

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

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018**

**Course Code: EC360**

**Course Name: SOFT COMPUTING**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer any two full questions, each carries 15 marks.*

Marks

- 1 a) Define Soft computing. Mention the applications of soft computing. (7)
- b) Consider two fuzzy sets A & B (8)

$$A = \left\{ \frac{0.2}{2} + \frac{0.5}{4} + \frac{0.3}{6} + \frac{0.8}{8} + \frac{0.1}{10} \right\}$$

$$B = \left\{ \frac{1}{2} + \frac{0.2}{4} + \frac{0.4}{6} + \frac{0.5}{8} + \frac{0.2}{10} \right\}$$

Find their Union, Intersection, Complement, Bounded sum and Bounded difference.

- 2 a) Compare and contrast classic logic and fuzzy logic with an example. (4)
- b) With the help of a neat diagram explain the features of membership function (5)
- c) Justify the following statement: “*Partial membership is allowed in fuzzy sets*” (3)
- d) Describe alpha cuts of fuzzy sets with an example. (3)
- 3 a) Explain Type-2 fuzzy sets with an example. (3)
- b) With an example prove Demorgan’s Law of Equality for Fuzzy Sets (4)
- c) Consider two fuzzy Sets given by (8)

$$P = \left\{ \frac{0.9}{\text{short}} + \frac{0.3}{\text{medium}} + \frac{0.5}{\text{tall}} \right\}$$

$$Q = \left\{ \frac{0.7}{\text{positive}} + \frac{0.4}{\text{zero}} + \frac{0.8}{\text{negative}} \right\}$$

- i) Find the fuzzy relation for the Cartesian product of P and Q i.e.,  $R=P \times Q$
- ii) Introduce a fuzzy set T given by
- $$T = \left\{ \frac{0.9}{\text{short}} + \frac{0.3}{\text{medium}} + \frac{0.6}{\text{tall}} \right\}$$
- Find the relation between T and Q using Cartesian product, i.e., find  $S = T \times Q$
- iii) Find  $T \circ R$  using max-min composition.
- iv) Find  $T \circ S$  using max-min composition.

**PART B**

*Answer any two full questions, each carries 15 marks.*

- 4 a) Consider the fuzzy relation R defined in B x B .Check whether the fuzzy relation ( 7)  
is i)Reflexive ii)Symmetric and iii) Transitive

$$R = \begin{bmatrix} 0.2 & 0.4 & 0.6 \\ 0.2 & 0.6 & 0.2 \\ 0.4 & 1 & 0.6 \end{bmatrix}$$

- b) With graphical representations ,explain the activation functions used in Artificial (8)  
Neural Network
- 5 a) Define defuzzification. With an example explain in detail the following (10)  
defuzzification methods i) Centre of sums and ii) Centroid of Area
- b) Write short notes on fuzzy connectives. (5)
- 6 a) Differentiate between supervised and unsupervised learning (6)
- b) Implement ANDNOT function using McCulloch-Pitts neuron (take binary data). (9)

**PART C**

*Answer any two full questions, each carries 20 marks.*

- 7 a) Using the linear separability concept, obtain the response for (10)  
a) OR function  
b) AND function
- b) Define perceptron learning rule. (5)
- c) Draw and explain the architecture of back-propagation network. (5)
- 8 a) Explain the different methods of encoding that are possible in Genetic (5)  
Algorithm.
- b) Discuss the Applications of Genetic Algorithm. (5)
- c) With the help of examples, explain the various crossover techniques employed in (10)  
genetic algorithms.
- 9 a) What is meant by genetic algorithm? With a neat flowchart, explain the (10)  
operation of a simple genetic algorithm.
- b) Implement AND function using perceptron networks for bipolar inputs & (10)  
targets.

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