Semester: July 2024 –November 2024		
Maximum Marks: 100	**Examination: ESE Examination**	**Duration:3 Hrs.**
Programme code: 02 **Programme: B. Tech. in Electronics Engineering**	**Class:** VII	**Semester: (SVU 2020)**
Institute/School/Department: K. J. Somaiya School of Engineering	**Name of the department:** ETRX	
Course Code: 116U02E712	**Name of the Course: Industrial Product Design**	
Instructions: 1)Draw neat diagrams 2) All questions are compulsory **3) Assume suitable data wherever necessary**		

Que. No.	Question	Max. Marks
Q1	Solve any **Four**	**20**
i)	What is the importance of good interface design?	5
ii)	What are the potential failure modes of the product and its components?	5
iii)	Discuss the sketching process and its need in product design.	5
iv)	Define the term Visualization in product design.	5
v)	What are the most popular and effective software tools used in modern product design?	5
vi)	What is the purpose of prototyping in the product design process?	5

Que. No.	Question	Max. Marks
Q2 A	Solve the following	**10**
i)	Name six key UI design principles and their importance.	5
ii)	What is the role of aesthetics in creating a successful product?	5
	OR	
Q2 A	How can we differentiate our product from competitors through unique features and benefits? Explain with a case study.	10
Q 2 B	Solve any **One**	**10**
i)	How do national and international standards impact product quality, safety, and performance? Give a case study example.	10
ii)	How do UI/UX specifications differ from functional specifications? Discuss with a suitable example.	10

Que. No.	Question	Max. Marks
Q3	Solve any **Two**	**20**
i)	Draw the product life cycle and discuss the key characteristics of each stage of the product life cycle?	10
ii)	What are the challenges and opportunities in incorporating emerging technologies into product design?	10
iii)	How can we design products with a reduced environmental impact throughout their lifecycle?	10

Que. No.	Question	Max. Marks
Q4	Solve any **Two**	**20**
i)	What are the emerging materials and technologies that can revolutionize product design? Discuss using a case study.	10
ii)	What are the challenges and opportunities in automated assembly of products design? Give an example.	10
iii)	What are the ethical considerations in design, particularly in relation to sustainability and social impact? Discuss with suitable example.	10

Que. No.	Question	Max. Marks
Q5	Solve any **four** (Short notes)	**20**
i)	3-D Printing	5
ii)	Exploratory research	5
iii)	Ideation process and importance	5
iv)	Product Modelling	5
v)	Product functionality and importance	5
vi)	Cognitive Ergonomics	5

Semester: July 2023 –October 2023		
Maximum Marks: 100	**Examination: ESE Examination**	**Duration:3 Hrs.**
Programme code: 02 **Programme: B. Tech. in Electronics Engineering**	**Class: LY**	**Semester: VII (SVU 2020)**
Name of the Constituent College: **K. J. Somaiya College of Engineering**	**Name of the department: ETRX**	
Course Code: 116U02E712	**Name of the Course: Industrial Product Design**	
Instructions: 1)Draw neat diagrams 2) All questions are compulsory **3) Assume suitable data wherever necessary**		

Que. No.	Question	Max. Marks
Q1	Solve any **Four**	**20**
i)	How aesthetics can create an emotional connection between products and consumers.	5
ii)	Why is it important for designers to find a harmonious balance between the aesthetics and functionality of product design?	5
iii)	What is cognitive ergonomics, and how does it relate to product design?	5
iv)	Define the term Scalability.	5
v)	Give the steps for the designing of product.	5
vi)	Define the term product assembly.	5

Que. No.	Question	Max. Marks
Q2 A	Solve the following	**10**
i)	Define the term exploratory research in product design.	5
ii)	Discuss the importance of sketching in product design.	5
	OR	
Q2 A	Explain the key stages involved in the New Product Development (NPD) process. Provide a brief description of each stage and highlight the importance of effective management at each step.	10
Q 2 B	Solve any **One**	**10**
i)	Explain the process of evaluating and screening ideas to determine their feasibility and alignment with the organization's goals.	10
ii)	Provide a specific example of a product that has successfully incorporated these design criteria, leading to a high-quality outcome.	10

