VIT

Vellore Institute of Technology
CHENNAI

Continuous Assessment Test (CAT) – II - OCTOBER 2024

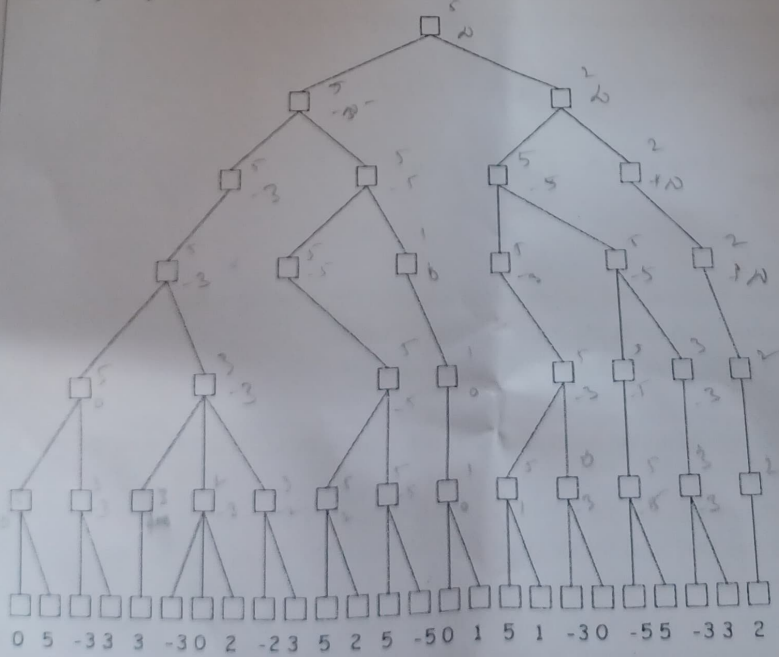
Programme	:	B.Tech	Semester	:	FALL 2024-25
Course Code & Course Title	:	BCSE306L Artificial Intelligence	Class Number	:	E2+TE2
Faculty	:	Dr. B Radhika Selvamani Dr. Tahir Mujtaba Dr. Modigari Narendra Dr. Bhavadharini Dr.Sharmila Dr. Madura Meenakshi Dr.Krithiga	Class Number	:	CH2024250101164 CH2024250101176 CH2024250101166 CH2024250101168 CH2024250101171 CH2024250101174 CH2024250101178
Duration	:	1 ½ hours	Max. Mark		50

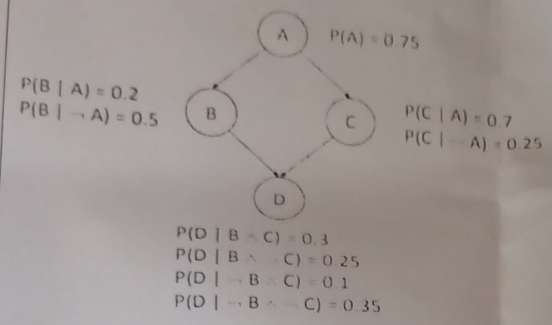
General Instructions:

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

Answer all questions

Q. No	Description	Mark
1.	Three different procedures (p, q, r) are given to two students (Aditya & Binaya). The students are left free to apply any of combine, reverse and concatenate operations over the procedures to arrive at a required solution. Test whether the following solutions submitted by students are equivalent or not. Student Aditya: $\neg(\neg p \vee q) \vee \neg(\neg q \vee r)) \vee \neg p \vee r$ Student Binaya: $(\neg p \vee (p \wedge \neg q)) \vee (r \vee (q \wedge \neg r)))$ Note: • combine – logical and, concatenate – logical OR, reverse – Negation • Operations can be applied any number of times. • Ensure exhaustive testing.	4
	The given statements have been used to describe a modified version of the hare and tortoise story. a. If a tortoise is slow and steady it will win the race. b. If a hare is fast and lethargic it will not win the race. c. If a tortoise is not pessimistic it will participate in the race. d. If a tortoise does not participate in the race, it will not win the race. e. If a hare thinks tortoise is slow it becomes lethargic. f. If a hare has a friend tortoise, then he will not think tortoise is slow.	

		g. If a tortoise has a friend hare the tortoise will become pessimistic. h. If a hare has a friend tortoise, then the tortoise has a friend hare. i. A tortoise is slow and steady. j. A hare has a friend tortoise.	
	a)	Represent the given statements in propositional logic. Check the consistency of the given Knowledge Base of Propositions.	6
	b)	Can you prove that the tortoise will win the race using the above propositions? If so, justify. Else, delete the appropriate proposition to make the KB consistent, so that you can prove that both the tortoise and hare can win the race.	6
3.		Consider the below statements about a social media platform. a. Every boy who has an online profile sends a friend request to all girls. b. No smart girl accepts the friend request sent from a boy who has a fake profile. c. Any boy who claims to live in moon has a fake profile. d. Any girl who claims to have a rocket is smart. e. A boy who has sent friend request to a girl feels dejected if it gets rejected.	
	a)	Represent the statements in FOL and convert to Conjunctive Normal Form.	6
	b)	Prove that "All boys who claim to live in moon feel dejected when any girl claims to have a rocket".	6
4.		Mr. X represents the entire flow of a game he played with his son in a tree model as in Figure 1. Apply alpha-beta approach to identify the best possible path to reach success. Record each step of traversal. Justify why pruning, if any is done at every step  Figure 1: Heuristic info about the game	10

5.		The event of cyclone occurring above Bay of Bengal may cause cloudy sky and turbulent wind in the city. The government may declare a holiday if the sky is found cloudy and the wind are turbulent.  	
	a)	Map the above scenario to the variables A, B, C and D in the given Bayesian Network. A, B, C, and D are Boolean random variables. If we know that the government has announced holiday, what is the probability of Cyclone having formed above the Bay of Bengal being true?	5
	b)	Assume that the government has identified 5 additional factors which cause the Cyclone formation namely the average temperature above the sea, the humidity, the season, the presence of depression above the Indian ocean, the presence of pollutants in the atmosphere and the ozone depletion. Draw the new Bayesian Network considering the above factors.	2
	c)	Assume that the presence of pollutants in the atmosphere is a rare event with a prior of 0.02 and the priors of the other newly added factors are above 0.5. Identify a suitable approximate inference method which is applicable in the above scenario and illustrate the same with a suitable query of your own.	5
		Total	50

******* All the Best *******