Code No: **RT42024C**

R13

Set No. 1

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2019
AI TECHNIQUES
(Electrical and Electronics Engineering)

Time: 3 hours   Max. Marks: 70

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
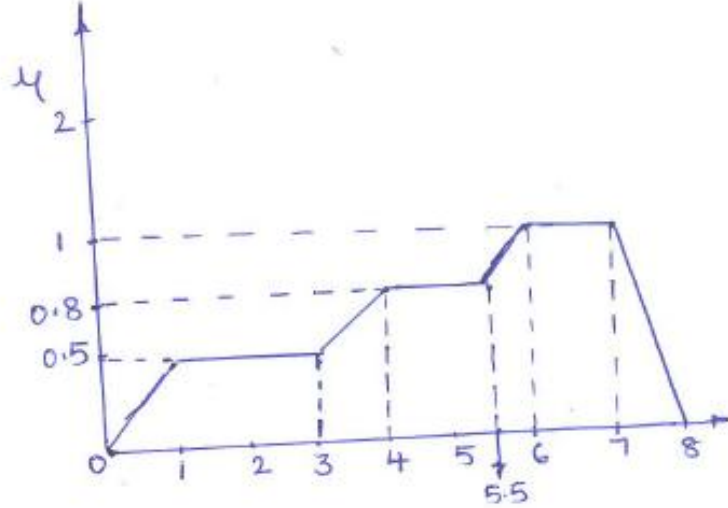*Answer any THREE questions from Part-B*
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PART–A *(22 Marks)*

1. a) What is meant by learning process? [3]
    b) Explain about the threshold function with neat sketch. [4]
    c) What is feedforward recall? [4]
    d) Define uncertainty? How is it arising in real time? [4]
    e) Explain about the fuzzification module? [4]
    f) What are the different types of forecasting methods? [3]

PART–B *(3x16 = 48 Marks)*

2. a) Explain the following characteristics of neural networks
       (i) Robustness and fault tolerance   (ii) Flexibility   (iii) Ability to deal with
       a variety of data situations   (iv) Collective computation [8]
    b) Illustrate the human beings are better than computers. [8]

3. a) What is perceptron? Write the limitation of perceptron model. [8]
    b) Explain the single layer continuous perceptron networks for linearly separable
       classification. [8]

4. a) Write step by step algorithm of error back propagation. [8]
    b) Explain training mechanism adopted in Hopfield network. [8]

5. a) Write mathematical expression for membership function. Draw different shapes
       of membership functions and also draw membership function for the set of
       people in the different age groups, use linguistic names as "*young*", "*middle
       aged*", and "*old*". [6]
    b) Let us define three fuzzy sets
       $\tilde{A} = \{(x_1, 0.3)(x_2, 0.5)(x_3, 0.2)\}$, $\tilde{B} = \{(x_1, 0.4)(x_2, 0.6)(x_3, 1)\}$ and $\tilde{C} = \{(x_1, 0.2)(x_2, 0.8)(x_3, 0.3)\}$,
       Verify the following properties of fuzzy sets
       (i) $\tilde{A} \cap \tilde{B} = \tilde{B} \cap \tilde{A}$
       (ii) $\tilde{A} \cup (\tilde{B} \cup \tilde{C}) = (\tilde{A} \cup \tilde{B}) \cup \tilde{C}$
       (iii) $\tilde{A} \cup (\tilde{B} \cap \tilde{C}) = (\tilde{A} \cup \tilde{B}) \cap (\tilde{A} \cup \tilde{C})$
       (vi) $(\tilde{A} \cup \tilde{B})^c = (\tilde{A}^c \cap \tilde{B}^c)$ [10]

|"|'|||||"|"|||'|

6. a) Explain about the basic hybrid systems and its advantages. [8]

    b) Compute x^* by using Centroid method as shown in figure. [8]

Figure

7. What is the importance of reactive power? Explain reactive power control in power distribution system using fuzzy logic controller. [16]

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Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
*****

## PART–A *(22 Marks)*

1. a) Write the sequence of leaning process.   [4]
   b) Explain about the piecewise linear function with neat sketch.   [3]
   c) What is recurrent network? Explain.   [4]
   d) Explain the following operation on crisp sets with examples (i) Complement (ii) Difference.   [4]
   e) Explain about the defuzzification module?   [3]
   f) Why load flow study is required?   [4]

PART–B *(3x16 = 48 Marks)*

2. a) Explain the concept of knowledge representation in artificial neural networks.   [8]
   b) Explain the following learning tasks
      (i) pattern recognition   (ii) control   (iii) Beam forming   [8]

3. a) What is meant by topology? Explain with neat sketch, the various architectures of artificial neural networks.   [8]
   b) Implement the Mc-Culloch pitts networks for AND logic function.   [8]

4. a) Explain briefly about the radial basis function algorithms.   [8]
   b) Derive the equation for weight change in the input layer and hidden layer for Back Propagation Network.   [8]

