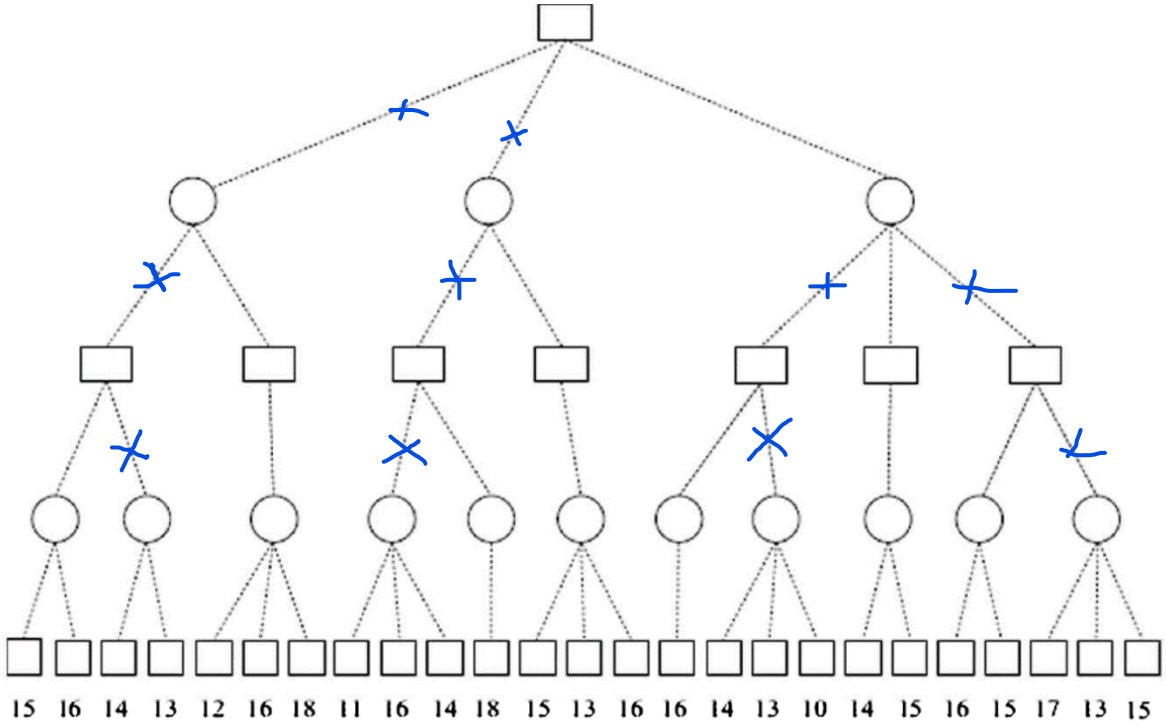
MC 312 ARTIFICIAL INTELLIGENCE

ASSIGNMENT 2

2022-23 SESSION

Q.1 What is the size of the game tree, i.e., maximum number of nodes and depth in a game tree representing the game of noughts & crosses (Tic-Tac-Toe) ?

Q.2. Consider a game tree given below:

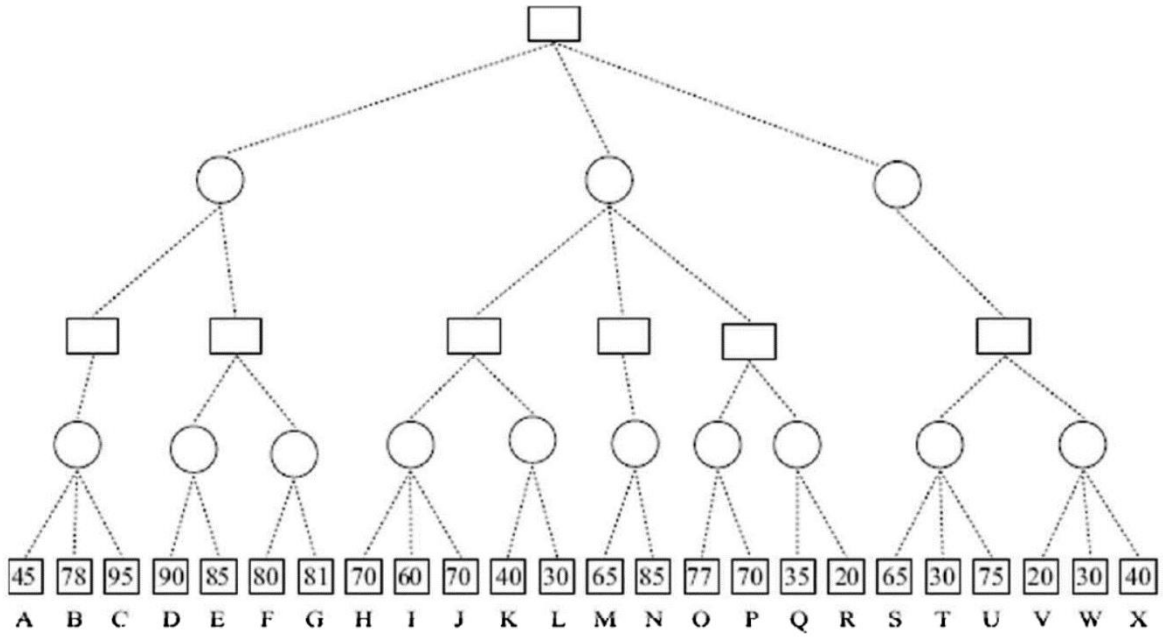


Show how the algorithm Alpha-Beta explores this game tree, which works from left to right.

(a) Fill in the leaves that are inspected by the Alpha-Beta approach.
(b) Show the cut-offs and label them with their type, i.e., whether Alpha Cutoff or Beta cutoff.
(c) Highlight the move that the MAX will make at the root with the alpha-beta technique.

Q.3. Consider the game tree given in the above question. If we apply MIN-MAX algorithm, will the MAX make the same move as selected with the Alpha-Beta technique ?

Q.4. Given a game tree below:



All the leaf nodes are shown with an evaluation function. Show how the SSS* algorithm will work on the given tree. Describe the order in which the algorithm inspect the nodes. What is the minimax value of the game ?

Q.5. Consider an area which is used to transport packages between various locations. Trucks are used to transport the packages from the source location to the destination location. Drivers are responsible to drive the trucks and transport the packages. Driver will have to walk towards the truck, board the truck and then drive the truck to the destination. Express this in the form of planning problem. Remember that planning problem consists of domains (set of attributes), and set of possible actions. What can be the attributes and actions for this truck-packages problem ?

Q.6. Given an initial state: {On(P, T), OnTable(O), OnTable(T), ArmEmpty, clear(P), clear(O)}. Suppose the goal state is { On(T, O), On(O, P)}. Show step by step how the following techniques can achieve this goal state:

(a) FSSP

(b) BSSP

(c) Goal Stack Planning.

You can choose any order for the sub-goals.

Q.7. Given an initial state: {On(A, B), OnTable(B), On(C, D), OnTable(D), ArmEmpty, clear(A), clear(C)}. Suppose the goal state is { On(A, D), On(C, B)}. Explain how Plan Space Planning will achieve this goal state. Also write down the plan returned by the algorithm that will achieve the given goal state.