

AR – 2548

Third Semester M. Sc. (Applied Electronics) Examination

NEURAL NETWORKS AND PATTERN RECOGNITION

Paper – 3 AE 5

(Elective – II)

(USC – 15042)

P. Pages : 3

Time : Three Hours]

[Max. Marks : 80

- Note :** (1) Separate answer book must be used for each section in the subject Geology, Engineering material of civil branch and Separate answer book must be used for Section A and B in Pharmacy and Cosmetic Tech.
- (2) Answer **Three** questions from Section A and **Three** questions from Section B.
- (3) Due credit will be given to neatness and adequate dimensions.
- (4) Assume suitable data wherever necessary.
- (5) Illustrate your answer wherever necessary with the help of neat sketches.
- (6) Use pen of Blue/Black ink/refill only for writing the answer book.

SECTION A

1. (a) What do you understand by statistical pattern recognition ? Explain with an appropriate example. 7
- (b) Explain clearly the differences between classification problem and a regression problem. 6

OR

2. (a) Why do pre-processing and feature extraction have a significant impact on the final performance of a pattern recognition system ? Explain. 7
- (b) What is polynomial curve fitting ? Explain. 6
3. (a) Explain the concept of a linear separability by considering simple two-input AND Gate and two-input OR Gate problems. 7
- (b) Why can't single layer perceptron network solve non-linearly separable classification problem such as Two-input XOR Gate ? Justify your answer. 7

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OR

4. (a) Draw and explain the architecture of the multi-layer perceptron which has a single hidden layer with 5 processing elements. The network should have three inputs and four outputs. The hidden and output layer processing elements have sigmoidal activation functions. 7
- (b) State and explain Kolmogorov's theorem in the context of Neural Networks. 7
5. (a) Compare Radial Basis Function neural network with multilayer perceptron neural network. 7
- (b) Explain why the decision boundary estimated by the RBF neural network is always closed where as the decision boundary estimated by the MLP neural network is always open-ended. 6

OR

6. (a) Explain how basis function optimization is accomplished in RBF neural networks. 7
- (b) Once the radial basis functions are determined how are connection-weights estimated in RBF neural network ? What type of training is used for training of RBF network ? 6

SECTION B

7. (a) Explain the concept of sum-of-squares error. 7
- (b) How do you model conditional distributions ? 6

OR

8. (a) Explain sum-of-squares for classification problems. 7
- (b) How is the concept of cross entropy be applied to the training of neural networks ? 6

9. (a) Explain the importance of line search in conjugate-gradient algorithm. 7
(b) What are the basic principles of Newton's method ? What do you mean by Newton direction ? Explain. 7

OR

10. (a) What is the concept of conjugate directions ? Summarize the key steps of conjugate-gradient algorithm. 7
(b) Explain the concept of error surfaces with the help of suitable sketches. Locate various stationary points such as local minimum global minimum and saddle-point on this error surface. What is the condition that has to be satisfied by all these points ? 7
11. (a) How do you deal with the missing data while training the neural network ? 7
(b) Compare and contrast neural network growing and pruning algorithms. 6

OR

12. (a) What are the advantages of neural network training with addition of noise into the input vectors during training process ? Explain. 6
(b) What is the concept of committee of neural networks ? Explain. 7