5. a) Explain in briefly with expression (i) Crisp Cartesian product   (ii) Fuzzy Cartesian product.   [8]
   b) Let us define three fuzzy sets
      $\tilde{A} = \{(x_1, 0.3)(x_2, 0.5)(x_3, 0.2)\}$, $\tilde{B} = \{(x_1, 0.4)(x_2, 0.6)(x_3, 1)\}$ and $\tilde{C} = \{(x_1, 0.2)(x_2, 0.8)(x_3, 0.3)\}$, Verify the following properties of fuzzy sets
      (i) $\tilde{A} \cup \tilde{B} = \tilde{B} \cup \tilde{A}$
      (ii) $\tilde{A} \cap (\tilde{B} \cap \tilde{C}) = (\tilde{A} \cap \tilde{B}) \cap \tilde{C}$
      (iii) $\tilde{A} \cap (\tilde{B} \cup \tilde{C}) = (\tilde{A} \cap \tilde{B}) \cup (\tilde{A} \cap \tilde{C})$
      (vi) $(\tilde{A} \cap \tilde{B})^c = (\tilde{A}^c \cup \tilde{B}^c)$.   [8]

6. a) Explain the following (i) Inductive reasoning in membership value assignment
        (ii) Centre of sums method   [8]
    b) Compute x^* by using Centroid method as shown in figure.   [8]
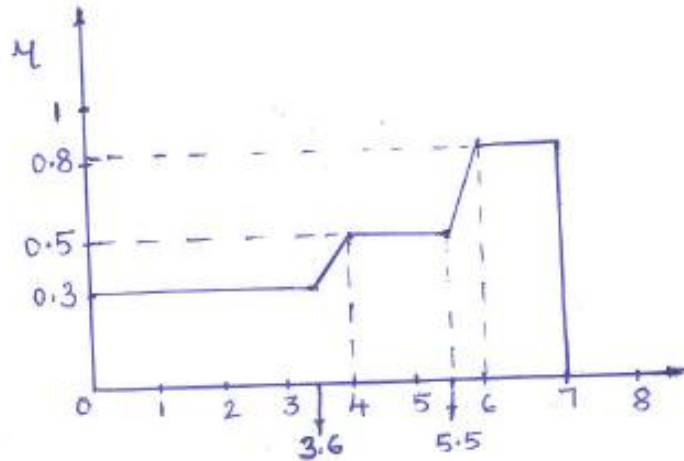
Figure

7.   What is economic load dispatch? Discuss the economic load dispatch with
        suitable example using artificial neural networks.   [16]

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Set No. 3

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AI TECHNIQUES
(Electrical and Electronics Engineering)
Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
*Answer any THREE questions from Part-B*
*****

PART–A *(22 Marks)*
1. a) What is pattern association? [3]
    b) Explain about the sigmoid function with neat sketch. [4]
    c) What is the use of back propagation algorithm? [4]
    d) Differentiate between crisp set and fuzzy set. [4]
    e) Explain about the Fuzzy inference engine? [4]
    f) What is lambda in economic dispatch? [3]

PART–B *(3x16 = 48 Marks)*
2. a) Explain the following learning processes
        (i) Error correction learning (ii) Memory based learning (iii) Hebbian learning [8]
    b) Comparison between learning without teacher and with teacher. [8]

3. a) Discuss the performance comparison of computer and biological neural networks. [8]
    b) Illustrate Mcculloch-pitts neuron model? Write the draw backs of this model. [8]

4. a) Discuss in what aspects multi layer perceptrons are advantageous over single layer perceptrons. [8]
    b) Explain recurrent network architecture and explain its advantages. [8]

5. a) Explain the following basic fuzzy set operations (i) Complement (ii) Product of two fuzzy sets (iii) Equality (iv) Difference [8]
    b) Let us define three fuzzy sets
        $\tilde{A} = \{(x_1, 0.3)(x_2, 0.7)(x_3, 0.2)\}$, $\tilde{B} = \{(x_1, 0.4)(x_2, 0.8)(x_3, 0.9)\}$ *and*
        $\tilde{C} = \{(x_1, 0.2)(x_2, 0.8)(x_3, 0.3)\}$,
        Verify for the following properties of fuzzy sets
        (i) Associativity
        (ii) Idempotence
        (iii) Demorgans laws
        (iv) Involution. [8]

|''|'|''|||''|'|'''|||'|'|

6. a) Discuss the following (i) Mean of Maxima defuzzification (ii) Defuzzification
        to crisp sets.   [8]
    b) Compute x^* by using Centroid method as shown in figure.