Que. No.	Question	Max. Marks
Q3	Solve any **Two**	**20**
i)	Discuss methods, organizations can use to gather information about customer requirements, such as surveys, interviews, or market research.	10
ii)	Discuss how well-designed features contribute to the effectiveness and efficiency of the product in meeting user needs.	10
iii)	Explain the significance of comprehending customer needs and preferences before designing product functionality.	10

Que. No.	Question	Max. Marks
Q4	Solve any **Two**	**20**
i)	Provide a comprehensive overview of the role of aesthetics in product design. How do aesthetics influence consumer perceptions, and why is it a crucial aspect of the overall design process? Illustrate your answer with examples from different industries.	10
ii)	Briefly explain how the combination of critical thinking and effective visualization contributes to the creative process in designing products.	10
iii)	Discuss the importance of iterative design and feedback loops to refine functionality based on customer input.	10

Que. No.	Question	Max. Marks
Q5	Write notes on any **four**	**20**
i)	National/International standards of design	5
ii)	Importance of brain storming during the design process	5
iii)	Prototype design	5
iv)	Importance of innovative design	5
v)	Product Manufacturing	5
vi)	3-D modelling tools	5

K. J. Somaiya College of Engineering, Mumbai-77
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End Semester Examinations
May-June 2022

Max. Marks: 100 **Duration: 3Hrs.**
Class: TY Semester: VI
Name of the Course: Industrial Product Design
Branch: ETRX
Course Code: 2UXE605

Instructions:
(1) **All Questions are Compulsory**
(2) **Draw neat diagrams**
(3) **Assume suitable data if necessary**

Question No.		Marks
Q 1	Attempt any two: (a) Explain the product development process with block diagram (b) Describe the factors affecting product design (c) Explain how standardization affects product design. (d) Describe the reasons of diversification in product life cycle.	20
Q 2	Describe the steps involved in quality by design. Explain with case study examples.	20
Q3 (a)	Describe the aspects of Product Quality. Give case study example on quality aspects. **(OR)** Discuss importance of Aesthetics in design and development of any product.	10
Q3 (b)	Give the differences between quality of design and quality of conformance.	10
Q4 (a)	Describe User Interface Design principle. Give case study example.	10
Q4 (b)	Explain the guidelines to design for Manufacturing (DFM) with examples.	10
Q5	Attempt any **four:** (a) Innovation in Material selection (b) Product assembly (c) Effect of visualization in product design (d) Importance of creativity in Product design (e) Effects of testing in development of product (f) Process of Idea development	20

Semester: January 2024– April 2024		
Maximum Marks: 50	**Examination: End-Semester Examination**	**Duration: 2 Hrs.**
Programme code: 02 **Programme: B. Tech in Electronics Engineering**	**Class: L.Y.**	**Semester: VIII (SVU 2020)**
Name of the College: **K. J. Somaiya College of Engineering**	**Name of the department: ETRX**	
Course Code: 116U02E811	**Name of the Course: Introduction to Cryptography and Network Security (ICNS)**	
Instructions: 1) Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary		

Que. No.	Question Statement	Max. Marks
Q.1	Attempt any **two**	
i)	What are replay attacks? Give an example of replay attacks.	05
ii)	Discuss the concept of phishing with an example.	05
iii)	Explain key principles of security with example of each.	05
Q.2	Attempt any **one**	10
i)	a) Convert the Given Text "CRYPTOGRAPHY" into cipher text using Rail fence Technique. b) Given Cipher text "YMJTYMJWXNIJTKXNQJSHJ", the message is encrypted by Caesar cipher and k=5. Decrypt the message.	5 5
ii)	Encrypt the following using play fair cipher using the keyword MONARCHY. Use X for blank spaces "SWARAJ IS MY BIRTH RIGHT	
Q.3	Attempt any **one**	10
i)	Write the characteristics of a good firewall implementation. How is circuit gateway different from an application gateway?	
ii)	What is a VPN? Explain working of VPN with reference to its architecture.	
Q.4	Attempt the following.	10
i)	What is digital signature? How RSA is used for performing digital signatures?	

