SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF

ELECTRICAL AND ELECTRONICS ENGINEERING

QUESTION BANK

II SEMESTER

1916210 - SOFT COMPUTING TECHNIQUES

Regulation – 2019

Academic Year 2019 – 20

Prepared by

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SUBJECT : 1916210 - SOFT COMPUTING TECHNIQUES

SEM / YEAR: II/I M.E(PSE)

UNIT I - INTRODUCTION AND EVOLUTIONARY PROGRAMMING

Introduction to intelligent systems- Soft computing techniques- Conventional Computing versus Swarm Computing - Classification of meta-heuristic techniques - Properties of Swarm intelligent Systems - Application domain - Discrete and continuous problems - Single objective and multiobjective problems. Evolutionary programming – Genetic algorithms & Genetic programming - Particle Swarm Optimization- Ant colony Optimization

PART – A

Q.No	Questions		BT Level	Competence	Course Outcome
1.	What is soft computing?		BTL 1	Remember	CO1
2.	Compare soft computing vs. hard computing.		BTL 2	Understand	CO1
3.	Classify the various types of soft computing techniques		BTL 3	Apply	CO1
4.	Define single-objective optimization.		BTL 1	Remember	CO1
5.	Define multi-objective optimization.		BTL 1	Remember	CO1
6.	Define Intelligent System		BTL 1	Remember	CO1
7.	Define Evolutionary Computation		BTL 1	Remember	CO1
8.	What are the basic variations of Evolutionary Algorithm		BTL 3	Apply	CO1
9.	Generalize the characteristics of intelligent systems		BTL 2	Understand	CO1
10.	State the principles for an ideal multi-objective optimization		BTL 2	Understand	CO1
11.	In what way if-then rules are used for multiobjective optimization?		BTL 2	Understand	CO1
12.	State few advantages and disadvantages of Genetic Algorithm.		BTL 2	Understand	CO1
13.	Mention the role of fitness function in Genetic Algorithm.		BTL 2	Understand	CO1
14.	How is Genetic Algorithm differ from traditional algorithm?		BTL 4	Analyse	CO1
15.	Write the applications of PSO?		BTL 2	Understand	CO1
16.	Mention the advantages of Particle Swarm optimization		BTL 2	Understand	CO1
17.	Compare and Contrast—Genetic Algorithm and Particle Swarm Optimization		BTL 4	Analyse	CO1
18.	What are the characteristics of Ant Colony Optimization		BTL 2	Understand	CO1
19.	State the various applications of ACO		BTL 2	Understand	CO1
20.	Justify Swarm intelligence is superior to conventional computing algorithm.		BTL 4	Analyse	CO1
	PART – B				
1.	Explain the classical methods for handling multi-objective	(13)	BTL 3	Apply	CO1

