

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2021

Course: Decision Logic and Decision Making

Semester: V

Program: B. Tech./ECE

Duration: 03 hrs.

Course Code: ECEG3022

Max. Marks: 100

Instructions: Attempt all the questions

SECTION A **(5 X 4= 20 Marks)**

S. No.		Marks	CO
Q 1	(a) Which of the following are the sub-areas of Artificial Intelligence (i) Soft computing (ii) Natural language processing (iii) Game Playing (iv) All of these (b) Which heuristic algorithm solves the AND-OR problem. (i) Best first search (ii) Depth first search (iii) A* algorithm (iv) AO* algorithm (c) Which scientist first coined the term artificial intelligence? (i) Alan Turing (ii) Marie Curie (iii) John McCarthy (iv) None of these (d) Which company uses artificial intelligence to build MANI app to empower the visually impaired people. (i) Daffodil Software (ii) AWS (iii) IBM (iv) Microsoft	4 M	CO1
Q 2	(a) What are the limitations of the semantic networks? (i) Intractability (ii) Lack in expressing some of the properties (iii) Incomplete (iv) Has memory constraints (b) Convert into FOL form: UPES is an academic institution (i) academic institution (UPES) (ii) UPES (academic institution) (iii) UPES → academic institution (iv) None of these (c) Which of the following represents the first order logic form of the following statement? <p style="text-align: center;">“Ram lives in red house”</p> (i) lives (Ram, house) \wedge colour (house, red) (ii) lives (Ram, house) \vee colour (house, red) (iii) lives (house, Ram) \vee colour (house, red) (iv) lives (house, Ram) \wedge colour (house, red) (d) Which of the following primitive defines the statement “Transfer of Mental Information” . (i) ATRANS (ii) MTRANS (iii) PROPEL (iv) MBUILD	4 M	CO2
Q 3	Suppose we make an initial observation E_1 that confirms our belief in H with $MB [H, E_1] = 0.4$ and $MD [H, E_1] = 0$. Consider a second observation E_2 that also confirm H with $MB [H, E_2] = 0.3$ and $MD [H, E_2] = 0.1$. Compute $CF [H, E_1, E_2]$.	4 M	CO3
Q 4	Briefly explain the constraint satisfaction algorithm with suitable example.	4 M	CO4

Q 5	List out the differences between propositional logic and first order logic with suitable examples.	4 M	CO2
SECTION B		(10 X 4 = 40 Marks)	
Q 6	What do you understand by state space representation? Differentiate informed and uninformed search techniques. Explain the following algorithms with suitable examples: (a) Depth First Search (b) Breadth First Search (c) AO* algorithm (d) Alpha Beta Pruning algorithm	10 M	CO1
Q 7	What is a script? List the components of scripts. Develop a railway ticket reservation script. The following scenes can be considered for the script. (a) Entering the railway station (b) Reserving the ticket (c) Checking the ticket (d) Leaving the station	10 M	CO2
Q 8	Explain the following probabilistic approaches to measure uncertainty with suitable examples: (a) Hidden Markov Model (b) Certainty Factor	10 M	CO3
Q 9	What do you understand by normal form games? Briefly explain the following terms with respect to algorithmic game theory: (a) Nash Equilibrium (b) Dominant Strategy Equilibrium	10 M	CO4
SECTION C		(20X2=40 Marks)	
Q 10 (a)	Explain the concept of resolution in predicate logic. Consider the following facts: (a) John likes all kinds of pets. (b) Dogs are pets. (c) Cats are pets. (d) Any animal anyone owns and is not killed is a pet. (e) Reji owns a goat and is still alive. (f) Vinod owns everything Reji owns. (i) Translate the facts into formulae in predicate logic. (ii) Convert the formulae into clausal form. (iii) Prove that Jack likes goats using resolution	20 M	CO2
Q 10 (b)	What do you understand by semantic network? Express the following statements as semantic network in short form. (a) A house is a (kind of) building (b) A house has at least one storey (the number of storeys of a house is one or more) (c) A house is used for living in (d) A single-storey dwelling is a (kind of) house		

- (e) A single-storey dwelling has one storey
- (f) My house is an instance of a single-storey dwelling
- (g) My house has its roof color red.
- (h) My house has its walls made of brick

Q 11 (a) The Bayesian network and the corresponding table is given in figure 1 and table 1, generate the conditional probability table.

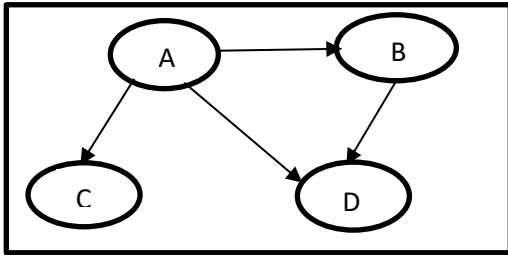


Figure 1

$P(A)$	0.4
$P(B A)$	0.5
$P(B \sim A)$	0.1
$P(C A)$	0.6
$P(C \sim A)$	0.3
$P(D A,B)$	0.8
$P(D A,\sim B)$	0.3
$P(D \sim A,B)$	0.3
$P(D \sim A,\sim B)$	0.05

Table 1

Compute the following probabilities

- (i) Joint probability $P(A, B, C, D)$
- (ii) $P(A|B)$
- (iii) $P(A|C)$
- (iv) $P(A|B, C)$

Q 11 (b) The probability of Mike has a cold is 0.25, the probability of Mike was observed sneezing when he had cold in the past is 0.9 and the probability of Mike was observed sneezing when he did not have cold is 0.20. Find the probability of Mike having a cold given that he sneezes.

[15+5]M CO3