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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

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

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| **Code :** | **17EI2032** | **Duration :** | **3hrs** |
| **Sub. Name :** | **THEORY AND DESIGN OF NEURO FUZZY 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. | Illustrate the generation and propagation of action potential in a nerve cell and the electrochemical activity at the synaptic junction. | CO1 | 15 |
| b. | Outline the concept of linear inseparability using XOR gates. | CO2 | 5 |
| (OR) | | | | |
| 2. | a. | Differentiate Hard and Soft computing techniques. | CO1 | 6 |
| b. | Explain the significant features of back propagation network and derive the generalized delta learning rule for weight adjustment in the hidden layer and output layer. | CO2 | 14 |
|  |  |  |  |  |
| 3. | a. | Identify the goal of Inverted pendulum task. Examine how a neuro-controller is used to achieve the goal. | CO3 | 10 |
|  | b. | With a neat block diagram, demonstrate feedforward control of a plant with plant inverse learning and specialized learning. | CO3 | 10 |
| (OR) | | | | |
| 4. | a. | From first principles, explain the use of neurocontroller for articulation control. | CO3 | 10 |
|  | b. | Design a neuro controller for a level process using system identification techniques. | CO3 | 10 |
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| 5. | a. | For the given Fuzzy sets, find the following: | CO4 | 15 |
|  | b. | Distinguish between fuzzy set and classical set. | CO4 | 5 |
| (OR) | | | | |
| 6. |  | Three variables of interest in power transistors are the amount of current that can be switched,the voltage that can be switched, and the cost. The following membership functions for powertransistors were developed from a hypothetical components catalog:  Find the fuzzy Cartesian product P=V X I  i. Fuzzy set for the cost C, in dollars, of a transistor is defined as     1. Using a fuzzy Cartesian product, find T = I x C. What would this relation, T, representphysically? 2. Using max–min composition, find E = P x T. What would this relation, E, representphysically? 3. Using max–product composition, find E = P x T. | CO4 | 20 |
|  |  |  |  |  |
| 7. | a. | Aggregation of three fuzzy sets is represented in the figure.    Determine the crisp value by defuzzification using the following methods.   1. Centroid 2. Weighted Average 3. Center of Sums | CO4 | 15 |
|  | b | Infer the general form of a fuzzy rule and outline the set theoretic operation involved. | CO4 | 5 |
| (OR) | | | | |
| 8. |  | Define fuzzy logic controller and design a fuzzy logic controller for a temperature process. | CO5 | 20 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Illustrate the control of Inverted Pendulum using Fuzzy Logic Controllers. | CO5 | 15 |
|  | b. | Outline the concepts of adaptive fuzzy systems. | CO5 | 5 |

ALL THE BEST