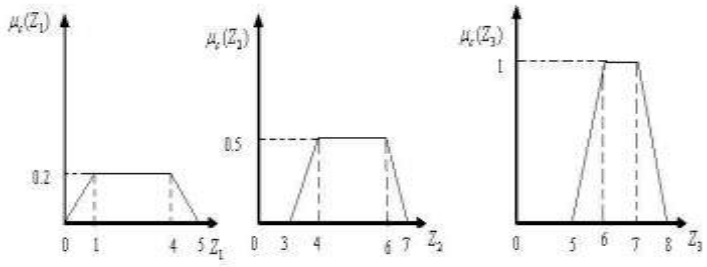
	optimization problems.				
2.	Explain the procedure involved in using Evolutionary programming for multi-objective problems.	(13)	**BTL 1**	**Remember**	**CO1**
3.	(i) Explain the classification of Metaheuristic Techniques (ii) Explain the Preparatory Steps of genetic programming.	(6) (7)	**BTL 2**	**Understand**	**CO1**
4.	With a new flowchart, explain the Executional steps of genetic programming.	(13)	**BTL 1**	**Remember**	**CO1**
5.	Draw the functional block diagram of swarm intelligence system, explain the role of sub blocks. Also represent the properties and application domain of swarm intelligence system.	(13)	**BTL2**	**Understand**	**CO1**
6.	Implement a vehicle routing problem using the concept of particle swarm optimization.	(13)	**BTL 6**	**Create**	**CO1**
7.	Enumerate the procedure involved in using Genetic Algorithm for optimizing controller parameters	(13)	**BTL 2**	**Understand**	**CO1**
8.	With a neat flowchart, explain the algorithm of Genetic Algorithm.	(13)	**BTL 1**	**Remember**	**CO1**
9.	Implement Optimization of Traveling Salesman Problem using Genetic algorithm approach.	(13)	**BTL 6**	**Create**	**CO1**
10.	(i) What are the properties of Swarm intelligent Systems (ii) Discuss the principles of multi-objective optimization	(5) (8)	**BTL 2**	**Understand**	**CO1**
11.	With a neat flowchart, explain the algorithm of particle swarm optimization.	(13)	**BTL 1**	**Remember**	**CO1**
12.	With a neat flowchart, explain the algorithm of Ant Colony Optimization	(13)	**BTL 1**	**Remember**	**CO1**
13.	(i) Discuss the behavior of real ants and compare it with artificial ants. (ii) Differentiate the features of soft computing and hard computing.	(7) (6)	**BTL 2**	**Understand**	**CO1**
14.	Compare and Contrast—Genetic Algorithm, Particle Swarm Optimization and Ant Colony Optimization	(13)	**BTL 4**	**Analyse**	**CO1**
	PART – C				
1.	Implement a vehicle routing problem using the concept of particle swarm optimization.	(15)	**BTL 6**	**Create**	**CO1**
2.	Ant colony optimization algorithm is best suited for protein-folding problems—Justify	(15)	**BTL 5**	**Analyse**	**CO1**
3.	Assume a typical control problem of yours and create the various steps involved in finding a solution using GA	(15)	**BTL 6**	**Create**	**CO1**
4.	Let a function $f(x) = x - \frac{x^2}{16}$ be defined on the interval [0,31]. Apply Genetic Algorithm for determining the maximum of the given function (Assume suitable missing data)	(15)	**BTL 3**	**Apply**	**CO1**

UNIT II - FUZZY LOGIC SYSTEM

Introduction to crisp sets and fuzzy sets- basic fuzzy set operation and approximate reasoning. Introduction to fuzzy logic modeling and control- Fuzzification inferencing and defuzzification- Fuzzy knowledge and rule bases-Fuzzy modeling and control schemes for nonlinear systems. Self-organizing fuzzy logic control- Fuzzy logic control for nonlinear time delay system. Case study – Familiarization of FLC Tool Box.

