Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14EC2058** | **Duration :** | **3hrs** |
| **Sub. Name :** | **NEURAL NETWORKS AND FUZZY SYSTEMS** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | | Discuss the following characteristics of artificial neural networks.  (i) architecture (ii) training and (iii) activation functions. | CO1 | 15 |
| b. | | Write briefly the limitations of single layer neural networks. | CO3 | 5 |
| **(OR)** | | | | | |
| 2. | a. | With suitable diagram explain the procedure to train the hidden layers in Backpropagation neural network. | | CO1 | 10 |
| b. | Find the suitable weights of a McCulloch Pitts Neuron for OR and XOR function. | | CO1 | 10 |
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| 3. | a. | Find the weight values of a Perceptron network for AND function with bipolar inputs and targets, α = 1 and intial weights are zeros. | | CO1 | 10 |
| b. | Explain the training algorithm of Adaline network. | | CO1 | 10 |
| **(OR)** | | | | | |
| 4. | a. | Draw the architecture of Mexican hat network and explain the procedure for its training. | | CO1 | 15 |
| b. | Discuss how associative memories can be used for medical applications. | | CO2 | 5 |
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| 5. | a. | Given a Kohonen’s Self Organizing Map (KSOM) with weight matrix W = [0.3,0.6,0.1,0.4,0.8; 0.7,0.9,0.5,0.3,0.2]. Use square of Euclidean distance to finc the cluster (winning) unit closest to input vector (0.5, 0.2). Use a learning rate of 0.2 and find the new weights of the winning unit. If its immediate neighbors are allowed to learn the input pattern, find their new weights. | | CO1 | 15 |
| b. | Discuss the types of neighborhoods in KSOM. | | CO1 | 5 |
| **(OR)** | | | | | |
| 6. |  | Explain the training algorithm of Learning Vector Quantization (LVQ) for pattern classification. Illustrate the same with an example. | | CO1 | 20 |
|  |  |  | |  |  |
| 7. | a. | For the given fuzzy sets D1 ={1/1 + 0.75/1.5 + 0.3/2 + 0.15/2.5 + 0/3}, D2 = {1/1 + 0.6/1.5 + 0.2/2 + 0.1/5 + 0/3}, find (i) D1U D2 (ii) D1∩D2 (iii) D1’ (iv) D2’ (v)D1|D2 and (vi) D2|D1 | | CO1 | 12 |
| b. | Discuss the various membership functions. | | CO1 | 8 |
| **(OR)** | | | | | |
| 8. | a. | | With necessary diagram describe Sugeno fuzzy model. | CO3 | 12 |
| b. | | For the fuzzy relations RX×Y = {0.7, 0.5; 0.8,0.4}, SY×Z = {0.9,0.6,0.2; 0.1,0.7,0.5} find the fuzzy relation TX×Z using max-min and max-product compositions. | CO1 | 8 |
|  | | | **Compulsory**: |  |  |
| 9. | a. | | Discuss the important aspects of fuzzy pattern recognition. | CO3 | 8 |
| b. | | Describe the fuzzy procedure to perform contrast enhancement of images. | CO3 | 12 |

**Course Outcomes:**

After completion of the course, students will be able to:

**CO1:** Apply the concepts of Neural Network and Fuzzy logic in practical applications

**CO2:** Confidence to use the concept of Neural networks in medical field.

**CO3:** Use the knowledge gained by practical application in companies