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



**End Semester Examination – Nov/Dec– 2017**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **17BM3003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **SOFT COMPUTING TECHNIQUES FOR BIOMEDICAL ENGINEERS** | **Max. marks :** | **100** |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Apply delta learning rule for with initial weight vector w = [1 -1 0 0.5] needs to be trained using the set of 3 input vector.  x1= [1 -2 0 -1] x2= [1 1.5 -0.5 -1] x3= [-1 1 0.5 -1] for an arbitrary choice of learning constant c=0.1 and desired response d1= -1, d2 = -1, d3 = 1. | CO1 | 14 |
| b. | Realize NOT function using McCulloch-Pitts neuron model. | CO2 | 6 |
| (OR) | | | | |
| 2. | a. | Compare biological neural network with artificial neural network. | CO1 | 6 |
| b. | A hetero associative net is trained by Hebb outer product rule for input row vectors S=(x1,x2,x3,x4) to output row vectors t= (t1,t2). Find the weight matrix and the test the network with the training input vectors.  S1= (1 1 0 0) t1= (1 0)  S2= (0 1 0 0) t2= (1 0)  S3= (0 0 1 1) t3= (0 1)  S4= (0 0 1 0) t4= (0 1) | CO2 | 14 |
|  |  |  |  |  |
| 3. | a. | Explain the algorithm for Back-propagation training and explain about the updation of weight. Also mention the merits, demerits and of Back Propagation Algorithm. | CO1 | 14 |
|  | b. | Distinguish between: supervised and unsupervised learning rule | CO1 | 6 |
| (OR) | | | | |
| 4. | a. | What is biological neuron and explain how information flow takes place in nervous system. | CO2 | 10 |
|  | b. | Discuss how Neural Networks are used for Classification and Pattern Recognition of Biological Signals. | CO4 | 10 |
|  |  |  |  |  |
| 5. | a. | Explain in detail the different defuzzification methods used in fuzzy logic control. | CO1 | 10 |
|  | b. | Define the term fuzzy relation. List and discuss the operations and properties of fuzzy relations. | CO1 | 10 |
| (OR) | | | | |
| 6. | a. | Design a fuzzy controller for blood pressure during anesthesia. | CO5 | 10 |
|  | b. | With suitable example, discuss the major modules involved in the design of a fuzzy control system. | CO1 | 10 |
|  |  |  |  |  |
| 7. | a. | Discuss with example, Biomedical Image Edge Detection using an Ant Colony Optimization technique. | CO5 | 14 |
|  | b. | Compare Genetic Algorithm with traditional search methods. | CO2 | 6 |
| (OR) | | | | |
| 8. | a. | Explain three basic operations used in genetic algorithm. | CO1 | 10 |
|  | b. | Define mutation rate. Give the significance of using mutation rate in genetic algorithm. | CO2 | 10 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | A factory process control operation involves two linguistic parameters consisting of pressure and temperature in a fluid delivery system. We characterize each parameter in fuzzy linguistic terms as follows;  Low temperature=  High temperature =  High pressure =  Low pressure =  Find the following membership function   1. Temperature not very low 2. Temperature not very low and not very high 3. Pressure slightly high 4. Pressure fairly high [light] | CO6 | 14 |
|  | b. | Explain the different types of membership functions in fuzzy logic. | CO1 | 6 |

ALL THE BEST