

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

Online End Semester Examination, June 2021

Programme Name: M. Tech. /CFD	Semester : II
Course Name : Artificial Intelligence	Time : 03 hrs
Course Code : CSEG7008P	Max. Marks: 100
Instructions: Attempt all the questions	

SECTION A

(6 X 5 = 30 Marks)

S. No.		Marks	CO
Q 1	<p>(a) Which of the following python library contains machine learning algorithms? (i) Numpy (ii) Pandas (iii) Pylab (iii) Sklearn</p> <p>(b) Which of the following platform implements the Python code on Cloud Server? (i) Spyder (ii) Google Colab (iii) Jupyter (iv) None of These</p> <p>(c) What is the answer to this expression, 23 % 3 is? (i) 1 (ii) 3 (iii) 5 (iv) 2</p> <p>(d) Which one of the following has the highest precedence in the expression? (i) Exponential (b) Addition (c) Multiplication (d) Parentheses</p> <p>(e) What will be the output of the following Python code?</p> <pre> i = 1 while True: if i%2 == 0: break print(i) i += 2 </pre> <p>(i) 1 (ii) 2 (iii) 1, 2, 3, 4, 5, 6 (iv) 1, 3, 5, 7, 9, 11....</p>	5 M	CO1
Q 2	<p>(a) Which of the following is/are Uninformed Search technique/techniques (i) Breadth First Search (ii) Depth First Search (iii) Bidirectional Search (iv) All of these</p> <p>(b) Which search is similar to minimax search? (i) Hill-climbing search (ii) Depth-first search (iii) Breadth-first search (iv) All of the mentioned</p> <p>(c) The term _____ is used for a depth-first search that chooses values for one variable at a time and returns when a variable has no legal values left to assign. (i) Forward search (ii) Backtrack search (iii) Hill algorithm (iv) Reverse-Down-Hill search</p> <p>(d) Which search is equal to minimax search but eliminates the branches that can't influence the final decision? (i) Depth-first search (ii) Breadth-first search (iii) Alpha-beta pruning (iv) None of these</p>	5 M	CO2

	(e) Which search method takes less memory? (i) Depth-First Search (ii) Breadth-First search (iii) Optimal search (iv) Linear Search		
Q 3	(a) Which of the following are the supervised classification algorithms? (i) Decision Trees (ii) Random Forest (iii) SVM (iv) All of these (b) In SVM, _____ functions take low-dimensional input space and transform it to a higher dimensional space. (i) Kernel (ii) Vector (iii) Support Vector (iv) Hyper Plane (c) In a classification problem if actual values is [0,1,1,0,1,0,1,1] and the predicted values is [1,0,1,1,0,0,1,0]. Jaccard Index is? (i) 0.6 (ii) 0.23 (iii) 0.8 (iv) 0.42 (d) Which algorithm is also known as ensemble classifier? (i) Decision Tree (ii) Random Forest (iii) SVM (iv) kNN (e) Which clustering technique may filter out outliers (i) Hierarchical (ii) k-means (iii) Density-based (iv) None of these	5 M	CO4
Q 4	(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) Whale Optimization algorithm comes under which category of metaheuristic algorithm (i) Evolutionary (ii) Swarm Intelligence (iii) Physics based (iv) Human based (c) _____ is a touring problem in which each city must be visited exactly once. The aim is to find the shortest tour. (i) Finding shortest path between a source and a destination (ii) Travelling Salesman problem (iii) Map coloring problem (iv) Depth first search traversal on a given map represented as a graph (d) Which of the following are the Artificial Intelligence programming language. (i) LISP (ii) Prolog (iii) Python (iv) All of these (e) How the new states are generated in genetic algorithm? (i) Composition (ii) Mutation (iii) Cross-over (iv) Both Mutation & Cross-over	5 M	CO1
Q 5	What do you understand by the term metaheuristic? List its advantages over conventional optimization techniques. Elucidate No Free Lunch Theorem.	5 M	CO5
Q 6	Differentiate the following: (a) Supervised learning and Unsupervised learning (b) K-Means and Density based clustering	5 M	CO4
SECTION B		(5 X 10 = 50 Marks)	
Q 7	(a) What is the significance of state space representation in artificial intelligence? With suitable example briefly discuss three current applications of artificial intelligence in the field of aerospace engineering. (b) Write the python program to calculate the average of numbers in a given list. OR Write the python program to take two floating point input (Cost Price and Selling	[5+5] M	CO1

