Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Make Up Examinations – December 2025

Date: 26 – 12- 2025 **Time:** 1.00pm to 04.00pm

School: SOCSE	**Program:** B Tech	
Course Code: CSE3208	**Course Name**: Artificial Intelligence in Practice	
Semester: MK	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**
Marks	**26**	**26**	**24**	**24**

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

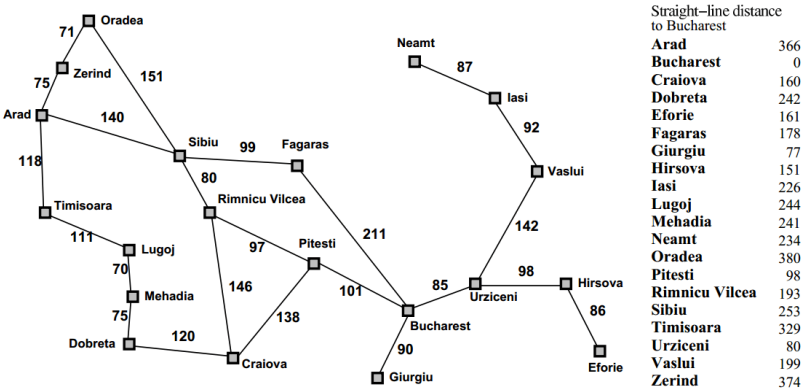
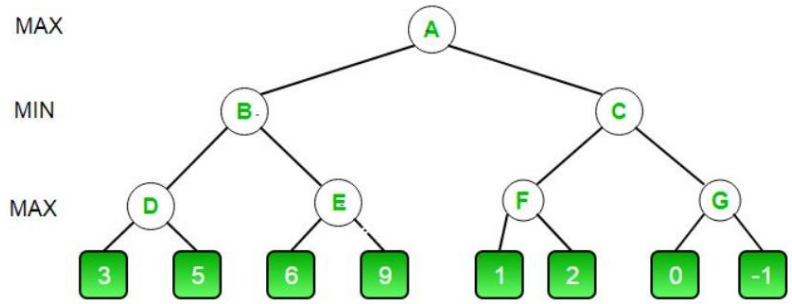
Part A

Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1.	Define an admissible heuristic .	**2 Marks**	**L2**	**CO1**
2.	Distinguish between A* and Uniform Cost Search	**2 Marks**	**L2**	**CO1**
3.	Distinguish between BFS and DFS	**2 Marks**	**L2**	**CO1**
4.	Define WFF.	**2 Marks**	**L2**	**CO2**
5.	Write the truth table for implication (P → Q)	**2 Marks**	**L2**	**CO2**
6.	Convert the sentence ¬(P ^ Q) to an equivalent expression using De Morgan's law.	**2 Marks**	**L2**	**CO2**
7.	Define MRV (Minimum Remaining Values) heuristic	**2 Marks**	**L2**	**CO3**
8.	State Bayes' theorem	**2 Marks**	**L2**	**CO3**
9.	What does the Viterbi algorithm compute?	**2 Marks**	**L2**	**CO4**
10.	Define Part-of-Speech (POS) tagging.	**2 Marks**	**L2**	**CO4**

Part B

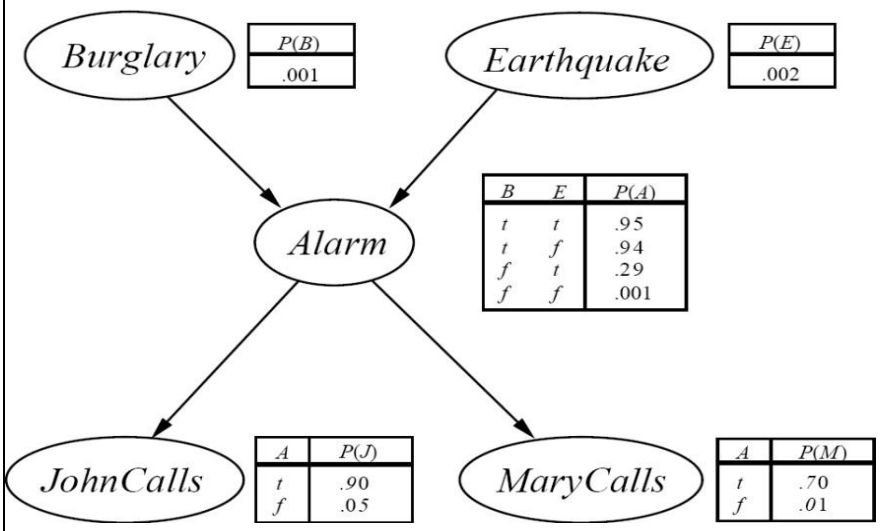
Answer the Questions. **Total Marks 80M**