Q.5	Attempt the following.	**10**
	Use RSA algorithm to encrypt the message M =123 using following parameters p=11, q=3, e=13 Also perform and show the decryption steps for the obtained cipher text.	

Maximum Marks: 100	**Semester: July 2024 –November 2024** **Examination: ESE Examination**	**Duration:3 Hrs.**
Programme code: 116 **Programme: Electronics Engineering**	**Class:** LY	**Semester: VII (SVU 2020)**
Institute/School/Department: K. J. Somaiya School of Engineering	**Name of the department:** ETRX	
Course Code: 116U02E713	**Name of the Course: Machine Learning**	
Instructions: 1)Draw neat diagrams 2) All questions are compulsory **3) Assume suitable data wherever necessary**		

Que. No.	Question(s)	Max. Marks
Q1	Solve any **Four**	**20**
i)	Explain in brief the bias-variance trade-off in machine learning.	5
ii)	Define multiple linear regression and discuss one practical example of its application.	5
iii)	Define the cost function for linear regression and describe the gradient descent optimization approach to minimize this cost.	5
iv)	Provide a case study example where logistic regression can be applied effectively.	5
v)	With respect to Naive Bayes, explain Bayes' Rule and its application in the Naive Bayes Classifier for spam detection.	5
vi)	What is clustering? Explain the K Means algorithm	5

Que. No.	Question(s)	Max. Marks
Q2 A	Solve the following	**10**
i)	Explain the concept of overfitting and under fitting in linear regression.	5
ii)	Describe the sigmoid function in logistic regression and explain how it helps classify data points in binary classification.	5
	OR	
Q2 A	Explain the challenges of using logistic regression for multiclass classification and describe the "soft-max" approach to extend logistic regression for multiclass cases.	10
Q 2 B	Solve any **One**	**10**
i)	Describe the concept of Maximum Likelihood Estimation (MLE) and how it is used in training a Naïve Bayes classifier. Provide an example involving a categorical dataset with conditional probabilities.	10
ii)	Given a dataset with two classes, Class A and Class B, calculate the optimal hyperplane using SVM if the support vectors are located at points (1, 2) and (2, 3) for Class A, and (3, 3) and (4, 5) for Class B. Assume a linear kernel. Show the steps involved in calculating the margin and formulating the decision boundary.	10

Que. No.	Question(s)			Max. Marks
Q3	Solve any **Two**			**20**
i)	Use K Means algorithm to create two clusters			10
	Object	Attribute-1 (x)	Attribute-2 (y)	

	A	2	2	
	B	3	2	
	C	1	1	
	D	3	1	
	E	1.5	0.5	
ii)	Discuss the application of PCA in reducing the dimensionality of a high-dimensional dataset. Provide an example where PCA could be applied, and explain how the principal components are selected to retain the maximum variance.			10
iii)	Describe one real-world application of hierarchical clustering and explain how it groups data into clusters.			10

Que. No.	Question(s)	Max. Marks
Q4	Solve any **Two**	**20**
i)	Explain the mathematical formulation of the SVM optimization problem for a linearly separable dataset. Derive the objective function and constraints, and describe how maximizing the margin enhances model accuracy.	10
ii)	What are the steps in designing a machine learning problem? Discuss with suitable example.	10
iii)	What is learning? Derive an expression for any two learning algorithms.	10

Que. No.	Question(s)	Max. Marks
Q5	Solve any **four** (Short notes)	**20**
i)	Training, Testing and Validation (K-fold cross validation)	5
ii)	Elastic Net Regression	5
iii)	Analysis, Testing of hypotheses	5
iv)	Types of Unsupervised Learning	5
v)	Need of Multilayer Perceptron	5
vi)	Classification Vs Regression	5

