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



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

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| **Code :** | **18BM3012** | **Duration :** | **3hrs** |
| **Sub. Name :** | **COGNITIVE TECHNOLOGY FOR BIOMEDICAL ENGINEERS** | **Max. Marks :** | **100** |

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| **Q. No.** | **Sub Div.** | **Questions** | **Course Outcome** | **Marks** |
| **ANSWER ANY FIVE QUESTIONS (5 x 16 = 80 Marks)** | | | | |
| 1. | a. | Compare the performance of an Artificial Neural System and that of a Biological Neural Network in terms of speed of processing, size and complexity, storage, fault tolerance and control mechanism. | CO1 | 8 |
| b. | Perform two training step of the network using perceptron learning rule for η = 0.5. The training pair is x1=[11 -1], d­1=1 and x2=[1 1 2], d2=1 Assume bipolar binary activation function. The initial weights are [1 0 -1]. | CO2 | 8 |
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| 2. | a. | Write the steps involved in back propagation algorithm and derive the expression for generalized delta learning rule for weight adjustment. | CO1 | 8 |
| b. | Discuss the use of Kohonen’s Self Organizing Map for classification in medical diagnostic applications. | CO1 | 8 |
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| 3. | a. | Differentiate between the Classical and Fuzzy Logic Techniques. Write down the steps to design a fuzzy logic controller for blood pressure control during anesthesia. | CO6 | 8 |
| b. | Mention the various types of fuzzy inference mechanisms and explain the features of each one with an example. | CO4 | 8 |
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| 4. | a. | Comment on the following terms relevant to Genetic Algorithm.  i) Chromosomes ii) Reproduction  iii) Crossover iv) Mutation | CO3 | 8 |
| b. | Summarize the process of multilevel optimization using Genetic Algorithm. | CO3 | 8 |
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| 5. | a. | Discuss the integration of genetic algorithm with fuzzy logic for design of optimized fuzzy systems. | CO5 | 8 |
| b. | Specify the advantages of hybrid soft computing techniques. Illustrate with necessary explanations a case study of biomedical application using hybrid soft computing techniques. | CO5 | 8 |
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| 6. | a. | Comment on the various defuzzification techniques used for the conversion of linguistic variable into a crisp quantity. | CO4 | 8 |
| b. | Write a short note on fuzzy measures used in decision making. | CO2 | 8 |
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| 7. | a. | Comment on the effect of momentum factor and learning rate on the performance of a back propagation network. | CO2 | 8 |
| b. | Differentiate between Autoassociative and Hetero associative network with examples. | CO4 | 8 |
| **COMPULSORY QUESTION (1 x 20 = 20 Marks)** | | | | |
| 8. | a. | Discuss briefly the optimization of Traveling Salesman Problem using genetic algorithm. | CO6 | 10 |
| b. | With necessary diagrams and algorithms, illustrate a medical diagnostic case study that uses the soft computing techniques. | CO6 | 10 |