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

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

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| **Code :** | **17EC3009** | **Duration :** | **3hrs** |
| **Sub. Name :** | **COMPUTATIONAL INTELLIGENCE AND OPTIMIZATION TECHNIQUES** | **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. | How will you solve the practical difficulty of perceptron neural networks? Use illustrations wherever necessary. | CO1 | 10 |
| b. | What is the role of activation functions in Artificial Neural Networks? Comment briefly on the various activation functions along with neat sketches. | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | “Kohonen neural networks are mostly preferred for clustering applications”. Justify this statement with necessary mathematical equations. | CO1 | 10 |
| b. | The initial weight matrix given for Kohonen network is [0.5 0.5; 0.2 0.2]. The input x is [1 2]. Estimate the new weight values after 3 iterations. Check whether you have reached the convergence state based on the weight values. | CO2 | 10 |
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| 3. | a. | Comment briefly on the various approaches used for converting a classical variable into a fuzzy variable. | CO3 | 10 |
| b. | Let  and  Estimate: (i) , (ii) , (iii) , (iv) , (v) | CO3 | 10 |
| (OR) | | | | |
| 4. | a. | Estimate the third relation T for the given relations R and S using max-min composition method.  R = and S = | CO3 | 15 |
| b. | What is the difference between max-min composition method and max-product composition method? Will there be a change in the results for the same classical set when executed over the max-min method and max-product method? Justify your answer. | CO3 | 5 |
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| 5. | a. | How will you fix the structure of ANFIS using CART algorithm? Explain the process of tree growing for both classification and regression applications. | CO4 | 15 |
| b. | Draw the neuro fuzzy spectrum and bring out the significance of neuro fuzzy approaches. | CO4 | 5 |
| (OR) | | | | |
| 6. | a. | “K-means clustering algorithm is a type of classical clustering approach”. Justify this statement with mathematical expressions. | CO4 | 12 |
| b. | Explain the subtractive clustering methodology for the initialization of cluster centres in conventional clustering algorithms. | CO4 | 8 |
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| 7. | a. | With neat architecture, explain the working principle of ANFIS. Include mathematical equations wherever necessary. | CO4 | 15 |
| b. | Illustrate the training algorithm of ANFIS with necessary mathematical equations. | CO4 | 5 |
| (OR) | | | | |
| 8. | a. | How will you perform clustering process with Fuzzy C-Means algorithm? | CO4 | 10 |
| b. | Explain the mountain clustering methodology for the initialization of cluster centres in FCM algorithm. | CO4 | 10 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Illustrate the various reproduction operators of Genetic Algorithm with neat diagrams. | CO5 | 10 |
| b. | With neat flowchart, illustrate the methodology of optimization using Genetic Algorithm. | CO5 | 10 |