19/05/2022

K. J. Somaiya College of Engineering, Mumbai-77
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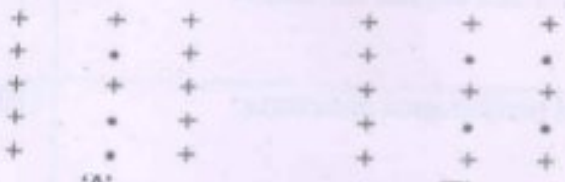
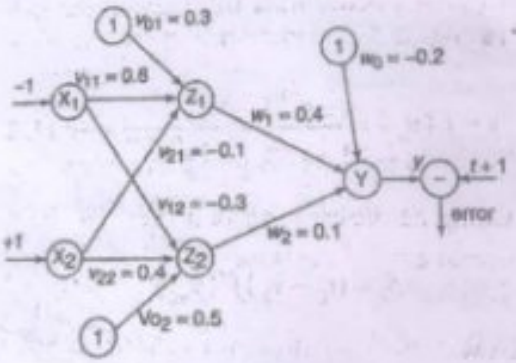
End Semester Examinations
May-June 2022

Max. Marks: 100 **Duration:** 3 Hrs
Class: TY Semester: VI
Name of the Course: Artificial Neural Network and Fuzzy System
Branch: Electronics
Course Code: 2UXE601

Instructions:
(1) **All Questions are Compulsory**
(2) **Draw neat diagrams**
(3) **Assume suitable data if necessary**

Question No.		Marks
Q 1 (a)	Classify the input patterns shown below using Hebb training algorithm. Assume bipolar input and target.  'A' 'E' Target value +1 −1 Train up to one epoch.	(10)
Q 1 (b)	Differentiate following **(Any two)** i. Biological NN and Artificial NN ii. Unsupervised and Reinforcement learning iii. Linear and nonlinear separability iv. Training and testing of Hopfield network	(10)
Q2 (a)	Attempt **(Any Two)** i. Discuss the selection of tuning parameters in BPN ii. Comparison of RBF and MLP Network iii. Delta learning Rule iv. Multilayer perceptron	(10)
Q2 (b)	Find the new weights after one epoch, using back propagation network for the following network. The network is presented with the input pattern [-1,1] and the target output is +1. Use a learning rate of α=0.25 and bipolar sigmoidal function.	(10)

		
Q3 (a)	Design a Kohonen self-organizing net with two cluster unit and five input units. The weight vectors for the cluster units are given by W1=[1.0 0.9 0.7 0.5 0.3] W2=[0.3 0.5 0.7 0.9 1.0] Use the square of the Euclidean distance to find the winning cluster unit for the input pattern X=[0.0 0.5 1.0 0.5 0.0] and learning rate 0.25, find the new weights for winning unit.	(10)
Q3 (b)	What are the key concept of Adaptive Resonant Theory Network? Draw the fundamental architecture of ART 1 and explain the role of supplement unit of ART 1	(10)
Q4 (a)	Discuss the following computational performance parameter i. Confusion Matrix ii. Cross validation	(10)
Q4 (b)	Discuss the following recent trends in ANN **(Any one)** i. Predicting car performance ii. Predicting tumor	(10)
Q5	Design a Fuzzy controller to regulate the temperature of a domestic shower. Assume that i. The temperature is adjusted by single mixer tap ii. The flow of water is constant iii. Control variable is the ratio of the hot to the cold water input iv. Assume five descriptor for each input and output The design should clearly mention the descriptors used for Fuzzy sets and control variables, set of rules to generate control action and defuzzyfication. The design should be supported by diagram whenever possible. **OR** Draw the block diagram of Fuzzy controller system and explain the following with suitable diagram and example i. Difference with Crisp and Fuzzy values ii. Fuzzification and Membership function iii. Defuzzification methods iv. Fuzzy knowledge base v. Mamdani Fuzzy Model vi. Fuzzy controller design steps	(20)

