

Continuous Assessment Test (CAT-2) - OCTOBER 2024

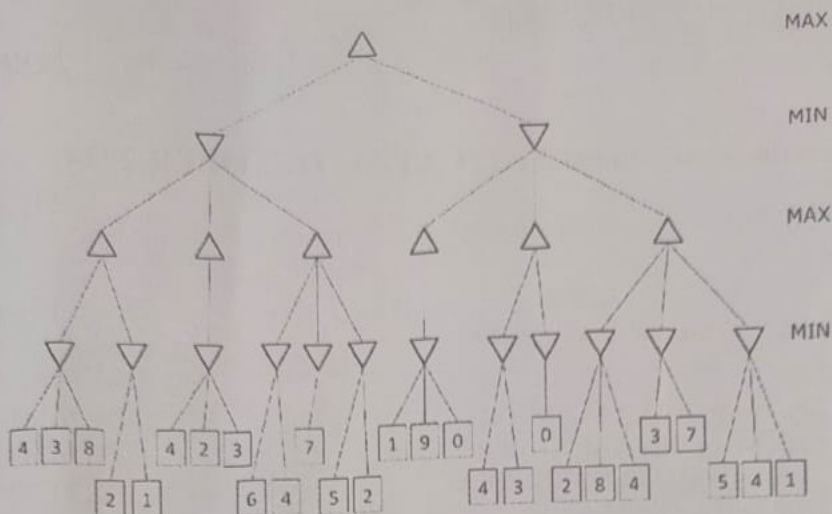
Programme	:	B.Tech (CSE with Specialization)	Semester	:	FALL 2024-25
Course Code & Course Title	:	BCSE306L Artificial Intelligence	Slot	:	C2+TC2
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Duration	:	1 ½ hours	Max. Mark	:	50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.

Answer all questions

Q. No	Sub Sec.	Description	Marks
1		Game tree for a two-player Connect-4 game is given below. Assuming root to be the max node, find out the possible branches that can be cut down to achieve minimum loss for worst-case scenarios in this game.	10



(i) Consider the following set of sentences:

1. If it rains, the ground will be wet and marshy.
2. If the ground is wet, the match will be postponed or cancelled.
3. The players will be unhappy if the match is postponed.
4. If the ground is marshy, the ball might get slippery and greasy.
5. The players will be upset if the match is cancelled.
6. The players are not unhappy and not upset.
7. It is raining.

(a) Convert these sentences into propositional logic statements. (5 marks)

(b) Convert those propositional logic statements into Conjunctive Normal Form (CNF). (5 marks)

(ii) Consider the following set of premises:

1. If she gets up early in the morning, she will have breakfast in the hostel mess.
2. She has breakfast in the hostel mess.
3. If she does not sleep till 9am, she will do yoga before her breakfast.
4. If she sleeps till 9 am, she will not have breakfast in the hostel mess.
5. If she does yoga before her breakfast, she will feel fresh throughout the day.

Deduce the following: (5 marks)

- (a) Can we conclude that she does not sleep till 9am? If yes, name the inference rule used for this conclusion, with its explanation.
- (b) Considering one more premise - "She will not have breakfast in the hostel mess or she will not feel fresh throughout the day", what conclusion do you make and name the inference rule used for this conclusion, along with its explanation.

3	<p>Consider these set of sentences:</p> <ol style="list-style-type: none"> 1. Devasena is the mother of Bahubali. 2. Everyone who has a child is a parent. 3. Someone is the mother of a child. 4. The mother of Bahubali is a parent. 5. Sivagami is the mother of Bhallaldeva. <p>(i) Convert them into FOL logic. (3 marks)</p> <p>(ii) Explain one case each, where unification succeeds, as well as, unification fails, for this example. (5 marks)</p> <p>(iii) List out any two conditions for unification to be enabled in FOL. (2 marks)</p>	10
4	<p>i) Build a Bayesian Network modelling the diagnosis of a car's electrical system. The system has a battery powered video display system, light system and ignition. Car's engine will be started through either ignition or fuel system. Fuel system also controls air conditioning inside the car. If the engine starts the car will move. (5 marks)</p> <p>ii) Formulate Conditional Probability Table (CPT) for the above built network and explain all possible options in each CPT (5 Marks)</p> <p>iii) Calculate the probability of "car moves" when engine starts with ignition and without fuel system, video display off and lights on through battery. Assume the conditional probability table for each node (5 marks).</p>	15