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# B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

## September / October 2024 Supplementary Examinations

**Programme: B.E.**

**Branch: Artificial Intelligence & Machine Learning**

**Course Code: 22AM4PCIAI**

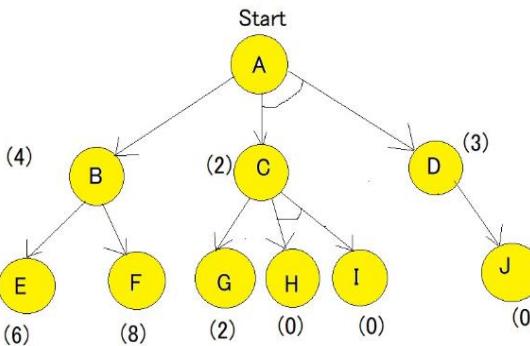
**Course: Introduction to Artificial Intelligence**

**Semester: IV**

**Duration: 3 hrs.**

**Max Marks: 100**

**Instructions:** 1. Answer any FIVE full questions, choosing one full question from each unit.  
2. Missing data, if any, may be suitably assumed.

			<b>UNIT - I</b>	<i>CO</i>	<i>PO</i>	<b>Marks</b>
1	a)		For each of the following activities, give a PEAS description of the task environment and characterize it in terms of the properties. i. Exploring the subsurface oceans of Titan. ii. Performing a high jump.	<b>1</b>	<b>1,2</b>	<b>5</b>
	b)		How does the Iterative Deepening Search algorithm operate when there are cycles in the graph? Talk on its Completeness, Optimality, time complexity and space complexity.	<b>1</b>	<b>1</b>	<b>10</b>
	c)		Write pseudocode agent programs for Goal based and Utility-based agents.	<b>1</b>	<b>1</b>	<b>5</b>
			<b>UNIT - II</b>			
2	a)		Explain A* algorithm and provide an example of the A* search procedure during node expansion, highlighting how it selects the current best path?	<b>1</b>	<b>2</b>	<b>10</b>
	b)		Illustrate Hill Climbing algorithm using 8-puzzle problem. What factors contribute to its frequent failure to reach a solution?	<b>1</b>	<b>2</b>	<b>10</b>
			<b>OR</b>			
3	a)		Solve the following problem using AO* search algorithm.	<b>1</b>	<b>2</b>	<b>10</b>
	b)		 <p>Solve the following problem using AO* search algorithm.</p> <p><b>CROSS + ROADS = DANGER</b></p>	<b>1</b>	<b>2</b>	<b>10</b>

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

<b>UNIT - III</b>						
4	a)	Using a consistent vocabulary, convert the following sentences in to First-order logic. (i) Some students took French in Spring 2001. (ii) Every student who takes French passes it. (iii) Only one student took Greek in Spring 2001. (iv) The best score in Greek is always higher than the best score in French. v) The only good extraterrestrial is a drunk extraterrestrial.	2	2	<b>10</b>	
	b)	Analyze the given premises and represent using Forward and Backward Chaining.  $\begin{aligned} P &\rightarrow Q \\ L \wedge M &\rightarrow P \\ B \wedge L &\rightarrow M \\ A \wedge P &\rightarrow L \\ A \wedge B &\rightarrow L \\ A \\ B \end{aligned}$	2	2	<b>10</b>	
<b>OR</b>						
5	a)	Give the precise definition of task environment for WUMPUS world. Show the steps taken by the agent with suitable illustration.	2	<b>1</b>	<b>5</b>	
	b)	Prove the following by resolution.  Either Heather attended the meeting or Heather was not invited. If the boss wanted Heather at the meeting, then she was invited. Heather did not attend the meeting. If the boss did not want Heather there, and the boss did not invite her there, then she is going to be fired. Prove Heather is going to be fired.	2	3	<b>10</b>	
	c)	Differentiate between Procedural and Declarative Knowledge.	2	<b>1</b>	<b>5</b>	
<b>UNIT - IV</b>						
6	a)	Differentiate Exact and Appropriate Inference in Bayesian network.	2	<b>1,3</b>	<b>6</b>	
	b)	Is inference by enumeration is preferable method for computing probabilities using Bayes Net? Justify.	2	2	<b>4</b>	
	c)	We have a bag of three biased coins a, b, and c with probabilities of coming up heads of 20%, 60%, and 80%, respectively. One coin is drawn randomly from the bag (with equal likelihood of drawing each of the three coins), and then the coin is flipped three times to generate the outcomes X1, X2, and X3. a. Draw the Bayesian network corresponding to this setup and define the necessary CPTs. b. Calculate which coin was most likely to have been drawn from the bag if the observed flips come out heads twice and tails once.	2	3	<b>10</b>	

<b>UNIT - V</b>					
7	a)	How does knowledge play a role in problem-solving within an expert system?	<b>3</b>	<b>1</b>	<b>5</b>
	b)	Differentiate between the Conventional System and the Expert System.	<b>3</b>	<b>1</b>	<b>10</b>
	c)	Provide EMYCIN rule and its applications within the context of the SACON expert system.	<b>3</b>	<b>1</b>	<b>5</b>

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SUPPLEMENTARY EXAMS 2024