PART – A

Q.No	Questions		BT Level	Competence	Course Outcome
1.	In What context fuzzy systems are used?		BTL 1	Remember	CO2
2.	Mention the limitations of Fuzzy system?		BTL 2	Understand	CO2
3.	Compare fuzzy set and crisp set?		BTL 2	Understand	CO2
4.	Mention some applications of Fuzzy logic.		BTL 3	Apply	CO2
5.	What is cardinality of a Fuzzy set? Whether a power set can be formed for a fuzzy set?		BTL 1	Remember	CO2
6.	What is an empty Fuzzy set and What do you mean by height of a Fuzzy set?		BTL 1	Remember	CO2
7.	Explain Centre of gravity method of defuzzification.		BTL 1	Remember	CO2
8.	Explain Fuzzy compliment and Fuzzy relation ?		BTL 1	Remember	CO2
9.	Classify the different Fuzzy relation operation?		BTL 1	Remember	CO2
10.	Draw the block diagram of a Fuzzy logic system.		BTL 1	Remember	CO2
11.	Define Fuzzy inference System?		BTL 1	Remember	CO2
12.	Define a Fuzzy Cartesian product.		BTL 1	Remember	CO2
13.	How is fuzzy relation converted into a crisp relation using lamda-cut process?		BTL 1	Remember	CO2
14.	Explain the difference between conventional control and fuzzy control system.		BTL 2	Understand	CO2
15.	Classify the methods of defuzzification?		BTL 1	Remember	CO2
16.	What is the difference between fuzzy logic and binary logic?		BTL 2	Understand	CO2
17.	Write the classifications of Fuzzy Logic control?		BTL 1	Remember	CO2
18.	Illustrate any one defuzzification method with an example?		BTL 3	Apply	CO2
19.	What is approximate reasoning?		BTL 1	Remember	CO2
20.	Summarize Fuzzy rule and Fuzzy linqistic variable?		BTL 4	Analyse	CO2
	PART – B				
1.	(i)Explain with neat block diagram the various components of a fuzzy logic system (ii)Describe shortly on Centroid method	(8) (5)	BTL 1 BTL 1	Remember	CO2
2.	Describe the self-organizing Fuzzy Logic Control scheme with a suitable example. Mention its advantages over fuzzy logic controller.	(13)	BTL 3	Apply	CO2
3.	Write short notes on implementation of Fuzzy Logic Control for nonlinear time delay system.	(13)	BTL 6	Create	CO2
4.	(i) Discuss the methods of aggregation of fuzzy rules. (ii) Write short notes on fuzzy propositions.	(7) (6)	BTL 1	Remember	CO2
5.	(i) Differentiate between mamdani FIS and sugeno FIS. (ii) The membership functions for the linguistic variables "tall" and "short" are given below. $Tall = \{\frac{0.2}{5} + \frac{0.3}{7} + \frac{0.7}{9} + \frac{0.9}{11} + \frac{1}{12}\}$ $Short = \left\{\frac{0.3}{0} + \frac{0}{30} + \frac{1}{60} + \frac{0.5}{90} + \frac{0}{120}\right\}$ Describe the membership functions for the following linguistic phrases. Very tall, fairly tall, not very short	(5) (8)	BTL 2 BTL 5	Understand Evaluate	CO2
6.	Explain the features and benefits of the following Fuzzy propositions	(7)	BTL 4	Analyse	CO2

	(i) Unconditional and qualified propositions (ii) Conditional and Unqualified propositions	(6)			
7.	Explain the different types of membership function used in fuzzification process?	(13)	**BTL 3**	**Apply**	**CO2**
8.	Illustrate with suitable examples explain canonical rule formulation of fuzzy rule base	(13)	**BTL 3**	**Apply**	**CO2**
9.	The results of three implication processes arc as shown in fig. Find the aggregated output and the defuzzified output using the (1) Center of gravity (2) Center of sums and (3) Weighted average methods 	(13)	**BTL 5**	**Evalaute**	**CO2**
10.	Compare the following two fuzzy relations $R_1$and R_2 Using max-min and max average compositions: R_1: y_1 y_2 y_3 y_4; x_1 0.3 0 0.7 0.3; x_2 0 1 0.2 0 R_2: z_1 z_2 z_3; y_1 0.1 0.2 0.4; y_2 0.8 0.3 1; y_3 0.7 0.9 0.6; y_4 1 0.2 0.1	(13)	**BTL 5**	**Evalaute**	**CO2**
11.	Develop a typical case study in which Fuzzy logic is used as a model and controller	(13)	**BTL 6**	**Create**	**CO2**
12.	The discretized membership functions for a transistor and a resistor are given below: uT={ 0/0 + 0.2/1 + 0.7/2 + 0.8/3 + 0.9/4 + 1/5} uR={ 0/0 + 0.1/1 + 0.3/2 + 0.2/3 + 0.4/4 +0.5/5} Find the following (a) Algebraic sum (b) Algebraic product (c) Bounded sum (d) Bounded difference	(13)	**BTL 5**	**Evalaute**	**CO2**
13.	(i) Explain self organizing FLC. Mention its advantages over fuzzy logic controller (ii) Sketch the block diagram of Fuzzy Logic Controller for a nonlinear process.	(7) (6)	**BTL 2** **BTL 2**	**Understand**	**CO2**
14.	(i) Find the algebraic product of two fuzzy sets ‘A’ and ‘B’	(7)	**BTL 3**	**Apply**	**CO2**