	Price) from the user and print “Profit”/“Loss”/“No profit No Loss” with the following conditions. (i) If cost price is greater than selling price then print “Loss” (ii) If cost price is less than selling price then print “Profit” (iii) If both the cost are equal then print “No Profit No Loss”																																																																																																	
Q 8	Differentiate the following terms: (i) Depth first search and Breadth first search algorithm (ii) A* and AO* algorithm (iii) MIN-MAX and Alpha-Beta Pruning Algorithm (iv) Uninformed and Informed search techniques	10 M	CO2																																																																																															
Q 9	Why knowledge representation is required in artificial intelligence. Briefly explain all categories of knowledge representation with a suitable example.	10 M	CO3																																																																																															
Q 10	A leading aerospace company Airbus is coming in UPES for hiring M. Tech. students. This company last year selected the students based on certain criteria and is given in table 1. It is to be evaluated using decision tree algorithm that Rohit, a student of UPES, wants to find out if he may be offered a job in Airbus. His CGPA is low, Communication is Bad, Aptitude-High, Programming skills-Bad. <table border="1"> <thead> <tr> <th>CGPA</th> <th>Communication</th> <th>Aptitude</th> <th>Programing Skills</th> <th>Job Offered?</th> </tr> </thead> <tbody> <tr><td>High</td><td>Good</td><td>High</td><td>Good</td><td>Yes</td></tr> <tr><td>Medium</td><td>Good</td><td>High</td><td>Good</td><td>Yes</td></tr> <tr><td>Low</td><td>Bad</td><td>Low</td><td>Good</td><td>No</td></tr> <tr><td>Low</td><td>Good</td><td>Low</td><td>Bad</td><td>No</td></tr> <tr><td>High</td><td>Good</td><td>High</td><td>Bad</td><td>Yes</td></tr> <tr><td>High</td><td>Good</td><td>High</td><td>Good</td><td>Yes</td></tr> <tr><td>Medium</td><td>Bad</td><td>Low</td><td>Bad</td><td>No</td></tr> <tr><td>Medium</td><td>Bad</td><td>Low</td><td>Good</td><td>No</td></tr> <tr><td>High</td><td>Bad</td><td>High</td><td>Good</td><td>Yes</td></tr> <tr><td>Medium</td><td>Good</td><td>High</td><td>Good</td><td>Yes</td></tr> <tr><td>Low</td><td>Bad</td><td>High</td><td>Bad</td><td>No</td></tr> <tr><td>Low</td><td>Bad</td><td>High</td><td>Bad</td><td>No</td></tr> <tr><td>Medium</td><td>Good</td><td>High</td><td>Bad</td><td>Yes</td></tr> <tr><td>Low</td><td>Good</td><td>Low</td><td>Good</td><td>No</td></tr> <tr><td>High</td><td>Bad</td><td>Low</td><td>Bad</td><td>No</td></tr> <tr><td>Medium</td><td>Bad</td><td>High</td><td>Good</td><td>No</td></tr> <tr><td>High</td><td>Bad</td><td>Low</td><td>Bad</td><td>No</td></tr> <tr><td>Medium</td><td>Good</td><td>High</td><td>Bad</td><td>Yes</td></tr> </tbody> </table> <p style="text-align: center;">Table 1</p>	CGPA	Communication	Aptitude	Programing Skills	Job Offered?	High	Good	High	Good	Yes	Medium	Good	High	Good	Yes	Low	Bad	Low	Good	No	Low	Good	Low	Bad	No	High	Good	High	Bad	Yes	High	Good	High	Good	Yes	Medium	Bad	Low	Bad	No	Medium	Bad	Low	Good	No	High	Bad	High	Good	Yes	Medium	Good	High	Good	Yes	Low	Bad	High	Bad	No	Low	Bad	High	Bad	No	Medium	Good	High	Bad	Yes	Low	Good	Low	Good	No	High	Bad	Low	Bad	No	Medium	Bad	High	Good	No	High	Bad	Low	Bad	No	Medium	Good	High	Bad	Yes	10 M	CO4
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Q 11	Differentiate the term exploration and exploitation in metaheuristic algorithms. Illustrate the mathematical model and pseudo code of Grey Wolf Optimization algorithm.	10 M	CO5																																																																																															
SECTION C (1 X 20 = 20 Marks)																																																																																																		
Q 12	(a)What do you understand by production system? Explain the following heuristic search techniques with suitable example. (i) Hill climbing algorithm (ii) AO* algorithm	20 M	CO2																																																																																															

- (iii) Constraint Satisfaction Algorithm
- (iv) Mean End Analysis Algorithm

(b) Consider the tree shown in figure 1. The numbers on the arcs are the arc length; the heuristic estimates of $B = 4$, $C = 3$ and $D = 2$; all other states have a heuristic estimate of 0. Assume that the children of a node are explained in alphabetical order when no other order is specified by the search and that the goal is state J. No visited or expanded lists are used. In what order would the states be expanded by each type of search (DFS, BFS, best-first search and A*). Write only the sequence of states expanded by each search.

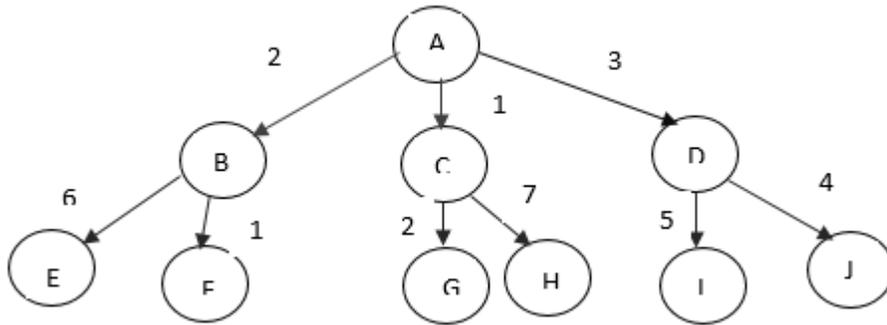


Figure 1.