VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD
B.E. (C.S.E: CBCS) VI-Semester Main Examinations, January-2021
Artificial Intelligence

Time: **2** hours

Max. Marks: **60**

Note: Answer any NINE questions from Part-A and any THREE from Part-B

Part-A (9 × 2 = 18 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Are human beings rational agents? Why? Justify in one sentence	2	3	1	2
2.	Write the Characteristics of the environment for the taxi driving task.	2	1	1	2
3.	What do you mean by 'adversarial search'? Give an example.	2	1	2	2
4.	Give an example for 'modus ponens'.	2	2	2	2
5.	Represent the following sentence into FOPL form A set is a subset of another set if and only if all the first set members are members of the second set. An object is in the intersection of 2 sets if and only if it is a member of both sets.	2	3	3	2
6.	What is 'unification'? Give example	2	1	3	2
7.	Find the solution for the cryptarithmatic problem TWO + TWO=FOUR	2	3	4	2
8.	Write the PDDL (Planning Domain Definition Language) description for the simple spare Tire problem.	2	2	4	2
9.	Conditional probability is defined as the likelihood that an event will occur, based on the occurrence of a previous outcome. State True or False. Write also the correct formulation for the conditional probability.	2	2	5	2
10.	State the Bayes' Rule and give example	2	3	5	2
11.	What are the properties of 'rationality', in the context of agents?	2	2	1	2
12.	Write the BNF (Backus –Naur form) grammar for the sentences in propositional logic.	2	2	2	1

Part-B (3 × 14 = 42 Marks)

13. a)	Apply the depth limited DFS for the following 8-puzzle problem upto level 5	08	3	1	2

Initial State

7	2	4
5		6
8	3	1

Goal State

	1	2
3	4	5
6	7	8

b)	Write a note on 'Problem solving agents' Give also an elaborative example	06	2	1	2
14. a)	Assume a Two player Tic-Tac-Toe game, where one of the payers is the human. Give some adversarial search strategies to be adopted by the rational agent to play against human.	10	2	2	2
b)	Classify the following as the statements of propositional logic or not. The reactor is on; What is the value of 2+3? The wing-flaps are up; John Major is prime minister; Are you going out somewhere?; Sun rises in the east.	04	3	2	2
15. a)	1. 'None of my friends is perfect'. 2. 'Some real numbers are rational' Represent the above statements in the first order logic. Assume necessary predicates and propositions properly if necessary	10	3	3	2
b)	Differentiate forward and backward chaining with a simple example	04	1	3	2
16. a)	SUDOKU is the game of writing numbers in the grid chart of size 9 X 9. This bigger grid chart is divided into 9 sub grids of size 3 X 3. The task is to write numbers 1,2,3,4,5,6,7,8,9 into these 81 cells of the grid chart such that, No repeated number should appear in either a row, or a column, or a sub grid. Express his problem as the CSP (Constraint Satisfaction Problem) using common representation. Assume necessary details	10	3	4	2
b)	Explain the Heuristics used in planning.	04	2	4	2

17. a)		Toothache		¬Toothache		10	3	5	2
		Catch	¬Catch	Catch	¬Catch				
	Cavity	0.108	0.012	0.072	0.008				
	¬Cavity	0.016	0.064	0.144	0.576				

Given in the above table are the probabilities of all atomic events of a full joint distribution that specifies the scenario of appearance of a tooth ache and the presence of a cavity. Based on the table find out the following probabilities

1. Marginal probability of the presence of the cavity, P(cavity)
2. The conditional probability P(cavity | toothache)
3. The conditional probability P(¬cavity | ¬toothache)
4. The conditional probability P(cavity | ¬toothache)

b)	List out the exact and approximate inferences in Bayesian networks with proper real time examples.	04	2	5	2

Contd...3

			M	L	CO	PO
18.	a)	While formulating a well-defined problem, important components to be addressed are 'Initial state, Action, transition, Goal test and path costing'. Explain each one of them formally with respect to '8-puzzle problem'	10	2	1	2
	b)	Explain the game 'Wumpus world' with at least four rules	04	2	2	2
19.		Answer any *two* of the following:				
	a)	Explain each of the following with a simple example ○ Universal Generalization ○ Universal Instantiation ○ Existential Instantiation ○ Existential introduction	7	2	3	2
	b)	Explain how node consistency, Arc consistency and path consistency used in constrain propagation with example.	7	2	4	2
	c)	A bag B1 contains 4 white and 6 black balls while another Bag B2 contains 4 white and 3 black balls. One ball is drawn at random from one of the bags, and it is found to be black. Find the probability that it was drawn from Bag B1 (Hint: Use Bayes' Theorem).	7	2	5	2

M: Marks;   L: Bloom's Taxonomy Level;   CO: Course Outcome;   PO: Programme Outcome

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	60
2	Knowledge on application and analysis (Level-3 & 4)	40
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	

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