

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2021

Course: Artificial Intelligence for Robotics

Program: B. Tech./ECE

Course Code: ECEG7012

Instructions: Attempt all the questions

Semester: I

Duration: 03 hrs.

Max. Marks: 100

SECTION A

(5 X 4= 20 Marks)

S. No.		Marks	CO
Q 1	(a) What is Artificial intelligence? (i) Putting your intelligence into Computer (ii) Programming with your own intelligence (iii) Making a Machine intelligent (iv) Playing a Game (b) 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 (c) Which of the following are the Artificial Intelligence programming language. (i) LISP (ii) Prolog (iii) Python (iv) All of these (d) Which of the following platform implements the Python code on Cloud Server? (i) Spyder (ii) Google Colab (iii) Jupyter (iv) None of These	4 M	CO1
Q 2	(a) Which search is similar to minimax search? (i) Hill-climbing search (ii) Depth-first search (iii) Breadth-first search (iv) All of the mentioned (b) 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 (c) Which search technique is the combination of depth first search and breadth first search technique? (i) Best first search (ii) MIN-MAX algorithm (iii) AO* algorithm (iv) None of these (d) MIN-MAX algorithm uses which algorithm for exploration of the complete game tree? (i) Depth first search (ii) Breadth first search (iii) Best first search (iv) None of these	4 M	CO2
Q 3	(a) Which of the following represents the first order logic form of the following statement? “Ram lives in red house” (i) lives (Ram, house) \wedge color (house, red) (ii) lives (Ram, house) \vee color (house, red) (iii) lives (house, Ram) \vee color (house, red) (iv) lives (house, Ram) \wedge color (house, red)	4 M	CO3

	<p>(b) Which of the following is the example of PTRANS? (i) Listen (ii) Tell (iii) Go (iv) Decide</p> <p>(c) Which of the following primitive defines the statement “Building of new Information from old”. (i) ATRANS (ii) MTRANS (iii) PROPEL (iv) MBUILD</p> <p>(d) Which knowledge representation describes sequence of events? (i) Frames (ii) Scripts (iii) Semantic Network (iv) First order logic</p>		
Q 4	<p>(a) Which of the following are the supervised classification algorithms? (i) Decision Trees (ii) Random Forest (iii) SVM (iv) All of these</p> <p>(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</p> <p>(c) Which algorithm is also known as ensemble classifier? (i) Decision Tree (ii) Random Forest (iii) SVM (iv) kNN</p> <p>(d) Which clustering technique may filter out outliers (i) Hierarchical (ii) k-means (iii) Density-based (iv) None of these</p>	4 M	CO4
Q 5	<p>(a) How the new states are generated in genetic algorithm? (i) Composition (ii) Mutation (iii) Cross-over (iv) Both Mutation & Cross-over</p> <p>(b) Whale Optimization algorithm comes under which category of metaheuristic algorithm (i) Evolutionary (ii) Swarm Intelligence (iii) Physics based (iv) Human based</p> <p>(c) Which of the following are the main reasons that metaheuristic algorithms are very popular in the field of optimization? (i) Simple and Flexible (ii) Derivative-free (c) Local Optima avoidance (d) All of these</p> <p>(d) In which algorithm flying of search agents are adjusted with respect to their own flying and flying of other search agents? (i) WOA (ii) GA (iii) PSO (iv) GWO</p>	4 M	CO5
SECTION B			
		(10 X 4 = 40 Marks)	
Q 6	<p>Differentiate the following search techniques: (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</p>	10 M	CO2
Q 7	<p>Why knowledge representation is required in artificial intelligence. Briefly explain all categories of knowledge representation with a suitable example.</p>	10 M	CO3
Q 8	<p>(a) What is logistic regression? How this algorithm is different from conventional regression algorithms. Explain this algorithm with suitable example. (b) Explain how gradient descent algorithm is used to solve regression problem.</p>	10 M	CO4
Q 9	<p>What is meant by exploration and exploitation in swarm intelligent system? Illustrate these two processes with respect to grey wolf optimization algorithm. Briefly explain the convergence phenomenon of optimization algorithm.</p>	10 M	CO5

SECTION C

(20X2=40 Marks)

Q 10 (a)

(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

What do you understand by semantic network? Express the following statements as semantic network in short form.

Q 10 (b)

(i) A house is a (kind of) building

(ii) A house has at least one storey (the number of storeys of a house is one or more)

(iii) A house is used for living in

(iv) A single-storey dwelling is a (kind of) house

(v) A single-storey dwelling has one storey

(vi) My house is an instance of a single-storey dwelling

(vii) My house has its roof color red.

(viii) My house has its walls made of brick

20 M

CO3

Q 11

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.

CGPA	Communication	Aptitude	Programming 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

20 M

CO4