U18CO081

AIML :
End Semester Examination
Section 1

Ans 1: Strong AI allows machines that can actually carry out tasks on their own, just like humans do.
On the other hand, Weak AI ~~allows~~ requires user input and intervention.

StrongAI has complex algorithms and techniques.
WeakAI has relatively simpler algorithms.

StrongAI can simulate human behaviour whereas WeakAI cannot.

For example, Alexa, Siri are Weak AI, OpenAI is strongAI.

Ans 2: A turing test is a simple method of determining whether a machine can demonstrate human intelligence or not.
- It passes the test if it is able to deceive the system into thinking that it is human.
- Turing test allows us to demarcate, differentiate between humans and bots and hence, safeguard technology on Web, Servers and Systems.

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Ans 3. • A* algorithm is optimal because it combines the technique of Uniform cost and Greedy Search algorithm.
• The heuristic value used in A* algorithm helps the algorithm into reaching the goal state in the shortest path as well as quickest time.
• A* algorithm uses both the distance from start as well as goal state to determine the next state and hence, it is optimal.

Ans 4. Simulated Annealing is a search technique that uses probabilistic approximation.
• Specifically, it is a metaheuristic to approximate global optimization in a large space search.
• The algorithm is basically hill climbing except instead of picking the best move, it picks a random move.
• If the selected move improves the current state, then it is always accepted.
• Otherwise the algorithm makes the move anyway with probability less than 1.
• The probability decreases exponentially with the badness of the move.

Ans 5. • The alpha beta pruning search computes the same moves as Minimax, but it eliminates the branches that can't influence the final decision.
• Let us see an example;

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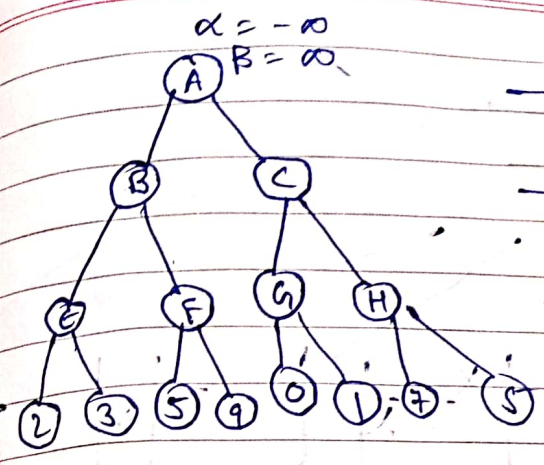
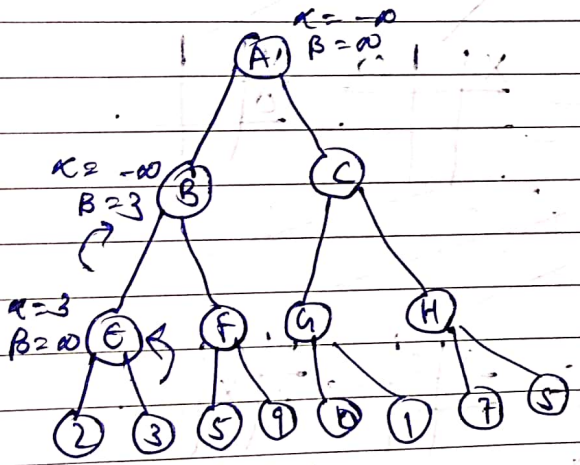
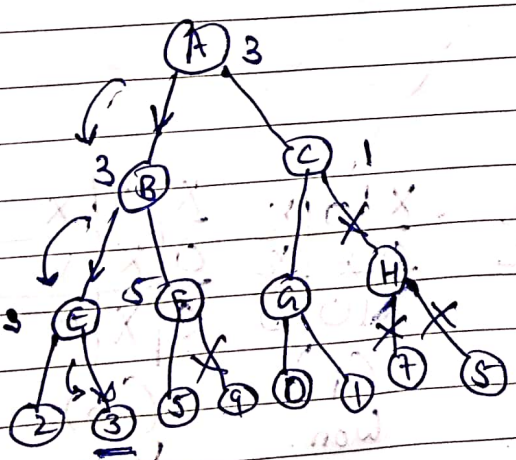


At node G, the value of α is equal to max of children. Then value of β is minimum of max of children. Hence,



