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Program: BE Electronics and Telecommunication Engineering
Curriculum Scheme: Revised 2019
Examination: Third Year VI Semester
Course Code: ECC604 and Course Name: Artificial Neural Networks and Fuzzy Logic

Time: 2 Hour and 30 Min | Max. Marks: 80

Note to the students: - All the Questions are compulsory and carry equal marks.

Q1.	XOR problem is exceptionally interesting to neural network researchers because
Option A:	It can be expressed in a way that allows you to use a neural network
Option B:	It is complex binary operation that cannot be solved using neural networks
Option C:	It can be solved by a single layer perceptron
Option D:	It is the simplest linearly inseparable problem that exists.
Q2.	The network that involves backward links from output to the input and hidden layers is called as
Option A:	Self-organizing maps
Option B:	Perceptron
Option C:	Recurrent neural network
Option D:	Multi layered perceptron
Q3.	Automated vehicle is an example of
Option A:	Supervised Learning
Option B:	Unsupervised Learning
Option C:	Kohonen Learning
Option D:	Reinforcement Learning
Q4.	In an Unsupervised learning
Option A:	Specific output values are given
Option B:	Specific output values are not given
Option C:	No specific Inputs are given
Option D:	Both inputs and outputs are given
Q5.	_____ computes the output volume by computing dot product between all filters and image patch.
Option A:	Input Layer
Option B:	Convolution Layer
Option C:	Activation Function Layer
Option D:	Pool Layer
Q6.	If an input image is a matrix of size 28 X 28 and a kernel/filter of size 7 X 7 with a stride of 1. What will be the size of the convoluted matrix?
Option A:	20 x 20
Option B:	26 x 26
Option C:	24 x 24
Option D:	22 x 22

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Q7.	In a simple Multi-layer Perceptron neural network model with 10 neurons in the input layer, 4 neurons in the hidden layer and 1 neuron in the output layer. What is the size of the weight matrices between hidden output layer and input hidden layer?
Option A:	[1 X 4] , [4 X 10]
Option B:	[4 X 1] , [10 X 4]
Option C:	[10 X 4] , [4 X 1]
Option D:	[10 X 4] , [1 X 4]
Q8.	In a fuzzy set, the membership function generally in ranges
Option A:	10-100
Option B:	100-1000
Option C:	1-10
Option D:	0 – 1
Q9.	Three main basic features involved in characterizing membership function are
Option A:	Intuition, Inference and Rank ordering
Option B:	Weighted Average, Mean of maximum, Centroid
Option C:	Fuzzification, Defuzzification, Knowledge base
Option D:	Core, Support and Boundary
Q10.	In SVM, if the number of input features is 2, then the hyper plane is a _____.
Option A:	Line
Option B:	Plane
Option C:	Circle
Option D:	Square

Q2	Solve any Four out of Six (5 marks each)
A	Compare Artificial Neurons with Biological Neurons. Draw the structure of Biological Neuron.
B	What are Support Vectors in Support Vectors Machines (SVM)? How SVM differs from conventional classifiers?
C	Draw two input AND gate using MP neuron
D	What do you mean by K Means algorithm? Where is it used?
E	What are the different types of Neural Network architectures?
F	Prove Demorgans's Theorem for the given two fuzzy sets Fuzzy set $A=\left\{\frac{0.4}{10}+\frac{0.9}{20}+\frac{0.1}{30}\right\}$ and Fuzzy set $B=\left\{\frac{0.2}{10}+\frac{0.7}{20}+\frac{0.6}{30}\right\}$

Q3	Solve any Two out of Three (10 marks Each)
A	What is Mamdani Fuzzy Inference System (FIS) ? What is the use of knowledge base and rule base in FIS? Draw the block diagram of FIS.
B	Organize the given samples (1 1 0 0), (0 0 0 1), (1 0 0 0) into two clusters using Kohonen self-organizing map. Assume the learning rate as 0.1.The weight matrix is given by

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	$w_{ij} = \begin{pmatrix} 0.1 & 0.6 \\ 0.2 & 0.8 \\ 0.8 & 0.2 \\ 0.1 & 0.5 \end{pmatrix}$
C	With neat flow chart, describe the training algorithm for Perceptron network.

Q4	Solve any Two out of Three (10 marks each)
A	Design a fuzzy controller to determine the wash time of a fuzzy washing machine. Assume the two fuzzy inputs are dirtiness of cloth and washing load. Consider 3 descriptors for both inputs and output. Show that wash time is high if clothes are soiled to higher degree.
B	Draw Hopfield network with four output nodes. List the steps involved in its testing algorithm. For an input vector (1 1 0 1), calculate the weight matrix.
C	Draw the architecture of simple Convolution Neural Network. Define the following terms with respect to CNN. i. Convolution ii. Max Pooling iii. ReLU Activation iv. Flattening