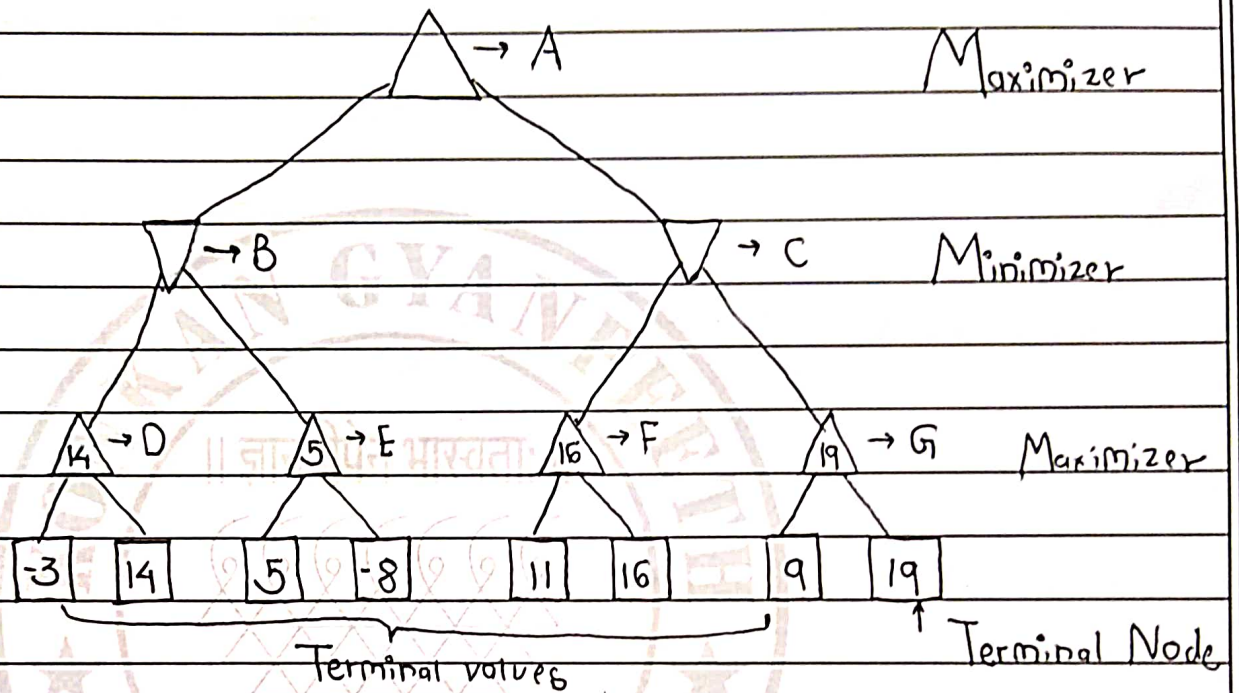| -3 | 14 | 5 | -8 | 11 | 16 | 9 | 19 |

Terminal node

Step 2 :

First we find the utilities value for the Maximizer, its initial value is $-\infty$, so we will compare each value in terminal stats with initial value of Maximizer and determines the higher nodes values. It will find the Maximum among all