K. J. Somaiya College of Engineering, Mumbai-77
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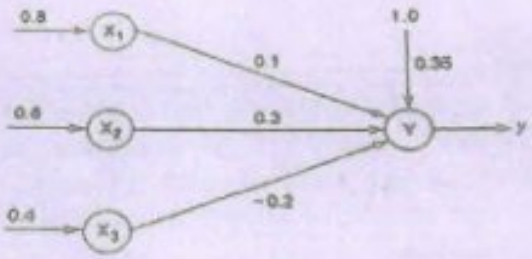
End Semester Examinations
May 2023

Max. Marks: 100 **Duration: 3 Hrs**
Class: TY Semester: VI
Name of the Course: Artificial Neural Network and Fuzzy system
Branch: Electronics
Course Code: 2UXE601

Instructions:
(1) All Questions are Compulsory
(2) Draw neat diagrams
(3) Assume suitable data if necessary

Que. No.	Question	Max. Marks
Q1	Solve any **Four**	**20**
i)	Describe biological neurons. How are Neural Networks modelled?	5
ii)	Define basic models of ANN.	5
iii)	What is an Activation Function? Describe four activation functions.	5
iv)	Compare BNN and ANN.	5
v)	Discuss the basic functional units of ANN for pattern recognition tasks.	5
vi)	Differentiate between Auto associate and Hetero associative neural network.	5
Que. No.	**Question**	**Max. Marks**
Q2 A	Solve the following	**10**
i)	Obtain the output of the neuron Y for the network shown below using binary sigmoidal function. 	5
ii)	Basic characteristics of ANN on the basis of • Architecture • Learning algorithm • Activation function	5
	OR	
Q2 A	Develop a perceptron for the OR function with bipolar inputs and target. Assume initial weight and bias one. Train the model up to one epoch.	10
Q 2 B	Solve any **One**	**10**
i)	Explain the training and testing of Back Propagation Neural Network	10

	(BPN) with the help of flow chart.	
ii)	With the help of suitable block diagram explain reinforcement learning. In what way it is different from supervised learning?	10
Que. No.	Question	Max. Marks
Q3	Solve any Two	20
i)	What are the objectives of K means clustering? Discuss the same with architecture and algorithm.	10
ii)	What are the key concept of Adaptive Resonant Theory Network? Draw the fundamental architecture of ART 1 and explain the role of supplement unit of ART 1	10
iii)	Design a Kohonen self-organizing net with two cluster unit and five input units. The weight vectors for the cluster units are given by W1=[1.0 0.9 0.7 0.5 0.3] W2=[0.3 0.5 0.7 0.9 1.0] Use the square of the Euclidean distance to find the winning cluster unit for the input pattern X=[0.0 0.5 1.0 0.5 0.0] and learning rate 0.25, find the new weights for winning unit.	10
Que. No.	Question	Max. Marks
Q4	Solve any Two	20
i)	Discuss the following computational performance parameter a) Confusion Matrix b) Cross validation	10
ii)	Draw the block diagram of Fuzzy controller system and explain the following a) Crisp and Fuzzy values b) Fuzzification and Membership function c) Defuzzification methods d) Fuzzy knowledge base e) Fuzzy controller design steps	10
iii)	Design a fuzzy controller for a train approaching station. Inputs are speed and distance and output is break-power. Consider three descriptor for input and five descriptor for output. Design a set of rules for control action and defuzzification. The design should be supported by figures wherever possible.	10
Que. No.	Question	Max. Marks
Q5	Write notes on any four	20
i)	Differentiate between Supervise and Unsupervised learning	5
ii)	Apply appropriate Neural Network architecture for Stock prediction	5
iii)	RBF Neural Network	5
iv)	What is Underfitting and Overfitting in machine learning and how to deal with it?	5
v)	Discuss training and testing of Hopfield network	5
vi)	Discuss five applications of fuzzy logic system.	5

