Paper ID : 250341

Roll No: | | | | | | | | | | | | | |

MCA
(SEM IV) THEORY EXAMINATION 2024-25
NEURAL NETWORK

TIME: 3 HRS **M.MARKS: 100**

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

Q No.	Question	CO	Level
a.	What are the features of neural networks?	1	K1
b.	Differentiate between supervised and unsupervised learning in artificial neural networks.	1	K2
c.	What are main components of McCulloch-Pitts neuron model?	2	K1
d.	Explain why a single-layer perceptron cannot solve nonlinearly separable problems.	2	K3
e.	Why moment based heuristic is used in back propagation?	3	K1
f.	Differentiate between local minima and global minima back propagation learning algorithm.	3	K2
g.	What is a recurrent neural network (RNN)?	4	K2
h.	What do you mean by principal component analysis (PCA)?	4	K1
i.	What is meant by hybrid soft computing techniques?	5	K1
j.	Write down the application of Soft computing.	5	K3

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

Q No.	Question	CO	Level
a.	What does "competitive learning" mean in the context of ANNs?	1	K2
b.	What is Hebbian learning and how is it applied in Hebb networks?	2	K3
c.	Explain Multi-layer neural network with proper diagram.	3	K1
d.	Describe the architecture and training algorithm of Kohonen's Self-Organizing Feature Map (SOM).	4	K1
e.	Explain the basic concept and working of Support Vector Machines (SVM).	5	K2

SECTION C

3. Attempt any *one* part of the following: **10 x 1 = 10**

Q No.	Question	CO	Level
a.	Define knowledge representation and explain it with proper example.	1	K2
b.	Explain the **statistical nature of the learning process** in artificial neural networks (ANNs).	1	K3

4. Attempt any *one* part of the following: **10 x 1 = 10**

Q No.	Question	CO	Level
a.	Discuss the various activation functions. Explain them schematically.	2	K1

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b.	Compare **gradient descent** and **least mean square (LMS)** algorithms in perceptron training.	2	K2

5. Attempt any *one* part of the following: 10 x 1 = 10

Q No.	Question	CO	Level
a.	Explain the **backpropagation algorithm** in multilayer networks. How does it address the problem of local minima?	3	K2,K3
b.	What is a Radial Basis Function (RBF) network? Explain its architecture, training procedure, and approximation capabilities.	3	K2

6. Attempt any *one* part of the following: 10 x 1 = 10

Q No.	Question	CO	Level
a.	Explain the architecture and learning algorithm of Learning Vector Quantization (LVQ).	4	K2
b.	Compare and contrast Principal Component Analysis (PCA) and Independent Component Analysis (ICA).	4	K3

7. Attempt any *one* part of the following: 10 x 1 = 10

Q No.	Question	CO	Level
a.	Explain the **Cognitron network** and its biological inspiration. How does its hierarchical structure differ from a multilayer perceptron (MLP)?	5	K2
b.	Describe the **architecture of a hybrid neuro-fuzzy system**	5	K1