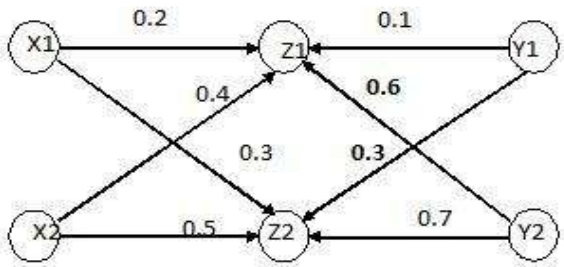
	where A={(3, 0.8)(5, 0.6)(6, 0.9)} and B={(3, 0.7)(4, 0.8)(5, 0.3)} (ii) Find the algebraic sum of two fuzzy sets A={(3, 0.5) (5, 1)(7, 0.6)} and 'B' and B={(3, 1)(5, 0.6)}	(6)			
PART – C					
1.	Given a conditional and qualified Fuzzy proposition 'P' of the form. P: If x is A, then y is B is S where ' S' is fuzzy truth qualifier and a fact is in the form" x is A" .We want to make an inference in the form "y is B " Design a method based on the truth- value restrictions for getting the inference	(15)	**BTL 6**	**Create**	**CO2**
2.	Design the general scheme for a Fuzzy controller. How different modules are interconnected? Deploying the above how will you solve the problem of stabilizing the inverted pendulum	(15)	**BTL 6**	**Create**	**CO2**
3.	Consider four travel packages offered by Celtic, Club Mahindra, Metro and Himalaya travels. We want to choose one. Their costs are INR 100,000, INR 200,000 , INR 150,000 and INR 175,000. Their travel time in hours are 150, 200, 100 and 125 respectively. They are viewed as interesting with degress 0.4, 0.3, 0.6 and 0.5. Define your own fuzzy set of acceptable travel times. Then determine the fuzzy sets of interesting travel packages whose cost and travel times are acceptable and use this set to choose one of your packages.	(15)	**BTL 5**	**Evaluate**	**CO2**
4.	Design a fuzzy logic controller for a non-linear system of your choice with a case study	(15)	**BTL 6**	**Create**	**CO2**

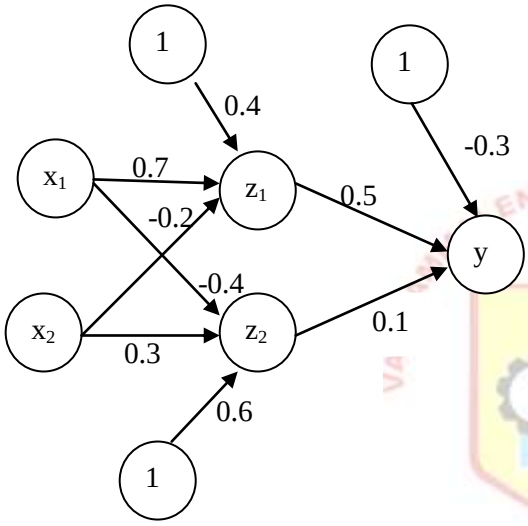
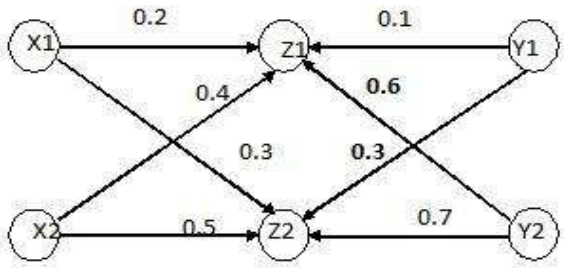
UNIT III - ARTIFICIAL NEURAL NETWORKS

Neuron- Nerve structure and synapse- Artificial Neuron and its model- activation functions- Neural network architecture- single layer and multilayer feed forward networks- Mc Culloch Pitts neuron model- perceptron model- Adaline and Madaline- multilayer perception model- back propogation learning methods. Counter propagation network- architecture- functioning & characteristics of counter Propagation network- Hopfield/ Recurrent network configuration- Adaptive Resonance Theory. Case study – Familiarization of NN Tool Box.

