



VIT
Vellore Institute of Technology

Final Assessment Test – November 2025

Course: BITE308L - Artificial Intelligence

Class NBR(s): 3106/3110/3113

Time: Three Hours

Slot: D2+TD2

Max. Marks: 100

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

COs	CO Statements
CO1	Elucidate various Artificial Intelligence techniques and their areas of applications.
CO2	Solve various real-world problems using Artificial Intelligence techniques.
CO3	Apply different knowledge representations and reasoning techniques.
CO4	Exercise probabilistic reasoning to solve problems with uncertain knowledge.
CO5	Practice various planning and learning methods in solving real-world problems.

BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

Answer ALL Questions

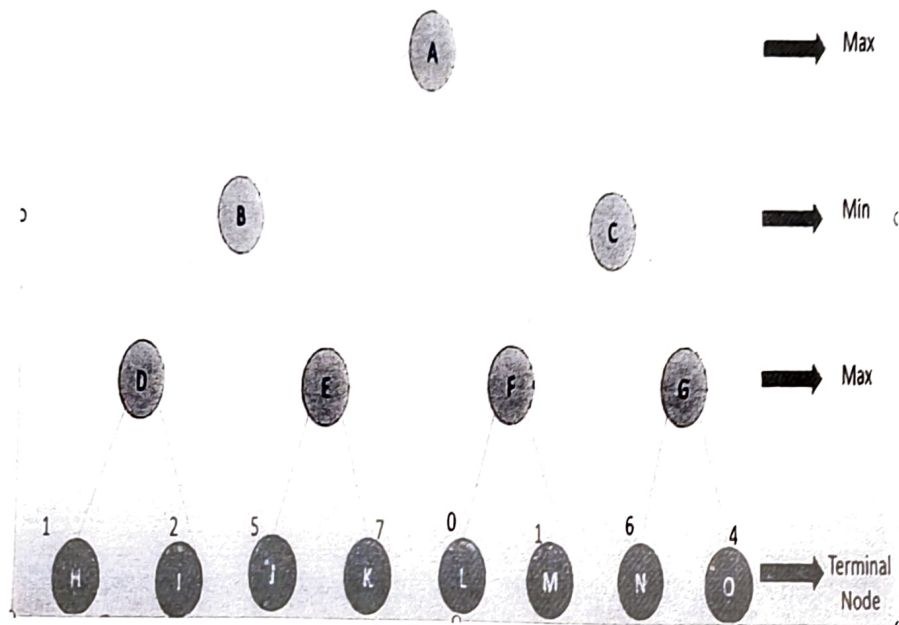
(10 X 10 = 100 Marks)

1. For the following scenario: CO1 BL3
- a) A self-driving car navigates traffic by observing its surroundings through sensors (e.g., LiDAR, cameras) and deciding when to accelerate, brake, or turn.
- b) An online delivery drone that must deliver a package on time.
- Identify the most suitable agent type, and explain with a brief architecture diagram.
- 2.(a) For each of the following activities, give a PEAS description of the task environment CO1 BL2
- i) Hospital management system,
 - ii) Automated car drive,
 - iii) Subject tutoring, and
 - iv) Satellite image analysis system.
- OR
- 2.(b) Explain the following environment with example. CO1 BL2
- i) Fully Observable vs Partially Observable
 - ii) Deterministic vs Stochastic
 - iii) Single-agent vs Multi-agent
 - iv) Static vs Dynamic
 - v) Discrete vs Continuous

3.

For the following search tree, apply minmax and the alpha-beta pruning algorithms to it. Make sure that you show where the alpha and beta cuts are applied, and which parts of the search tree are pruned as a result. Make sure that you show where the alpha and beta cuts are applied, and which parts of the search tree are pruned as a result.

