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



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

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| **Code :** | **17EI3005** | **Duration :** | **3hrs** |
| **Sub. Name :** | **INTELLIGENT CONTROLLERS** | **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. | List the various aspects of McCulloch and Pitts Neuron Model. | CO1 | 3 | |
| b. | Describe Perceptron learning rule. | CO1 | 7 | |
| c. | Explain with necessary diagram the training procedure for output layer neurons in the Backpropagation neural network. | CO6 | 10 | |
| (OR) | | | | |
| 2. | a. | Discuss any two activation functions. | CO1 | 4 | |
| b. | Describe Delta learning rule. | CO1 | 8 | |
| c. | Explain how the error is back propagated in the absence of target vectors directly to the hidden layers in the Backpropagation neural network. | CO6 | 8 | |
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| 3. | a. | Determine the updated weight values based on Delta learning rule for a supervised learning network with following: Input training vectors x1 = [1 -2 0 1]’, x2 = [0 1.5 -0.5 -1]’, x3 = [-1 1 0.5 -1]’, c = 0.1, λ = 1, Desired responses d1 = -1, d2 = -1 and d3 = 1. | CO1 | 10 | |
| b. | Illustrate the Specialized on-line learning control architecture for static and dynamic plant. | CO3 | 8 | |
| c. | List any two limitations of inverse plant identification. | CO6 | 2 | |
| (OR) | | | | |
| 4. | a. | In the Hebbian learningnetwork, for the given data, Input training vectors x1 = [1 -2 1.5 0]’, x2 = [1 -0.5 -2 -1.5]’, x3 = [0 1 -1 1.5]’,  c = 1, f(net) = sgn(net), determine the updated weight values. | CO1 | 10 | |
| b. | Explain the following i. transfer characteristic ii. transfer function iii. Inverse feedforward control and iv. feedback control. | CO1 | 8 | |
| c. | Compare supervised and unsupervised learning. | CO1 | 2 | |
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| 5. | a. | With necessary diagram explain the various one dimensional membership functions. | CO4 | 12 | |
| b. | If X = {3,4,5}, Y = {3,4,5,6,7} and µR(x,y) = {(y-x)/(x+y+2), if y > x; 0 if y <= x}. Show the relation matrix ‘R”. | CO4 | 8 | |
| (OR) | | | | |
| 6. | a. | Distinguish between Mamdani and Sugeno Fuzzy inference systems with necessary illustrations. | CO4 | 10 | |
| b. | Outline the various defuzzification methods. | CO1 | 10 | |
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| 7. |  | Explain the following for Greg Viot’s Fuzzy Cruise Controller i. Fuzzy rule base ii. Fuzzy sets iii. Fuzzification of inputs and iv. Defuzzification. | CO5 | 20 | |
| (OR) | | | | |
| 8. |  | With respect to fuzzy cruise controller, illustrate the following:  i. fuzzification of inputs and ii. computation of centre of gravity of the outputs due to fuzzy inference of rules. | CO6 | 20 | |
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|  | | **Compulsory:** |  |  | |
| 9. | a | Explain the difference between Genetic algorithm and traditional approach. | CO2 | 8 | |
|  | b. | Illustrate the following methods in Genetic algorithm i. binary encoding ii. permutation encoding and iii. value encoding. | CO2 | 12 | |

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