11.	**a.**	Apply A* algorithm, find the path and total cost to travel from Arad to Bucharest in the Romania map. **Romania with step costs in km**  Straight-line distance to Bucharest Arad 366 Bucharest 0 Craiova 160 Dobreta 242 Eforie 161 Fagaras 178 Giurgiu 77 Hirsova 151 Iasi 226 Lugoj 244 Mehadia 241 Neamt 234 Oradea 380 Pitesti 98 Rimnicu Vilcea 193 Sibiu 253 Timisoara 329 Urziceni 80 Vaslui 199 Zerind 374	**10 Marks**	**L2**	**CO1**
	b.	Explain the Depth-First Search (DFS) algorithm and Perform DFS traversal starting from node A, showing the order of node visits and the stack content at each step. **A** **/ ** **B C** **| |** **D E** **\ /** **F**	**10 Marks**	**L3**	**CO1**
		Or			
12.	**a.**	Explain A* search algorithm and demonstrate it on a small graph with given g(n)and h(n)) values to find the optimal path.	**10 Marks**	**L3**	**CO1**
	b.	 Apply Alpha-Beta Pruning on the given game tree and find **the** optimal value of the root node, showing pruned branches.	**10 Marks**	**L3**	**CO1**

13.	**a.**	**Use the resolution method in propositional logic to prove the conclusion:** **"We will get a holiday"** **from the following statements:** **1. If it rains or if it is a festival, then we will get a holiday.** **2. If we get a holiday, we will go for a picnic.** **3. It is a festival today.** **4. If we go for a picnic, we will be happy.**	**10 Marks**	**L3**	**CO2**
	b.	**Explain any four rules of inference used in propositional logic with examples**	**10 Marks**	**L3**	**CO2**
		Or			
14.	**a.**	**Explain the following terms and Construct the truth table for the given compound proposition and determine whether it is a tautology.** **i. Tautology** **ii. Contradiction** **iii. Logical Equivalence** **iv. Satisfiability** $(P \wedge Q) \vee (\neg P \wedge \neg Q)$	**10 Marks**	**L3**	**CO2**
	b.	**Prove by resolution that Ravi likes peanuts from the facts:** **- Ravi likes all food.** **- Apples and chicken are food.** **- Anything anyone eats and is not killed is food.** **- Ajay eats peanuts and is still alive.** **- Rita eats everything that Ajay eats.** **- Everything which is not killed is alive.**	**10 Marks**	**L2**	**CO2**

15.	**a.**	**Solve the N queens problem with N = 5. Your answer must contain the final allotment of the row numbers for each of the 5 queens. You must also draw a diagram (5x5 board) of the same.**	**10 Marks**	**L3**	**CO3**
	b.	**Consider the following situation, where we have a set of 5 variables , such that the domains are:** • $D(X_1) = \{91, 92, 93, 94, 95\}$ • $D(X_2) = \{93, 94, 95, 96, 97\}$ • $D(X_3) = \{95, 96, 97, 98, 99\}$ • $D(X_4) = \{97, 98, 99\}$ • $D(X_5) = \{99\}$	**10 Marks**	**L3**	**CO3**

		And the constraints are: • $X_1 < X_2$, • $X_2 < X_3$, • $X_3 < X_4$, and • $X_4 < X_5$ **and Draw the constraint graph. Is the network arc-consistent? If not, remove values in the domain to make it arc-consistent.**			
		Or			
16.	**a.**	**Explain Arc Consistency in a CSP with graph constraints with an example.**	**10 Marks**	**L2**	**CO3**
	b.	**Explain the concept constraint satisfaction procedure to solve the cryptarithmetic problem.**	**10 Marks**	**L2**	**CO3**

17.	**a.**	**1. Consider the Bayesian Network shown here:**  **Calculate the probability that a burglary has taken place, given that you DO NOT get a call from either John or Mary, that your Alarm is ringing**	**10 Marks**	**L3**	**CO3**
	b.	**Using the Hidden Markov Model (HMM) approach to sequence labeling, assign appropriate Named Entity Recognition (NER) tags to the following sentence:**	10 Marks	**L3**	**CO4**

		"Google appointed Sundar Pichai as CEO in California, USA."			
		Or			
18.	**a.**	**States = {H, F}** **Observations = {c, d, n}** **Initial Probabilities: H = 0.6, F = 0.4** **Using the Viterbi algorithm, determine the most likely sequence of hidden states (H or F) corresponding to these observations.**	**10 Marks**	**L3**	**CO4**
	b.	**Consider the following definitions for a deck of cards. A deck of cards has 52 cards which are split into 4 suits - called Spades (S), Diamonds (D), Clubs (C) and Hearts (H). Each suit has 13 cards which are divided as follows - 9 number cards (from 2 to 10) and 4 letter cards (the ace (A), king (K), queen (Q) and jack (J)). The letter cards are further classified into face cards (king, queen, jack) and the ace. With these definitions, calculate the probabilities (NOTE: you can leave the numbers as fractions) of the following events.** **1. You select the Queen of Spades from a deck of cards** **2. You select either a Queen OR a Spade from a deck of cards** **3. You select first a queen AND THEN a spade from a deck of cards (with replacing the first card back in the deck).** **4. You select an Ace of Spades , given that you have drawn an Ace from the deck of cards.** **5. You draw an Ace of Spades, given that you have drawn a Face card from the deck of cards.**	**10 Marks**	**L3**	**CO4**

Transition	Healthy	Fever
Healthy	0.7	0.3
Fever	0.4	0.6

Emissions	Healthy	Fever
Normal	0.5	0.1
Cold	0.4	0.3
Dizzy	0.1	0.6