PART – A

Q.No	Questions		BT Level	Competence	Course Outcome
1.	Distinguish between artificial neuron & biological neuron.		**BTL 2**	**Understand**	**CO3**
2.	Explain the factors affecting back propagation training?		**BTL 4**	**Analyse**	**CO3**
3.	Name some activation functions used in ANN?		**BTL 1**	**Remember**	**CO3**
4.	Explain a single layer net and multilayer net?		**BTL 1**	**Remember**	**CO3**
5.	What is a back propagation NN?		**BTL 1**	**Remember**	**CO3**
6.	Draw the basic model of Adaline network and Madaline Network		**BTL 1**	**Remember**	**CO3**
7.	Sketch the model of artificial neuron.		**BTL 3**	**Apply**	**CO3**
8.	Evaluate the learning rate and its function		**BTL 1**	**Remember**	**CO3**
9.	For derivative -based learning procedure why a sigmoidal function is used instead of a step		**BTL 3**	**Apply**	**CO3**

	function?				
10.	Define an artificial neural network.		**BTL 1**	**Remember**	**CO3**
11.	Draw a network for solving Exclusive OR problem.		**BTL 1**	**Remember**	**CO3**
12.	State the function of synapse.		**BTL 1**	**Remember**	**CO3**
13.	Justify why Artificial Neural Network is called adaptive system during training		**BTL 6**	**Create**	**CO3**
14.	What is meant by winner take all?		**BTL 1**	**Remember**	**CO3**
15.	What is the purpose of Hopfield Network? Give an example?		**BTL 2**	**Understand**	**CO3**
16.	Why Hopfield network is called as recurrent neural network?		**BTL 4**	**Analyse**	**CO3**
17.	Conclude the limitations of competitive learning?		**BTL 4**	**Analyse**	**CO3**
18.	Give the characteristics of counter propagation network		**BTL 2**	**Understand**	**CO3**
19.	Explain stability-plasticity dilemma?		**BTL 1**	**Remember**	**CO3**
20.	What are the properties of adaptive resonance theory?		**BTL 2**	**Understand**	**CO3**
	PART – B				
1.	Write short notes on Adaline and Madaline networks	(13)	**BTL1**	**Remember**	**CO3**
2.	Explain with a neat diagram the neural network architecture of multilayer feed forward network.	(13)	**BTL 1**	**Remember**	**CO3**
3.	Draw and describe the structure of a biological neuron.	(13)	**BTL 1**	**Remember**	**CO3**
4.	Using McCulloh-Pitts neuron model, design a neural network for 2-input OR functions.	(13)	**BTL6**	**Create**	**CO3**
5.	Explain the working of back propagation neural network with neat architecture and flowchart.	(13)	**BTL 4**	**Analyse**	**CO3**
6.	Using Adaline network to train ANDNOT function with bipolar inputs and targets. Perform 2 epochs of training.	(13)	**BTL6**	**Create**	**CO3**
7.	Determine the weights of a single layer perceptron for implementing the AND function. Consider the inputs and targets to be bipolar and $\alpha=1$	(13)	**BTL 5**	**Evaluate**	**CO3**
8.	Explain the single perceptron with its learning algorithm and its seperability and convergence property	(13)	**BTL 1**	**Remember**	**CO3**
9.	Develop and describe with a neat diagram the counter propagation network learning algorithm.	(13)	**BTL 6**	**Create**	**CO3**
10.	Consider the following full counter propagation network (CPN) shown in below fig. (a) using input pair x(1,1)y=(0,1); perform first phase of training (One step only).Find the activation of the cluster layer units and update the weights using learning rates of 0.3. 	(13)	**BTL 5**	**Evaluate**	**CO3**
11.	Explain basic structure, working and analysis of adaptive resonance theory(ART-1)	(13)	**BTL 4**	**Analyse**	**CO3**
12.	Draw the architecture of full counter propagation network and represent the active units in the first and second phase of counter propagation training. Explain how training a counter	(13)	**BTL 3**	**Apply**	**CO3**