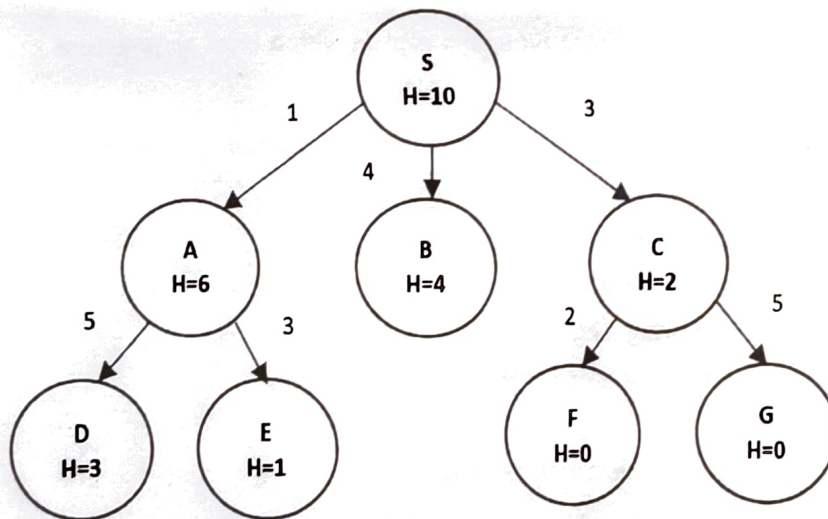
CO2 BL3



4.

Consider the directed graph below.

CO2 BL3



Where 'S' is the start node, and 'G' is the goal node.

Which sequences of paths are explored by the following algorithms to this problem? Show the complete intermediate state space.

- a) Breadth-first algorithm
- b) Depth-first search
- c) Best-First search
- d) A* graph search

5. Create a rule-based representation system for the given problem statement.

CO3 BL3

In modern households, energy efficiency and user comfort are key priorities. A Smart Home Automation System can automatically control home appliances — such as lights, fans, heaters, and security alarms — using rule-based artificial intelligence.

The goal is to design a rule-based system that takes input from sensors (like motion, temperature, light, and door sensors) and makes intelligent decisions to ensure safety, comfort, and energy saving without manual intervention.

These are the inputs collected from sensors and user settings:

Parameter	Possible Values	Description
Time	day / night	Current time period
Motion	yes / no	Whether motion is detected
Temperature	low / normal / high	Room temperature from thermostat sensor
Door	open / closed	Door status
User Present	yes / no	Whether user is at home
Light Level	bright / dim	Light intensity measured by sensor

- 6.(a) For the given scenarios, get a meaningful conclusion using the propositional logic:

CO3 BL3

- i) A building has smoke detectors and sprinklers. You have these observations / rules:

1. If there is a fire, the smoke alarm rings.
2. If the smoke alarm rings, sprinklers turn on.
3. If sprinklers turn on, the floor is wet.
4. The floor is not wet.
5. Either there is a fire or someone tested the alarm.

ii) A suspect could have been at café or at home. You have these observations / rules:

1. If suspect was at café, CCTV shows them.
2. If suspect was at home, phone GPS pins them at home.
3. CCTV does not show them.
4. Either the suspect was at café or at home.
5. If they were at café, a witness would have seen them.

OR

6.(b) For the following statements:

CO3 BL3

- i) Every doctor is educated.
- ii) Some doctors are not rich.
- iii) Whoever is educated and not rich is helpful.
- iv) Ram is a doctor.

Prove by resolution: "Ram is helpful."

7.

In a factory that produces bolts, three machines—A, B, and C—are responsible for manufacturing 25%, 35%, and 40% of the total bolts, respectively. The defect rates of these machines differ: machine A produces 5% defective bolts, machine B produces 4% defective bolts, and machine C produces 2% defective bolts. A bolt is randomly selected from the overall production, and it is found to be defective. What is the probability/likelihood that this defective bolt was produced by machine B?

CO4 BL3

8.

Explain the following types of planning in detail with an example.

CO5 BL2

- i) Classical
- ii) Hierarchical
- iii) Temporal
- iv) Forward State Space
- v) Backward State Space

9.

Let 'X' be weeks and 'Y' be the sales data (in lakhs) are given in the table. Find the linear regression equation for the given data and apply linear regression technique to predict the 8th and 10th week sales. Also, draw a regression line for the given data.

CO5 BL3

x	y
4	6
7	5
3	8
1	3

10. The following student result database consists of 3 input attributes: "Attendance", "Study_Hours", "Extra_Help", and one output attribute: "Result". The "Attendance" attribute has two values: High and Low. Similarly, the "Study_Hours" attribute has two values: Low and High. "Extra_Help" attribute has two values: Yes and No. The decision attribute "Result" has two values: Pass and Fail. Construct a decision tree using the entropy measure.

Attendance	Study_Hours	Extra_Help	Result
High	Low	Yes	Pass
High	High	No	Pass
Low	Low	No	Fail
High	High	Yes	Pass
Low	Low	Yes	Fail
High	High	Yes	Pass
Low	High	No	Pass
Low	Low	No	Fail
High	Low	Yes	Pass
Low	High	No	Fail

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