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



**End Semester Examination – Nov/Dec – 2018**

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

**ANSWER ANY FIVE QUESTIONS (5 x 16 = 80 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | State the characteristics of an artificial neural network. | CO1 | 8 |
| b. | Using linear seperability concept, obtain the response for NAND function. | CO1 | 8 |
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| 2. | a. | Discuss the limitations of autoassociative memory network. | CO1 | 8 |
| b. | Describe about the cerebellar model articulation controller with neat diagram. | CO1 | 8 |
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| 3. | a. | Compare contrained relation and non-constrained relation. | CO2 | 8 |
| b. | Two fuzzy relations are given by  Obtain fuzzy relation T as a composition between the fuzzy relations. | CO2 | 8 |
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| 4. | a. | Describe the operation of genetic algorithm. State the importance of genetic algorithm. | CO3 | 8 |
| b. | Optimize the logarithmic function using a genetic algorithm by writing a program. | CO3 | 8 |
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| 5. | a. | Describe in detail the application of genetic algorithm to biomedical engineering with suitable example. | CO4 | 8 |
| b. | Design an algorithm for automatic diagnosis of skin cancer using ANFIS. | CO4 | 8 |
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| 6. | a. | With a neat flowchart, explain the training process of perceptron network. | CO2 | 8 |
| b. | Derive the Generalized Delta rule of Back Propagation Network. | CO2 | 8 |
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| 7. | a. | Use the Hebb rule to store the vector (1 1 -1 -1) in Auto associative Neural Network.  (i) Find the Weight matrix.  (ii) Test the input vector.  (iii) Test the net with two missing components in the input vector.  (iv) Test the net with two mistake components in the input vector. | CO2 | 8 |
| b. | Write notes on Hopfield Network. | CO2 | 8 |
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| **COMPULSORY QUESTION (1 x 20 = 20 Marks)** | | | | |
| 8. | a. | With suitable block diagram, explain the principle involved in a liquid level controller using neurofuzzy technique. | CO6 | 10 |
| b. | List the application of hybrid fuzzy GA system and neurofuzzy system. | CO6 | 10 |