	propagation network occurs in two phases.				
13.	Draw the architecture of Hopfield net.design Hopfield net for 4 bit bipolar pattern The training pattern are I sample S1[1,1,-1,-1] II sample S2[-1,1,-1,1] III sample S3[-1,-1,-1,-1,1]	(13)	**BTL 6**	**Create**	**CO3**
14.	Describe with a neat diagram the architecture of recurrent network to perform XOR task with two inputs.	(13)	**BTL 3**	**Apply**	**CO3**
	PART – C				
1.	Can a two input Adaline compute the XOR function? Analyse the XOR function using Madaline?	(15)	**BTL 4**	**Analyse**	**CO3**
2.	Find new weight when the net illustrated in given figure is presented the input pattern (0, 1) and target output is 1. Use a learning rate $\alpha = 0.25$ and the binary sigmoid activation function. 	(15)	**BTL 5**	**Evaluate**	**CO3**
3.	Consider the following full counter propagation network (CPN) shown in below fig. (a) using input pair x(1,1) & y=(0,1); perform phase I & II of training update the weights using learning rates of 0.3. (One step only) 	(15)	**BTL 5**	**Evaluate**	**CO3**
4.	Consider an ART 1 network with four F1 units and three F2 units. Assume the initial weights as follows: Bottom up weights (bij) : {{0.67, 0, 0.3}, {0, 0, 0.3}, {0, 0, 0.4}, {0, 0.44, 0.5}} and Top down weights (tij) : {{1, 0, 0, 1}, {0, 1, 0, 1}, {1, 1, 1, 0}}. Determine the new weight matrices after the vector (0, 1, 0, 1) is presented, if the vigilance parameter is given as	(15)	**BTL 5**	**Evaluate**	**CO3**

	0.25 and 0.7				
UNIT IV - HYBRID CONTROL SCHEMES					
Fuzzification and rule base using ANN – Neuro fuzzy systems-ANFIS – Fuzzy Neuron - Optimization of membership function and rule base using Genetic Algorithm. Familiarization of ANFIS Tool Box.					
PART – A					
Q.No	**Questions**		**BT Level**	**Competence**	**Course Outcome**
1.	List few applications of hybrid fuzzy GA systems.		**BTL 2**	**Understand**	**CO4**
2.	List few applications of Neuro fuzzy systems.		**BTL 2**	**Understand**	**CO4**
3.	What are the parameters selected when implementing Fuzzy Logic Control using MATLAB		**BTL 3**	**Apply**	**CO4**
4.	What are the transfer functions available in MATLAB neural network toolbox.		**BTL 3**	**Apply**	**CO4**
5.	Classify the shapes of the membership function available in fuzzy logic tool box .		**BTL 4**	**Analyse**	**CO4**
6.	Name any three commercial software used for soft computing techniques.		**BTL 4**	**Analyse**	**CO4**
7.	Give the defuzzification methods available in MATLAB tool box And What are the inference methods available in MATLAB tool box?		**BTL 4**	**Analyse**	**CO4**
8.	What is the purpose of toolboxes in matlab?		**BTL 2**	**Understand**	**CO4**
9.	Write a few NN readily available in Mat lab tool box.		**BTL 2**	**Understand**	**CO4**
10.	Compare Fuzzy Processing and Neural Processing		**BTL 4**	**Analyse**	**CO4**
11.	What are the classifications of Neuro Fuzzy Hybrid Systems		**BTL 1**	**Remember**	**CO4**
12.	State the limitations of neural networks and fuzzy systems when operated individually		**BTL 2**	**Understand**	**CO4**
13.	List the various types of hybrid systems.		**BTL 2**	**Understand**	**CO4**
14.	Mention the properties of neuro-fuzzy hybrid systems		**BTL 2**	**Understand**	**CO4**
15.	Mention the characteristics of neuro-fuzzy hybrid systems		**BTL 4**	**Analyse**	**CO4**
16.	What are advantages of Genetic Fuzzy Hybrids system		**BTL 2**	**Understand**	**CO4**
17.	What are the objectives of optimization in fuzzy rule based system		**BTL 4**	**Analyse**	**CO4**
18.	Name the approaches used for Genetic Learning of Rule Bases		**BTL 2**	**Understand**	**CO4**
19.	List the Advantages of Neuro·Genetic Hybrids		**BTL 2**	**Understand**	**CO4**
20.	Distinguish between tuning and learning problems of fuzzy system.		**BTL 4**	**Analyse**	**CO4**
PART – B					
1.	What is called ANFIS? Draw the architecture of ANFIS network and represent the role of different layers.	(13)	**BTL 1**	**Remember**	**CO4**
2.	With suitable block diagram, explain the principle involved in a liquid level controller using neurofuzzy technique.	(13)	**BTL 4**	**Analyse**	**CO4**
3.	Discuss with relevant diagrams and mathematical expressions how a nonlinear system can be identified and controlled using MATLAB Neural Network Tool box. Choose appropriate example	(13)	**BTL 2**	**Understand**	**CO4**
4.	Using MATLAB FIS tool box discuss how will you identify and control the linear and nonlinear dynamic system	(13)	**BTL 3**	**Apply**	**CO4**
5.	Using MATLAB ANFIS tool box discuss how will you identify and control the linear and nonlinear dynamic system	(13)	**BTL 3**	**Apply**	**CO4**

