BIRLA INSTITUTE OF TECHNOLOGY
DEOGHAR CAMPUS

SUBJECT: CS 347 SOFT COMPUTING (PE-1) Time: 50 Minutes

Sem.: Vth Branch: CSE Session: MO/25 Full Marks: 10 **Set: B**

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1. Write the four characteristics of Fuzzy Logic. [01]

2. Which of the following is an example of a T-norm operator?

   i) max(a, b) ii) min(a, b) iii) a + b iii) 1 - max(0, a + b - 1) [01]

3. Consider the following fuzzy sets: [02]

   A = { 0/0 + 0.2/1 + 0.7/2 + 0.8/3 + 0.9/4 + 1/5 }

   B = { 0/0 + 0.1/1 + 0.3/2 + 0.2/3 + 0.4/4 + 0.5/5 }

   Find the following:

   (i) Bounded Product (ii) Algebric Product

   (iii) Bounded Sum (iii) Height of Fuzzy set A & B

4. Consider the following fuzzy sets: [02]
   $X = \{a, b, c, d\}$, $Y = \{1, 2, 3, 4\}$

   $A = \{(a, 0.2), (b, 0.7), (c, 0.5), (d, 1.0)\}$
   $B = \{(1, 0.2), (2, 1.0), (3, 0.8), (4, 0.1)\}$
   $C = \{(1, 0), (2, 0.4), (3, 1.0), (4, 0.7)\}$

   Determine the implication relation: **If x is A then y is B else y is C**

5. Find the cylindrical extension $C(R_A)$ and $C(R_{B)}$ if R = $\begin{bmatrix} 0.1 & 0.3 & 0.9 \\ 0.6 & 0.7 & 0.1 \\ 0.1 & 1.0 & 0.4 \end{bmatrix}$ [02]

   Where column heading and row heading are b1, b2, b3 and a1, a2, a3 respectively.

6. The capacity of an amplifier on a normalized universe say [0,100] can be described Linguistically by the following fuzzy variables: [02]

   Powerful= {(0.2, 1), (0.5, 10), (0.8, 50), (0.9, 80), (1,100)} and
   Weak= {(1, 1), (0.8, 10), (0.4, 50), (0.1, 80), (0,100)}.

   Find the belongingness of the following linguistic phrases used to describe the capacity of various amplifiers.

   (i) Not very powerful and more or less weak (ii) Extremely weak,
   (iii) Extremely powerful or not weak (iv) Powerful but not too powerful

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