And so, on we get a final state,



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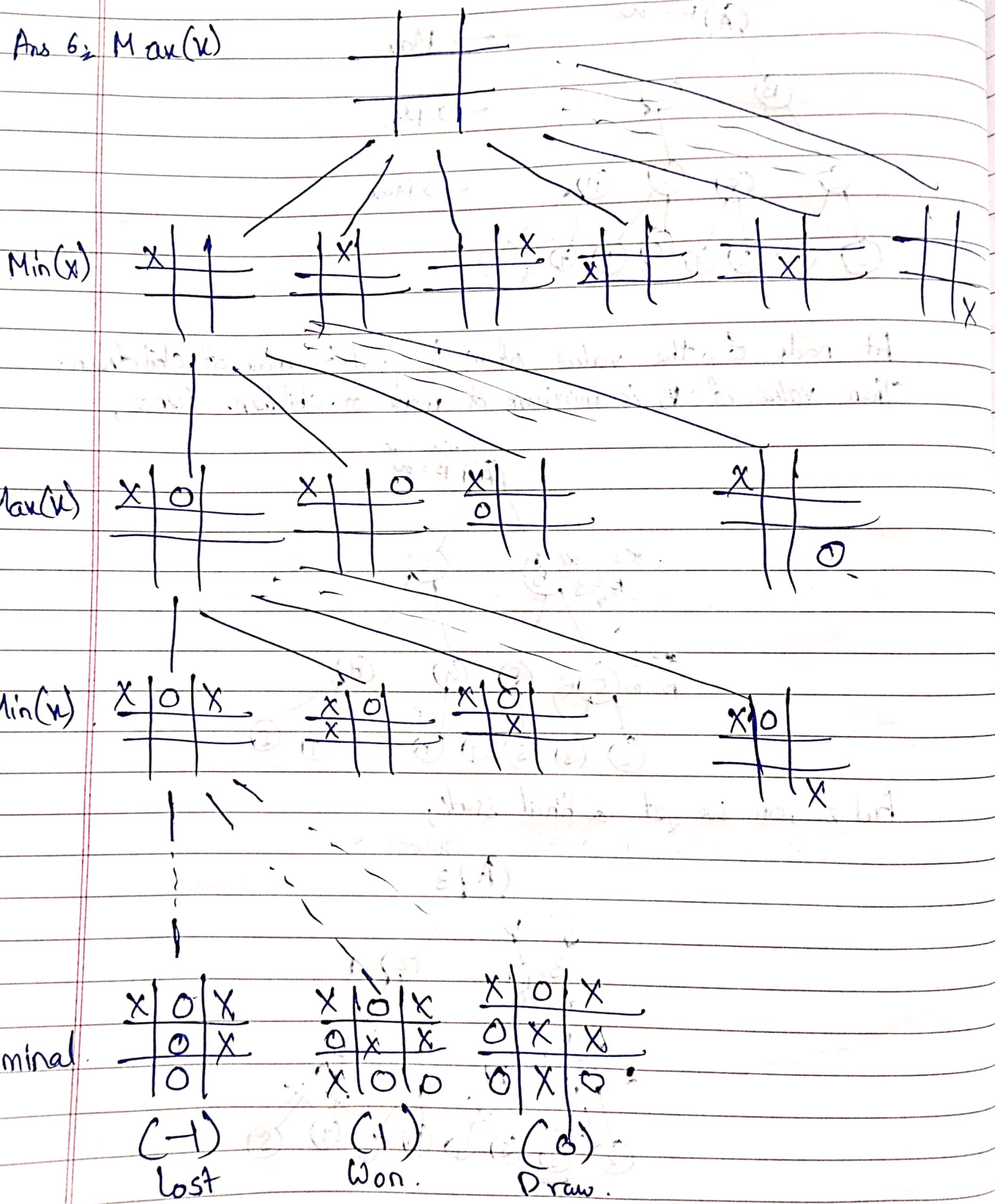
Ans 6: Max(X)