6.	Using MATLAB Neural Network tool box discuss how will you identify and control the linear and nonlinear dynamic system	(13)	**BTL 3**	**Apply**	**CO4**
7.	Show how neuro fuzzy logic control can be used for washing machine applications	(13)	**BTL 6**	**Create**	**CO4**
8.	Design a generic algorithm to optimize the weights of a neural network model while training an OR gate with 2 bipolar inputs and 1 bipolar targets.	(13)	**BTL 6**	**Create**	**CO4**
9.	Write a MATLAB program train NAND gate with binary inputs and targets(two input-one Output) using adaptive neuro-fuzzy hybrid technique.	(13)	**BTL 3**	**Apply**	**CO4**
10.	How are generic algorithms utilized for optimizing the weights in neural network architecture?	(13)	**BTL 5**	**Evaluate**	**CO4**
11.	Explain in detail the concepts of fuzzy generic hybrid systems	(13)	**BTL 1**	**Remember**	**CO4**
12.	Give details on the various applications of neuro fuzzy hybrid systems.	(13)	**BTL 2**	**Understand**	**CO4**
13.	Explain the classifications of neuro-fuzzy hybrid systems?	(13)	**BTL 1**	**Remember**	**CO4**
14.	With suitable block diagram, explain the principle involved in a liquid level controller using neurofuzzy technique.	(13)	**BTL 6**	**Create**	**CO4**
	PART – C				
1.	Create a neuro and fuzzy controller for its application in inverted pendulum system.	(15)	**BTL 6**	**Create**	**CO4**
2.	Show how fuzzy logic control and genetic algorithm based structural optimization can be used for plant control applications	(15)	**BTL 6**	**Create**	**CO4**
3.	Assume a typical control problem of yours and explain the various steps involved in finding a solution using Fuzzy and GA.	(15)	**BTL 6**	**Create**	**CO4**
4.	Create a GA-Fuzzy Systems for Control of Flexible Robots	(15)	**BTL 6**	**Create**	**CO4**

UNIT V - INTRODUCTION TO MACHINE LEARNING AND DEEP LEARNING

Linear Regression, Logistic Regression, Naive Bayes Classifier, kNN algorithm, Support Vector Machines (SVMs) and Decision Trees, Random Forest Classifier, Deep Learning-Recurrent Neural Networks and Convolutional Neural Networks and Reinforcement Learning: Markov Decision processes (MDPs) and Q-learning

PART – A

Q.No	Questions		BT Level	Competence	Course Outcome
1.	Define Logistic regression		**BTL 1**	**Remember**	**CO5**
2.	Why Is Logistic Regression Popular?		**BTL 2**	**Understand**	**CO5**
3.	Which of the following distance measure do we use in case of categorical variables in k-NN?		**BTL 3**	**Apply**	**CO5**
4.	How do we decide the value of "K" in KNN algorithm?		**BTL 4**	**Analyse**	**CO5**
5.	Why is KNN algorithm called Lazy Learner?		**BTL 2**	**Understand**	**CO5**
6.	What are the advantages and disadvantages of KNN algorithm?		**BTL 2**	**Understand**	**CO5**
7.	What are the limitations of Random Forest Classifier?		**BTL 2**	**Understand**	**CO5**
8.	Define SVM.		**BTL 1**	**Remember**	**CO5**
9.	What are the problems with the following characteristics is generally suited in decision tree learning?		**BTL 4**	**Analyse**	**CO5**
10.	Why is “Naive” Bayes naive?		**BTL 2**	**Understand**	**CO5**

