Name: **Enrolment No:**	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2022

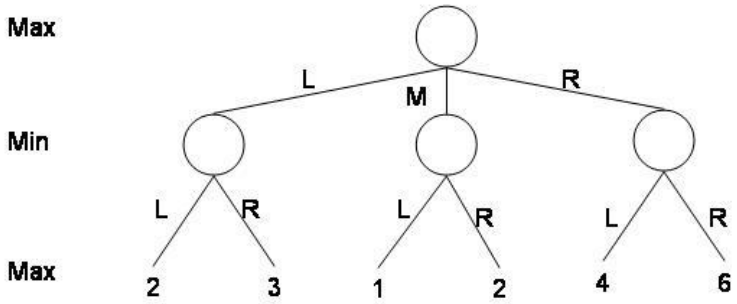
Course: Artificial Intelligence **Semester: VI**
Program: B.Tech-CSE Spl. CCVT, OGI, IT INFRA, BAO, CSF, GG, IOTSC, DEVOPS, BIG DATA, BLOCKCHAIN **Time: 03 hrs.**
Course Code: CSEG3005 **Max. Marks: 100**

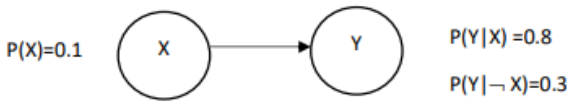
Instructions: Read all questions carefully. Q9 and Q11 has an internal choice.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Write brief note on any one AI programming language	**4**	**CO1**
Q 2	Compare any two knowledge representation schemes, bringing out advantages and limitations of each.	**4**	**CO3**
Q 3	Define (a) Symbolic Logic (b) Heuristics (c) Admissible Heuristics	**4**	**CO3**
Q 4	List the performance measures of search strategies	**4**	**CO2**
Q 5	Define Artificial Intelligence in terms of rational acting and rational thinking.	**4**	**CO1**

SECTION B
(4Qx10M= 40 Marks)

Q 6	Consider the game tree shown below. The top node is a max node. The labels on the arcs are the moves. The numbers in the bottom layer are the values of the different outcomes of the game to the max player. 	**10**	**CO2**

	Using alpha-beta pruning, consider the nodes from right to left, which nodes are cut off? Mention the nodes that are not examined.		
Q 7	a) Discuss different properties of Intelligent Agents. b) How to design an intelligent agent with its PAGE description for (i) Automated taxi driver (ii) Medical diagnosis system	**5+2.5 +2.5**	**CO1**
Q 8	**a)** Why Bayesian network is known as a probabilistic graphical model? **b)** Consider the following Bayesian network, where **X = having the flu** and **Y= coughing**:  **(i)** Write down the joint probability table specified by the Bayesian network. **(ii)** Determine the probabilities for the following Bayesian network.  **(iii)** Which Bayesian network would you have specified using the rules learned in class? **(iv)** Are Y and X independent in the given Bayesian network?	**2+8**	**CO4**
Q 9	Discuss that why hill climbing algorithm is known as greedy local search algorithm with its features and state space diagram? Also state the name of three regions in which hill-climbing algorithm cannot attain a global maximum or optimal solution with their solutions? **OR** **a)** What is a decision tree? Explain the working of ID3 algorithm in context of a classification problem. **b)** The following dataset given below will be used to learn a decision tree for predicting whether a mushroom is edible or not based on its shape, color and odor. **(i)** What is entropy H(Edible|Order = 1 or Odor = 3)? **(ii)** Which attribute would the ID3 algorithm choose to use for the root of the tree (no pruning)? **(iii)** Draw the full decision tree that would be learned for this data (no pruning).	**4+6**	**CO4**

	<table><tr><th>Shape</th><th>Color</th><th>Odor</th><th>Edible</th></tr><tr><td>C</td><td>B</td><td>1</td><td>Yes</td></tr><tr><td>D</td><td>B</td><td>1</td><td>Yes</td></tr><tr><td>D</td><td>W</td><td>1</td><td>Yes</td></tr><tr><td>D</td><td>W</td><td>2</td><td>Yes</td></tr><tr><td>C</td><td>B</td><td>2</td><td>Yes</td></tr><tr><td>D</td><td>B</td><td>2</td><td>No</td></tr><tr><td>D</td><td>G</td><td>2</td><td>No</td></tr><tr><td>C</td><td>U</td><td>2</td><td>No</td></tr><tr><td>C</td><td>B</td><td>3</td><td>No</td></tr><tr><td>C</td><td>W</td><td>3</td><td>No</td></tr><tr><td>D</td><td>W</td><td>3</td><td>No</td></tr></table>		
SECTION-C **(2Qx20M=40 Marks)**			
Q 10	**a)** *Given the following axioms*: Dogs likes bones Dogs eat everything they like Pasta is a dog Prove that Pasta eats bones. ***(i) Convert to clausal form*** ***(ii) Do resolution by refutation. Draw resolution tree.*** **b)** "As per the law, it is a crime for an American to sell weapons to hostile nations. Country A, an enemy of America, has some missiles, and all the missiles were sold to it by Robert, who is an American citizen." ***Prove that "Robert is criminal" using Backward chaining approach.***	**5+10+5**	**CO3**
Q 11	An organic juice company requires 12000, 20000 and 15000 barrels of orange, apple and guava fruit juices, respectively. Juicer Plant 'A' produces 100, 300, 200 barrels per day of orange, apple and guava juice respectively, whereas Juicer Plant 'B' produces 200, 400 and 100 barrels per day of orange, apple and guava juice respectively. If, Juicer Plant 'A' costs Rs 400 per day and Juicer Plant 'B' costs Rs. 300 per day to operate, how many days should each be run to minimize costs while satisfying the requirements. Formulate and solve the optimization problem, as LPP. **OR** Explain the following uninformed search strategies with examples. **(a)** Breadth First Search. **(b)** Uniform Cost Search **(c)** Depth First Search **(d)** Depth Limited Search	**20**	**CO3**