Figure

                                                                                     [8]
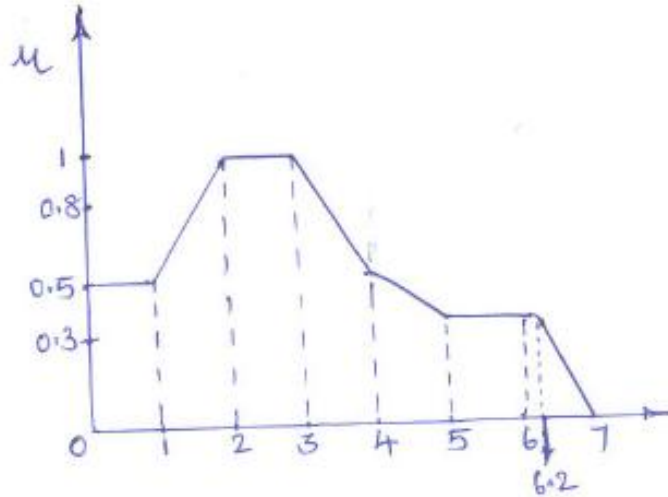
7.   Obtain the transfer function of ac motor? How can an artificial neural network
        be applied for speed control of dc motor?   [16]

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Code No: **RT42024C**　　　　**R13**　　　　Set No. 4

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2019
AI TECHNIQUES
(Electrical and Electronics Engineering)
Time: 3 hours　　　　　　　　　　　　　　　　　　　　　Max. Marks: 70

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
*Answer any THREE questions from Part-B*
*****

PART–A *(22 Marks)*

1. a) What is meant by learning process?　　　　　　　　　　　　　　　[3]
    b) Explain the activation function with neat sketch?　　　　　　　　　[3]
    c) What is multilayer feedforward network? Explain with neat sketch.　　[4]
    d) Explain the fuzzy relations with example.　　　　　　　　　　　　[4]
    e) Explain about the Fuzzy database module?　　　　　　　　　　　　[4]
    f) What is the importance of reactive power?　　　　　　　　　　　　[4]

PART–B *(3x16 = 48 Marks)*

2. a) Differentiate between supervised and reinforced learning.　　　　　[8]
    b) Explain the following learning processes (i) Competitive learning (ii)
        Boltzmann learning (iii) Credit assignment problem.　　　　　　　　[8]

3. a) Describe the organization of the brain.　　　　　　　　　　　　　[8]
    b) Implement the Mc-Culloch pitts networks for NOR logic function.　　[8]

4. a) Explain gradient type Hopfield network with necessary mathematical equations.　[10]
    b) Write the approximation properties of radial basis function network.　　[6]

5. a) If $\tilde{A} = \{(x_1, 0.2)(x_2, 0.7)(x_3, 0.3)\}, \tilde{B} = \{(x_1, 0.6)(x_2, 0.8)(x_3, 1)\}\ and\ \tilde{C} =$
        $\{(x_1, 0.3)(x_2, 0.5)(x_3, 0.7)\}$, Verify the following fuzzy set operation and its
        properties.
        (i) Equality　　　　　　　　　　　　　　　　　　　　　　　　[8]
        (ii) Difference
        (iii) Complement of each fuzzy set
        (iv) Distributivity
    b) $Let\ \tilde{A} = \{(x_1, 0.3)(x_2, 0.7)(x_3, 0.5)\}, \tilde{B} = \{(y_1, 0.2)(y_2, 0.8)\}$
        $\tilde{C} = \{(z_1, 0.2)(z_2, 0.5)(z_3, 1)\}$ are three fuzzy sets defined on the universe of
        discourse $X = \{x_1, x_2, x_3\}, Y = \{y_1, y_2\}\ and\ Z = \{z_1, z_2, z_3\}$ respectively, find
        max-min composition $\tilde{R}o\tilde{S}$.
        　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[8]

|"|'|||||'|'"|||'|

6. a) Explain the following (i) Basic hybrid system (ii) Development of rule base system. [8]

    b) Compute x^* by using Centroid method as shown in figure.
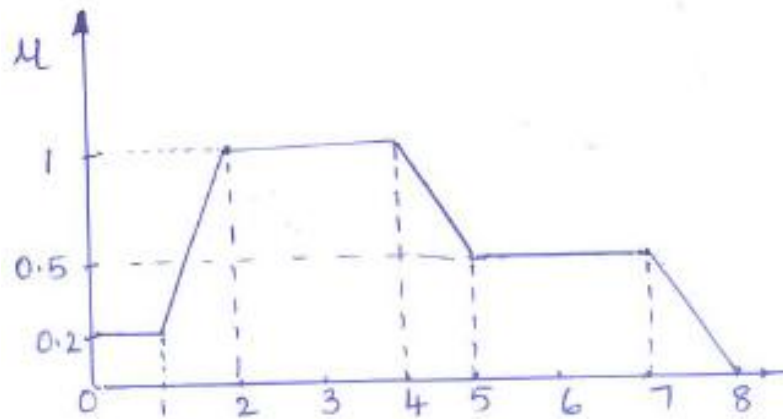
Figure
[8]

7.   Why load frequency control is important in power system? How can fuzzy logic controller be applied for load frequency control? [16]