K. J. Somaiya College of Engineering, Mumbai-77
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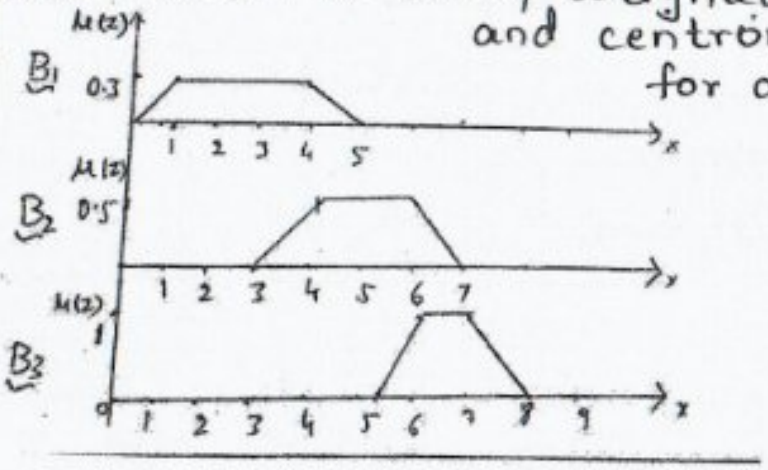
End Semester Exam
May –June 2019

Max. Marks: 100 **Duration: 3 Hrs.**
Class: TY Semester: VI
Name of the Course: Machine Learning and Fuzzy System
Branch: All
Course Code: UEXI604

Instructions:
(1) All Questions are Compulsory
(2) Draw neat diagrams
(3) Assume suitable data if necessary

Question No.		Max. Marks
Q 1 (a)	Draw the Mathematical model of artificial neural network. List the various activation functions and learning rules used in neural network architecture.	(10)
Q 1 (b)	Differentiate between supervised, unsupervised and Reinforcement learning with suitable example.	(10)
Q2 (a)	Develop a perceptron learning for the AND function with bipolar inputs and target.	(10)
Q2 (b)	Discuss the concept of clustering in machine learning algorithm. Describe any one clustering algorithm with example. **OR** Describe the concept of linearly and non-linearly separable pattern and also discuss the need of Multilayer Perceptron	(10)
Q3 (a)	Design a Kohonen self-organizing net with two cluster unit and five input units. The weight vectors for the cluster units are given by W1=[1.0 0.9 0.7 0.5 0.3] W2=[0.3 0.5 0.7 0.9 1.0] Use the square of the Euclidean distance to find the winning cluster unit for the input pattern X=[0.0 0.5 1.0 0.5 0.0] and learning rate 0.25, find the new weights for winning unit.	(10)
Q3 (b)	Construct an auto associative discrete Hopfield network with input vector [1 1 1 -1]. Test the discrete Hopfield network with missing entries in first and second components of the stored vector. Do the same upto two Iterations. **OR** Construct and test a BAM network to associate letters E and F with simple bipolar input output rectors. The target outputs are (-1,1) and (1,1) for the inputs E and F respectively. Display the matrix size for the input pattern as 5×3.	(10)

Q4 (a)	A railroad company intends to lay a new rail line in a particular part of a country, The whole area through which the new line is passing must be purchased for right of way considerations. It is surveyed and 3 fuzzy sets B1, B2, and B3 are defined as shown in the figure. Aggregate these 3 surveys to find the single most nearly representative right of way width (Z) to allow the railroad to make its initial estimate of the expenditure. Use Center of Sum, weighted average and centroid methods for defuzzification.  	(10)
Q4 (b)	What are tolerance and equivalence relations? How are a crisp tolerance relation and a Fuzzy tolerance relation converted to crisp equivalence relation and fuzzy equivalence relation respectively?	(10)
Q5	Design a controller to determine the wash time of a domestic washing machine. Assume that input is dirt and grease on cloths. Use the following a) Three descriptors for input variables b) Five descriptor for output variables c) If the cloths are soiled to a larger degree the wash time will be more Derive set of rules for controller action and defuzzification. The design should be supported by diagram whenever possible. **OR** Discuss the following with suitable figure and example a) Fuzzy Inference system b) Fuzzy membership functions	(20)

