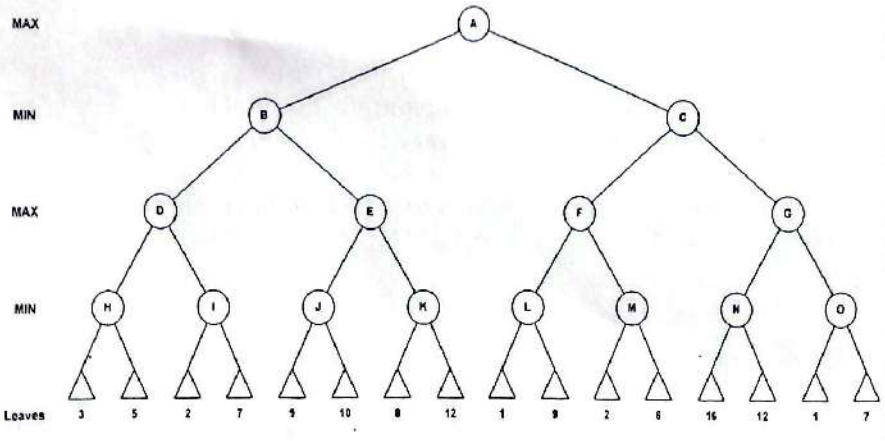
ourdiu.com | Shared by Md Jakaria Hossain

2. a)



Consider a depth-4 game tree for a two-player zero-sum game, with MAX at the root and alternating MAX and MIN levels. Assuming both players play optimally, **simulate** the Alpha-Beta Pruning algorithm using a left-to-right traversal. **Trace** the updates of α and β at each internal node, **detect** all pruned branches and **calculate** the percentage of branches pruned.

[Marks : 5]

CLO 2 *Level 3*

b)

"Alpha–Beta Pruning is computationally more efficient than the Minimax algorithm when determining the optimal move in a game"

Validate this statement by comparing their performance on the game tree illustrated in **Question 2(a).**

[Marks : 2]

3.

Based on the scenario described in **Question 1(a),** Asha, an autonomous rescue robot, monitors corridor conditions while navigating a damaged building. Each corridor is classified into one of four states: Safe (S), Smoke-Affected (M), Partially Blocked (P), or Blocked (B). Assume that the condition in the next time interval depends only on the current condition.

Initial State Probabilities

Safe (S)	Smoke-Affected (M)	Partially Blocked (P)	Blocked (B)
0.4	0.3	0.2	0.1

Transition Probability Matrix

Current State / Next State	Safe (S)	Smoke-Affected (M)	Partially Blocked (P)	Blocked (B)
Safe (S)	0.60	0.20	0.15	0.05
Smoke-Affected (M)	0.20	0.50	0.20	0.10
Partially Blocked (P)	0.10	0.20	0.50	0.20
Blocked (B)	0.05	0.10	0.25	0.60

Using the given initial state probabilities and transition probability matrix, **calculate** the probability of the following sequence of corridor conditions:
Safe → Smoke-Affected → Partially Blocked → Blocked → Smoke-Affected → Safe.

[Marks : 3]

CLO 2 *Level 3*