For node D : $\max(\overset{-3}{a}, -\infty) \Rightarrow \max(-3, 14) = 14$

For node E : $\max(5, -\infty) \Rightarrow \max(5, -8) = 5$

For node F : $\max(11, -\infty) \Rightarrow \max(11, 16) = 16$

For node G : $\max(9, -\infty) \Rightarrow \max(9, 19) = 19$

```
                    △ → A                          Maximizer


         ▽ → B                    ▽ → C            Minimizer


   14 △→D     5 △→E      16 △→F      19 △→G        Maximizer


  ┌──┬──┐ ┌──┬──┐   ┌──┬──┐  ┌──┬──┐
  │-3│14│ │ 5│-8│   │11│16│  │ 9│19│
  └──┴──┘ └──┴──┘   └──┴──┘  └──┴──┘
         └──────── Terminal values ──────┘    ↑ Terminal Node
```
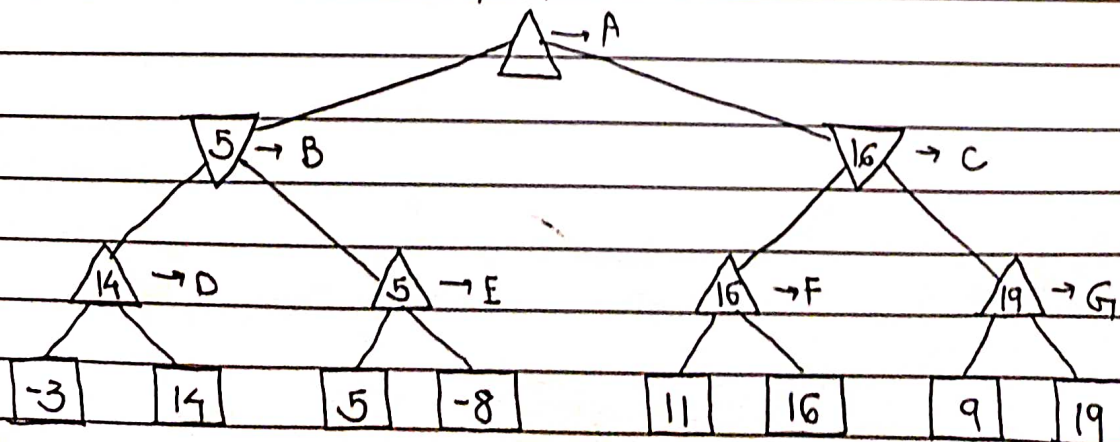
Step 3 :

In the next step, it's a turn for minimize. So it will compare all nodes value with two, and will find the 3rd layer node value.
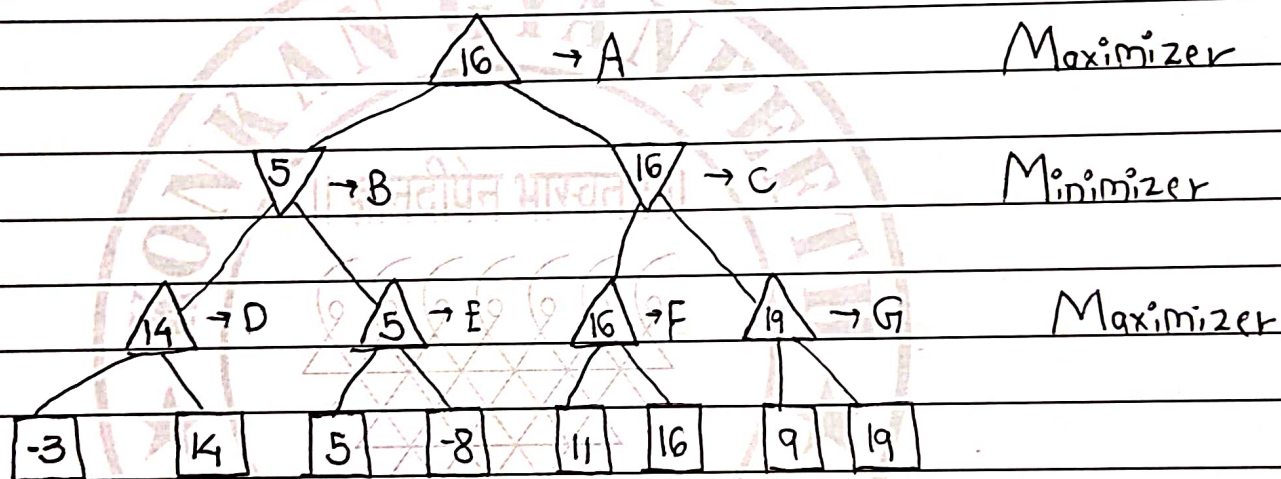
For node B : min (14, 5) = 5
For node C : min (16, 19) = 16

```
                         △ → A


           5 ▽ → B                      16 ▽ → C


    14 △→D        5 △→E        16 △→F          19 △→G


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  │-3│14│  │ 5│-8│      │11│16│     │ 9│19│
  └──┴──┘  └──┴──┘      └──┴──┘     └──┴──┘
```

Step 4 :

Now its a turn for maximizer, and it will again choose the maximum of all nodes values and find the maximum value for the root node.

For node A : max $(5, 16) = 16$

Hence, it was the complete workflow of the minmax algorithm with two player game.