11.	What are the properties of SVM.		**BTL 1**	**Remember**	**CO5**
12.	Mention the advantages and disadvantages of SVM.		**BTL 2**	**Understand**	**CO5**
13.	What is deep learning, and how does it contrast with other machine learning algorithms?		**BTL 5**	**Evaluate**	**CO5**
14.	Differentiate between Perceptron and SVM		**BTL 4**	**Analyse**	**CO5**
15.	How is a decision tree pruned?		**BTL 2**	**Understand**	**CO5**
16.	What are the applications of SVM.		**BTL 2**	**Understand**	**CO5**
17.	What are the Different Layers on CNN?		**BTL 1**	**Remember**	**CO5**
18.	What are the Challenges of Reinforcement Learning		**BTL 2**	**Understand**	**CO5**
19.	Name the Kernels used in SVM classification process.		**BTL 3**	**Apply**	**CO5**
20.	Justify the use of Reinforcement Learning?		**BTL 5**	**Evaluate**	**CO5**
	PART – B				
1.	Explain the Naïve Bayesian Classifier	(13)	**BTL 1**	**Remember**	**CO5**
2.	Discuss the Linear regression for machine learning	(13)	**BTL 2**	**Understand**	**CO5**
3.	With a neat flowchart, explain the working of k-NN algorithm.	(13)	**BTL 1**	**Remember**	**CO5**
4.	(i) What are the important objectives of machine learning? (ii) Discuss different examples of machine learnig.	(3) (10)	**BTL 4**	**Analyse**	**CO5**
5.	Discuss the Logistic regression for machine learning	(13)	**BTL 2**	**Understand**	**CO5**
6.	With neat flowgraph and explain the Pooling of Convolution netork	(13)	**BTL 1**	**Remember**	**CO5**
7.	Explain in detail the operation of Support Vector machines.	(13)	**BTL 1**	**Remember**	**CO5**
8.	Discuss the learning tasks and Q learning in the context of reinforcement learning	(13)	**BTL 4**	**Analyse**	**CO5**
9.	With neat algorithm and explain Random Forest Classifier	(13)	**BTL 1**	**Remember**	**CO5**
10.	Differentiate between linear SVM and Kernel SVM Explain with different kernels used in SVM.	(5) (8)	**BTL 2** **BTL 1**	**Understand** **Remember**	**CO5**
11.	Detailed workflow for training and evaluating a deep learning model	(13)	**BTL 5**	**Evaluate**	**CO5**
12.	(i) Compare Reinforcement Learning vs. Supervised Learning (ii) Applications of Reinforcement Learning (iii)Challenges of Reinforcement Learning	(5) (4) (4)	**BTL 4** **BTL 2**	**Analyse** **Understand**	**CO5**
13.	With a neat flowchart, explain the algorithm of SVM.	(13)	**BTL 1**	**Remember**	**CO5**
14.	Explain the components of Markov Decision Process and how to find optimal policy.	(13)	**BTL 5**	**Evaluate**	**CO5**
	PART – C				
1.	(i) Discuss the use of decision tree for classification problem (ii) Describe the ID3 algorithm for decision tree learning with example	(5) (10)	**BTL 2**	**Understand**	**CO5**
2.	Explain the architecture of Convolutional Neural Network with an example	(15)	**BTL 2**	**Understand**	**CO5**
3.	(i) Explain Hypothesis space search in decision tree (ii) Explain inductive in decision tree learning (iii)Write a short note with diagram on Decision trees, which are non linear, non metric classifiers	(5) (5) (5)	**BTL 1**	**Remember**	**CO5**
4.	For choice of your application, design and train the SVM network with different kernels and classify them.	(15)	**BTL 6**	**Create**	**CO5**