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Ans 7: For given Constraint Problem,

```
  SEND
+ MORE
------
 MONEY
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We have digits available from 0 to 9.
We need to assign digits to the letter.

expression1 = V(1) * 1000 + V(2) * 100 + V(3) * 10 + V(4) * 1 ; SEND
expression2 = V(5) * 1000 + V(6) * 100 + V(7) * 10 + V(2) ; MORE
~~if~~
expression3 = V(5) * 10000 + V(6) * 1000 + V(3) * 100 + V(2) * 10 + V(8)
; MONEY

If expression1 + expression2 = expression3,
then report V as solution.

Possible solution:
S=9, E=5, N=6, D=7, M=1, O=0, R=8, Y=2

Ans 8: ∀X ∀Y person(X) ∧ try to assassinate(X,Y) → ~loyal(X,Y)

Ans 9: Isa → It is used to show a class inclusion.
For example, isa(Megha, girl) → True

Instance → It is used to show class membership
Eg: instance(Hades, demon) → True.

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Ans 10:- In logic, unification is a process of solving equations between symbolic expressions.
It is a process of making two different logical atomic expressions identical by substitution.

For example:-
Let ψ_1 & ψ_2 be two atomic sentences,
then, σ be a unifier, such that
$\psi_1 \sigma = \psi_2 \sigma$.
Then, it can be expressed as $\sigma(\psi_1, \psi_2)$.

Ans 11:- Lifted Inference rules require us to make different logical expressions look identical, which is also called unification.

For example, Unifying Knows(Richard, x), Knows(Richard, John)

can be unified as:-
{knows(Richard, John), knows(Richard, John)}
by replacing $\theta = \{John/x\}$.

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Ans 2:- Inference rules in predicate logic are:-

- Implication:- $P \rightarrow Q$
- Converse:- $Q \rightarrow P$
- Contrapositive:- $\sim Q \rightarrow \sim P$
- Inverse:- $\sim P \rightarrow \sim Q$
- Modus Ponens:- $\frac{P \rightarrow Q, P}{\therefore Q}$
- Modus Tollens:- $\frac{P \rightarrow Q, \sim Q}{\sim P}$
- Hypothetical Syllogism
- Disjunctive Syllogism:- $\frac{P \vee Q, \sim Q}{P}$
- Addition
- Simplification.

Ans 3:- There are 2 proposition symbols in AI:-

- True:- The hypothesis is correct
- False:- The hypothesis is wrong.

There are 5 logical connectives in AI:-

- Negation:- $\sim P$
- Conjunction:- $P \wedge Q$
- Disjunction:- $P \vee Q$
- Implication:- $P \rightarrow Q$
- Biconditional:- $P \leftrightarrow Q$

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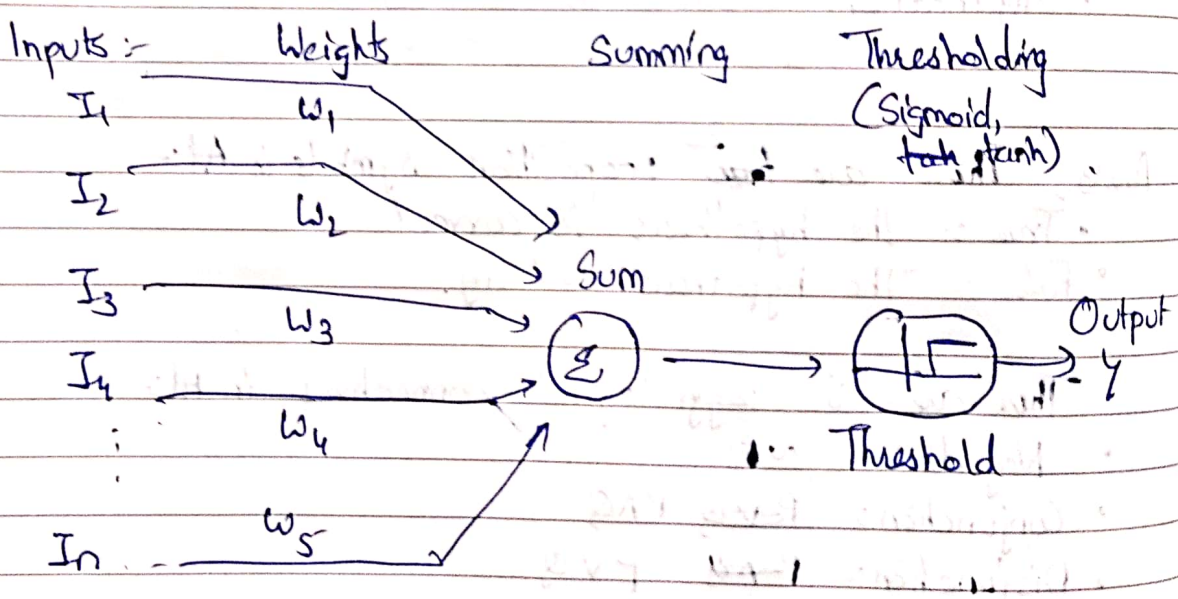
Ans 14:-

- A fuzzy set is determined by indeterminate boundaries. On the other hand, a crisp set has determinate, exact boundaries.
- A fuzzy set follows infinite-value logic, crisp set is based on bi-value logic.
- Fuzzy set are known to be partially accomodable, crisp sets have true or complete membership.

Ans 15:-



Mc Culloch-Pitts Model of Neural Network.

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Ans 16: Classification is a technique in Machine Learning where the Input variables are used to classify an object into clear discrete classes.

Classification	Regression
• It is discrete.	• It is continuous.
• It uses F1 score as determining accuracy.	• It uses Mean Square error for determining accuracy.
• It has a log based loss function.	• It has an Exponential loss function.

Ans 17: Polynomial regression uses higher degree terms of input variable.

For example, any input variable x can be expressed as

$$T(x) = \theta_0 + \theta_1 x + \theta_2 x^2 + \dots + \theta_n x^n$$

And cost is calculated using higher degree terms.

Linear Regression doesn't have degrees more than 1.

Ans 18: The best value for k is k=10 because it is the global minima and it gives the least error.

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Ans 19. Assignment of observations to cluster does not change between iterations. Except for cases with bad local minimum. This is because of the relative effect of all observations during the iterations.

Ans 20. • Reinforcement learning is a branch of Machine learning that provides with cost to each action taken by the agent.
• It follows a rewarding scheme wherein positive actions are rewarded and negative actions are penalised heavily.
• After the agent undergoes several episodes of training it is able to differentiate between good and bad actions.
• The agent is bound to learn from experience in reinforcement learning.
• The best example for it is Hill Climbing.