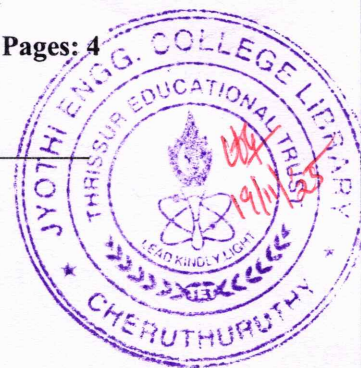


Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S3 (R) Examination November 2025 (2024 Scheme)



Course Code: PCAIT302

Course Name: FOUNDATIONS OF ARTIFICIAL INTELLIGENCE

Max. Marks: 60

Duration: 2 hours 30 minutes

PART A

(Answer all questions. Each question carries 3 marks)

		CO	Mark s
1	What is the cognitive modelling approach in Artificial Intelligence?	CO1	(3)
2	What does it mean for an agent to be rational in Artificial Intelligence, and how is rationality defined in terms of an agent's performance measure and environment?	CO1	(3)
3	What is a heuristic function? Explain its purpose and describe how it helps in guiding the search process in Artificial Intelligence.	CO2	(3)
4	What are the four components of a data structure to keep track of the search tree that is being constructed?	CO2	(3)
5	What is the minimax value of a node, and how is the minimax value function defined?	CO3	(3)
6	Formulate map colouring problem as a Constraint Satisfaction Problem.	CO3	(3)
7	Give the PEAS description of the "Wumpus world"	CO4	(3)
8	Represent the given sentences using First Order Logic. a) John teaches at least one person b) Every prime number greater than 2 is odd c) There exists a person who loves everyone	CO4	(3)

PART B

(Answer any one full question from each module, each question carries 9 marks)

Module -1

9	a) Explain the interaction of Agent with Environment using a neat figure.	CO1	4
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- b) Write the Agent Function and Agent Program for a vacuum cleaner world CO1 5
with just two locations. Add the necessary figure.
- 10 a) Define Artificial Intelligence. Explain the four approaches to AI. CO1 5
- b) Specify the task environment for the following. CO1 4
- a) Taxi Driver
- b) Medical Diagnosis System

Module -2

- 11 a) Illustrate the components of a well-defined problem in AI using the example of an agent travelling from Arad to Bucharest? CO2 5

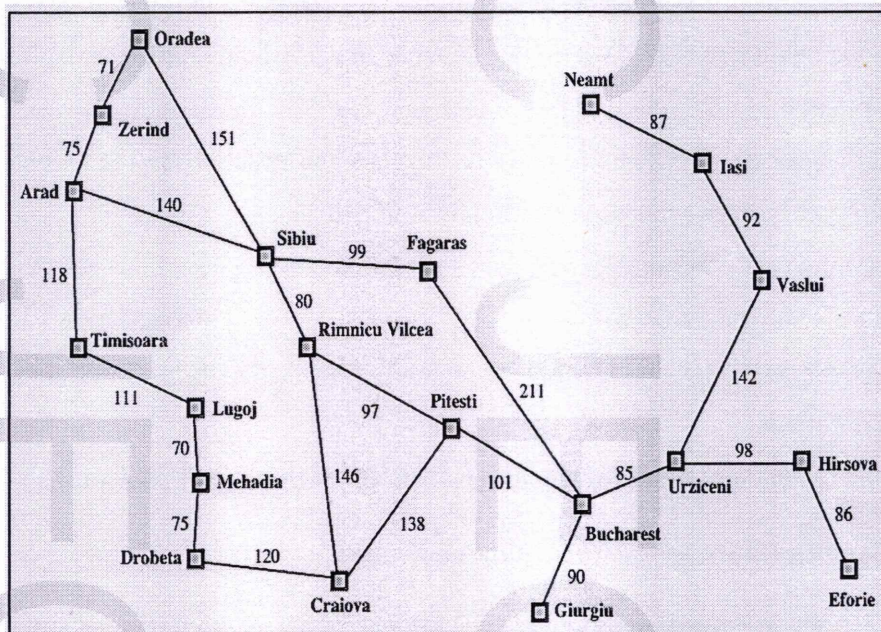
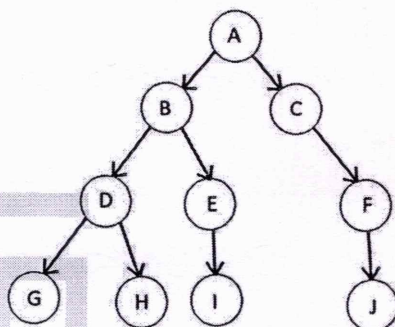
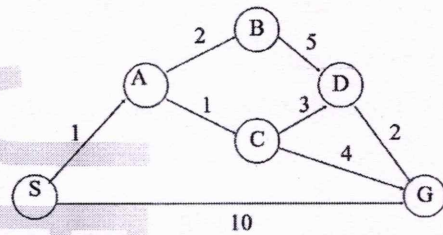


fig: A simplified road map of part of Romania.

- b) Illustrate Depth Limited search algorithm using the given figure and trace out the nodes explored. Take depth limit as 2. CO2 4



- 12 a) Apply A* algorithm to the given graph assuming S as start node. Heuristics are given on the table. CO2 5



S	A	B	C	D	G
5	3	4	2	6	0

- b) Differentiate between Informed Search and Uninformed Search strategies in Artificial Intelligence. Give examples for both and discuss the conditions for their optimality. CO2 4

Module -3

- 13 a) Explain the concept of Local Consistency in Constraint Satisfaction Problems (CSP). Discuss the different types of local consistencies and describe how enforcing them helps in pruning the search space during constraint propagation. CO3 5

- b) Solve the given crypt arithmetic problem using Constraint Satisfaction Problems (CSP) procedure. CO3 4

$$\begin{array}{r}
 \text{ T W O} \\
 + \text{ T W O} \\
 \hline
 \text{ F O U R}
 \end{array}$$

- 14 a) Explain the working of Minimax Search with an example. CO3 4
- b) What is the need for Alpha-Beta Pruning in Artificial Intelligence? How does it help in reducing the search space? Explain using algorithm. CO3 5

Module -4

- 15 a) The law states that it is a crime for an American to sell weapons to hostile nations. The country Nono is an enemy of America and possesses some missiles. All of Nono's missiles were sold to it by Colonel West, who is an American. An enemy of America is considered hostile. CO4 5
- Using the above information and applying Forward Chaining, prove that Colonel West is a criminal.
- b) Explain the syntax and semantics of First-Order Logic (FOL). Illustrate your answer with suitable example. CO4 4
- 16 a) Represent the given statements in CNF Form CO4 5
1. All men are people.
 2. Caesar was a ruler.
 3. All Romans were either loyal to Caesar or hated him.
 4. Everyone is loyal to someone.
 5. People only try to assassinate rulers they are not loyal to.
- b) Explain Unification with example. CO4 4