Time: 3 Hours **Total Marks = 80**

Note:
(i) Each question carries 20 marks
(ii) **Question 1** is compulsory
(iii) Attempt any **three (3)** from the remaining questions
(iv) Assume suitable data wherever required

Q1. Attempt any **four (4)** questions from the following: **[20]**
(a) Compare Model based agent with Goal based agent.
(b) Given a full 5-gallon jug and an empty 3- gallon jug, the goal is to fill the 3-gallon jug with exactly one gallon of water. Give state space representation
(c) Explain conditional independence relation in belief network with example
(d) Describe the environmental characteristics of WUMPUS world Puzzle.
(e) What is Supervised and Unsupervised learning? Give example of each.

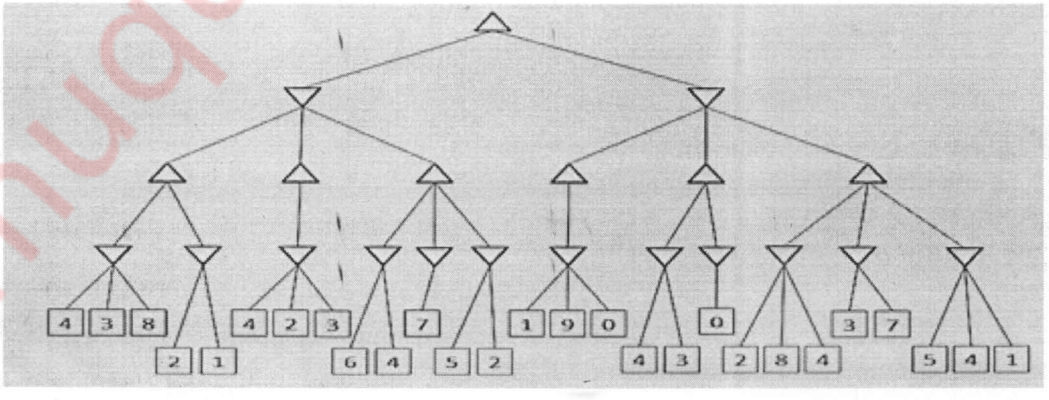
Q2 **(a)** Draw and illustrate the Architecture of Learning agent. Describe each of its component w.r.t. Medical diagnosis system **[6+4]**
(b) Distinguish between Propositional logic (PL) and first order predicate logic (FOPL) knowledge representation mechanisms. Take suitable example for each point of differentiation. **[10]**

Q3 **(a)** Consider the following set of sentences **[10]**
a) Whoever can read is literate
b) Birds are not literate
c) Some birds are intelligent

Prove the following using forward reasoning **"Some who are intelligent cannot read"**

(b) Evaluate **IDA* search** algorithms based on performance measures such as Complete, Optimal, Time and Space complexity with justification. Illustrate its working with a suitable example. **[6+4]**

Q4 **(a)** Apply Alpha-Beta Pruning on following example **[10]**



(b) Define Belief Network. Describe the steps of constructing belief network with an example. What types of inferences can be drawn from that? [2+6+2]]

Q5 (a) Explain Partial order planning with example. [10]

(b) Describe each component in the architecture of Expert System? What are the limitations of Expert System? [10]

Q6 Answer any **two (2)** of the following [20]

(a) Construct the decision tree from the following set of training data. Classify the new record: outlook=rain, temp =70, humidity=65, windy=true.

Tid	Refund	Marital Status	Taxable Income	Cheat
1	Yes	Single	>100	No
2	No	Married	80-100	No
3	No	Single	<80	No
4	Yes	Married	>100	No
5	No	Divorced	80-100	Yes
6	No	Married	<80	No
7	Yes	Divorced	>100	No
8	No	Single	80-100	Yes
9	No	Married	<80	No
10	No	Single	80-100	Yes

(b) What are steps involved in natural language processing (NLP) of an English sentence? Explain with an example sentence.

(c) Write a short note on local search algorithms.

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