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Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

Continous Assessment Test II – October 2023

Programme	:	B.Tech Computer Science and Engineering	Semester	:	Fall Semester 2023 - 24
Course Title	:	Artificial Intelligence	Code	:	CSE3013
			Class Nbr(s)	:	CH2023240100212
Faculty (s)	:	Dr.T.Benil	Slot	:	C2 +TC2
Time	:	9 AM to 10.30 AM	Max. Marks	:	50 marks

Answer all the Questions

1. A detective has interviewed witnesses to a crime: John, Jane, Suresh and Ramesh. From their stories, the detective concluded that: (15)

   - If John is telling the truth, then so is Jane.
   - Jane and Suresh cannot both be telling the truth.
   - Suresh and Ramesh are not both lying
   - If Ramesh is telling the truth, then Jane is lying.

   For each of the four witnesses, can the detective determine whether that person is telling the truth or lying by applying proof by contradiction?

2. a) Convert the following sentences into Sentential Logic (10)

   i) If the front door is opened and the alarm is armed, then trigger the alarm.(1 mark)

   ii) If any window is opened, trigger the alarm (1 mark)

   iii) The alarm is armed if and only if both motion sensors are activated (1 mark)

   iv) If the alarm is triggered, notify the security company and send an alert to the homeowner (1 mark)

   v) If the motion sensor malfunctions, the alarm should not be armed (1 mark)

   b) Convert the following sentences into First Order Logic

   i) If the light is on and the room temperature is below 25 degrees Celsius, then increase the air conditioning (2 marks)

   ii) Every student is enrolled in at least one course (2 marks)

   iii) The sun is hot and the sky is blue. (1 mark)

3. You are programming a Wumpus World agent that explores 4x4 cave system to find gold while avoiding dangers like pits and the Wumpus. You have a set of propositional variables to represent the state of the world, including pits, gold, stenches, breezes, and the Wumpus's location. Assume a current state of the cave system with its propositional variables, describe the sequence of logical inferences and actions your Wumpus World agent would take to decide whether it's safe to move to a neighbouring cell or not. 10

4. Suppose you have a medical diagnostic system that uses a Bayesian Belief network to assess the probability of a patient having a certain disease based on symptoms. The network has four variables: "Disease" (D) and "Symptoms" (S) Genetic Predisposition (G) and Environmental Factors (E). The conditional probabilities are as follows:

    1. Assume the needed values (2 marks)
    2. Given that the patient is showing symptoms (S = true), has a genetic predisposition (G = true), and has been exposed to environmental factors (E = true), what is the conditional probability that the patient has the disease (D = true)? Calculate this conditional probability (4 marks) 15
    3. What is the joint probability of the patient having the disease, showing symptoms, having a genetic predisposition, and being exposed to environmental factors simultaneously? Calculate this probability based on the conditional probabilities.(4 marks)
    4. Find (D=T) (5 marks)

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