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K. J. Somaiya College of Engineering, Mumbai-77
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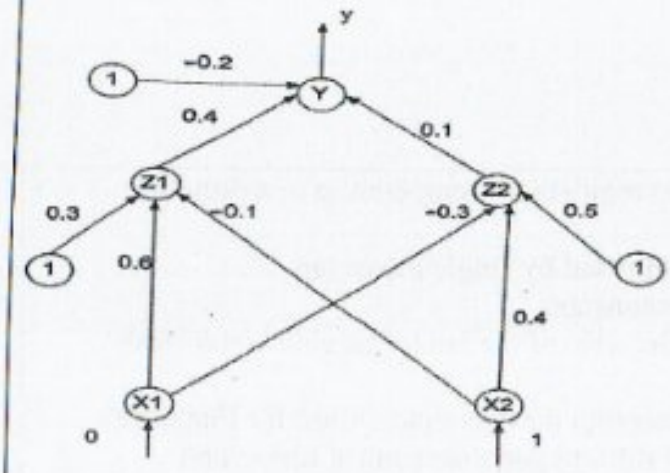
End Semester Exam
November December – 2019

Max. Marks: 100 | **Duration: 3 Hrs.**
Class: LY | Semester: VII
Name of the Course: Artificial Neural Network & Fuzzy System
Branch: Electronics
Course Code: UEXE706

Instructions:
(1) All Questions are Compulsory
(2) Draw neat diagrams
(3) Assume suitable data if necessary

Question No.		Max. Marks
Q 1 (a)	Describe the generalized ANN Model with the following a) The models synaptic interconnection b) The training rules c) Their activation function	(10)
Q 1 (b)	Design a Hebb net to implement logic AND function. Use bipolar inputs and target.	(10)
Q2 (a)	Apply back-propagation network to find the new weights for the following net.  Use input pattern [0, 1] , Target output=1, Learning rate α =0.25 and Activation function= Binary Sigmoidal	(10)
Q2 (b)	Implement MADALINE network for an AND function. Assume the necessary parameter. Use bipolar inputs and targets to make the network converge. Train the network up to one epoch. **OR** Compare the following a) ART 1 and ART 2 b) RBF and MLP	(10)

Q3 (i)	Find the weight matrix in bipolar form for the bidirectional associative memory using outer products rule for the following binary input-output vector pairs: S(1)=(1 0 0 0), t(1)=(1 0) S(2)=(1 0 0 1), t(2)=(1 0) S(3)=(0 1 0 0), t(3)=(0 1) S(4)=(0 1 1 0), t(4)=(0 1) Using the unit step function (with threshold 0) as the output activation function, test the response of the network on each of the input patterns. **OR** What is the significance of Associative neural networks? Differentiate between Auto associate and Hetero associative neural network with suitable example.	(10)
Q3 (ii)	Discuss the following computational performance parameter a) Confusion Matrix b) Cross validation	(10)
Q4 (i)	Apply appropriate Neural Network architecture for the following application **(Any One)** a) Recognition of Olympic games symbols, b) Recognition of printed characters.	(10)
Q4 (ii)	Describe the following fuzzy member ship functions a) Increasing and decreasing MFs b) Trapezoidal MFs c) Gaussian MFs d) Cauchy MFs e) Sigmoidal MFs	(10)
Q5	Design a Fuzzy controller to regulate the temperature of a domestic shower. Assume that a) The temperature is adjusted by single mixer tap b) The flow of water is constant c) Control variable is the ratio of the hot to the cold water input The design should clearly mention the descriptors used for Fuzzy sets and control variables, set of rules to generate control action and defuzzyfication. The design should be supported by diagram whenever possible. **OR** Discuss the following with suitable diagram and example a) Mamdani Fuzzy Model b) Fuzzy knowledge base controllers	(20)