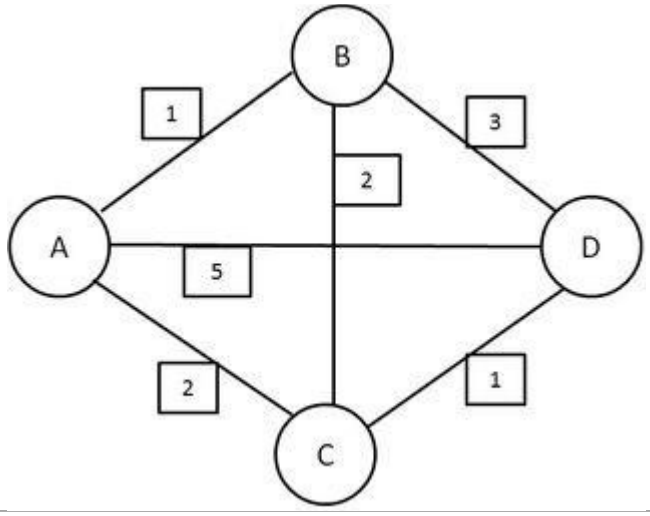
Name: Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Artificial Intelligence & Expert Systems **Course Code: CSAI7003**
Semester: I
Programme: M.Tech(Computer Science and Engineering)
Time: 03 hrs. **Max. Marks: 100**
Instructions:

Section A

S. No.		Marks	CO
1.	Write a short note on AND-OR graph using suitable example.	**4**	**[CO1]**
2.	What are the various issues in knowledge representation?	**4**	**[CO2]**
3.	Discuss the role of reasoning in AI.	**4**	**[CO3]**
4.	Write a short note on reinforcement learning.	**4**	**[CO4]**
5.	What is an expert system? What are the main advantages in keeping the knowledge base separate from the control module in knowledge based systems?	**4**	**[CO5]**
	Section B		
6.	**Solve the following problem using DFS search method.** *A Man wants to bring a Lion, a goat, and Grass across the river. The boat is tiny and can only carry two passengers at a time. If he leaves the Lion and the goat alone together, the Lion will eat the goat. If he leaves the goat and the Grass alone together, the goat will eat the Grass. How can he bring all three safely across the river?*	**10**	**[CO1]**
7.	a) Define Bayes' Rule and concept of Confidence factor. b) Differentiate between Non-monotonic and monotonic Reasoning.	**10**	**[CO3]**
8.	Discuss various learning methods in neural networks with suitable examples. **OR** Elaborate biological analogies with suitable examples. Discuss the concept of neurons and perceptron with example.	**10**	**[CO4]**
9.	What are the components of Expert Systems? Also, show the Architecture of Expert systems.	**10**	**[CO5]**

	Section C		
10.	Solve the following Cryptarithmetic Problem. Write Constraint equations and show the steps in finding solution. **L O G I C** **+ L O G I C** **----------** **P R O L O G** **----------** **OR** Solve the following three Travelling Sales problems using Best First Search algorithm. 	***20***	**[CO1]**
11.	a) Discuss the steps needed to convert a WFF in predicate logic into clause form. b) Translate the following sentences into formulas in first order predicate logic: i. John likes all kinds of food. ii. Apples are food. iii. Chicken is food. iv. Anything anyone eats and isn't killed by is food. v. Bill eats peanuts and is still alive. vi. Sue eats everything Bills eats.	***5*** ***15***	**[CO2]**

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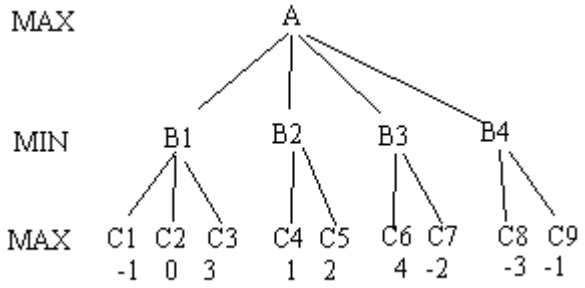
Section A

S. No.		Marks	CO
1.	What are the Limitations of Depth First Iterative Deepening (DFID) search technique?	4	[CO1]
2.	Define Modus Ponen's rule in Prepositional Logic.	4	[CO2]
3.	What is the need for Probability theory in uncertainty?	4	[CO3]
4.	What is the significance of neural networks in evolution of AI?	4	[CO4]
5.	What is the future scope of Expert System?	4	[CO5]
	Section B		
6.	Consider the following game tree in which static scores are all from the first players' point of view. Suppose the first player is the maximizing player. Show the solution path using Max-Min search procedure. 	10	[CO1]
7.	Write short notes on: a) Bayesian networks b) Fuzzy logic	10	[CO3]
8.	Discuss learning. Also, differentiate between Supervised and Unsupervised learning. **OR** Elaborate the role of rule-based learning in AI using suitable examples.	10	[CO4]
9.	Explain Rule-based expert system (RBS). How it is different	10	[CO5]

	from Fuzzy based and Frame based expert systems?		
	Section C		
10.	Solve the following Cryptarithmetic Problem. Write Constraint equations and show the steps in finding solution. **C R O S S** **+ R O A D S** **----------** **D A N G E R** **----------** **OR** **Solve the following problem using A* Algorithm.** *The 8-Puzzle problem has 3x3 grid with randomly numbered (1 to 8) tiles arranged on it and an empty tile/space. At any point, the adjacent can move to the empty tile and can create a new empty tile. The Initiate state and Goal State are given. The purpose is to attain the goal state.* Initial State 1 2 3 8 4 7 6 5 Goal State 2 8 1 4 3 7 6 5	***20***	**[CO1]**
11.	A knowledge base contains the following statements: i. Everyone who loves all animals is loved by someone. ii. Anyone who kills an animal is loved by no one. iii. Jack loves all animals. iv. Either Jack or Curiosity killed Tuna, the cat. **a) Convert these statements into First Order Predicate Logic.** b) **Using resolution, also prove that Curiosity killed the cat.**	***20***	**[CO2]**