Reg. No.

B.E / B.TECH. DEGREE EXAMINATION, MAY 2023
Sixth Semester
CS18601 ARTIFICIAL INTELLIGENCE
(Computer Science and Engineering)
(Regulation 2018)

TIME: 3 HOURS   MAX. MARKS: 100

CO 1   The student should be made to study the basic concepts of Artificial Intelligence and Production Systems
CO 2   The student should be made to learn about knowledge representation and inferencing for various logic
CO 3   The student should be made to know about Game Playing concepts for toy problems
CO 4   The student should be made to introduce the concepts of Learning
CO 5   The student should be made to learn about various Expert Systems

PART- A (10 x 2 = 20 Marks)
(Answer all Questions)

		CO	RBT LEVEL
1.	Why do you need Turing test?	1	2
2.	Formulate a good state space representation for 4 Queen problem.	1	2
3.	Formulate predicate logic statement for **"All cats like fish, cats eat everything they like, and Tom is a cat".**	2	4
4.	Construct a semantic network representation for the proposition **"Mary gave the green flowered vase to her favorite cousin"**.	2	4
5.	Mention the reasons for game playing to be listed as a good domain in Artificial Intelligence.	3	4
6.	Outline the importance of STRIPS operator in block world problem.	3	2
7.	How does learning take place in artificial neural networks?	4	4
8.	Explain Rote Learning.	4	2
9.	Illustrate the role of expert system shell.	5	3
10.	What is meta-knowledge? How it is represented in rule-based expert systems?	5	3

PART- B (5 x 14 = 70 Marks)

		Marks	CO	RBT LEVEL
11. (a)	Formulate state space representation along with **search tree and graph** for the Water jug problem given below using necessary Production rules.	(14)	1	4

Problem: You are given two jugs, a 5-gallon one and a 3-gallon one. Neither has any measuring mark on it. There is a pump that can be used to
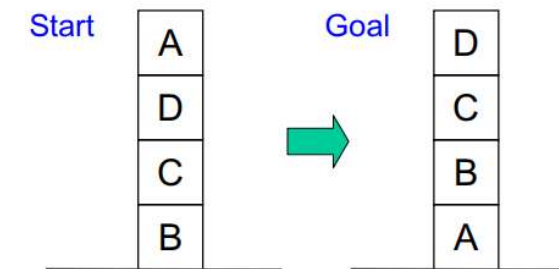
fill the jugs with water. How can you get exactly 2 gallons of water into the 3-gallon jug.
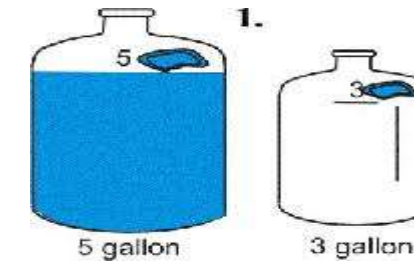
Water Jug Problem
(OR)

(b)	(i)	Investigate **Hill Climbing algorithm** for the given block world problem (7)	(14)	1	4

Block World Problem

(ii)   Devise the constraint satisfaction procedure solving the following Cryptarithmetic puzzle   (7)

```
      T W O
    + T W O
    -----------
    F O U R
    -----------
```

12. (a)	(i)	Assume the following facts:	(14)	2	4

- Marcus was a man
- Marcus was a Roman
- All men are people
- Caesar was a ruler
- All Romans were either loyal to Caesar or hated him
- Everyone is loyal to someone
- People only try to assassinate rulers they are not loyal to
- Marcus tried to assassinate Caesar.

Prove that **"Marcus hated Caesar"** using Resolution   (7)

(ii)   Illustrate **Dempster-Shafer** for the diagnosis problem θ = {Allergy, Flu, Cold, Pneumonia} where m_1 corresponds to the belief after observing fever {Flu, Cold, Pneumonia} is 0.6, m_2 corresponds to the belief after observing a running nose {Allergy, Flu, Cold) is 0.8, Compute m_3.   (7)

(OR)

(b) **(i)** Construct a semantic network for the following propositions using **Inheritance** inference mechanism **(14)** **2** **4**

Birds fly. Birds are covered by feathers. Bird is an animal. Fish is an animal. Animal is covered by skin. Fishes swim. Ostrich is a bird. Ostrich walks. Penguin is a bird. Penguin walks. Opus is a penguin. Penguin is brown is colour. Tweety is a canary. Tweety is coloured white. Canary sings sound. Canary is yellow in colour. Robin is a bird. Robin sings sound. Robin is red in colour. **(7)**

(ii) Apply backward chaining for the Knowledge Base given below:
- If [X croaks and eats flies] Then [X is a frog]
- If [X chirps and sings] Then [X is a canary]
- If [X is a frog] Then [X is colored green]
- If [X is a canary] Then [X is colored yellow]
- [Fritz croaks and eats flies]

Goal: Finding the color of Fritz. [Fritz is colored Y]? **(7)**

13. (a) **(i)** Apply Alpha beta pruning algorithm to find the optimal move for the given game tree. **(14)** **3** **3**
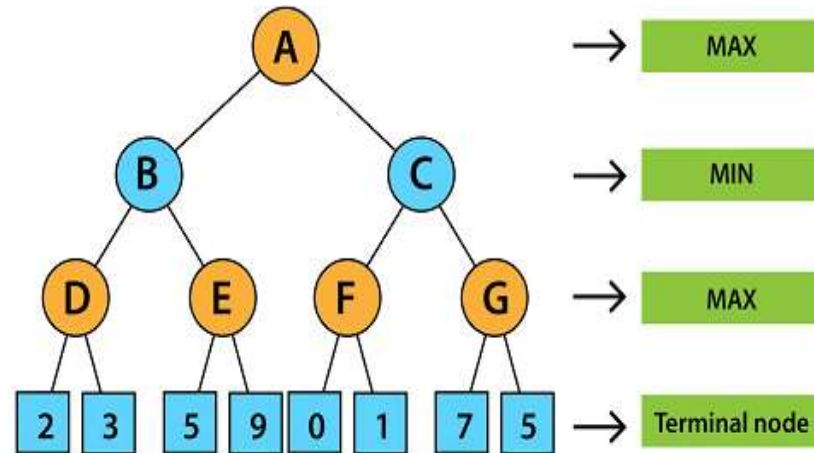
(OR)

(b) **(i)** Show how goal stack planning using STRIPS would solve the given block world problem. **(14)** **3** **3**

14. (a) Examine candidate elimination algorithm for learning the concept of "Japanese Economy Car". **(14)** **4** **4**

(OR)

(b) Examine how does Winston's learning program play a major role in Blocks World Learning. **(14)** **4** **4**

15. (a) Explain, with neat diagram, the architectural concepts of an expert system along with knowledge acquisition mechanism, advantages and disadvantages. **(14)** **5** **2**

(OR)

(b) Explain the architectural concepts of an expert system which was mainly used to diagnose and recommend treatment for certain blood infections. Discuss about its knowledge acquisition mechanism. **(14)** **5** **2**

PART- C (1 x 10 = 10 Marks)
(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	**Determine the most suitable knowledge representation mechanism for the following paragraph**	**(10)**	**3**	**5**

Jane was extremely hungry. She thought about going to her favorite restaurant for dinner, but it was the day before payday. So instead she decided to go home and pop a frozen pizza in the oven. On the way, though, she ran into her friend, Judy. Judy invited Jane to go out to dinner with her and Jane instantly agreed. When they got to their favorite place, they found a good table and relaxed over their meal.

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