LNMIIT
The LNM Institute of Information Technology

The LNM Institute of Information Technology
Department of CSE
Soft Computing (CSE3212)
Mid Term Examination 2019-2020

Time: 1hr 30 min **Date: 25/2/2020** **Max. Marks: 60**

Q. 1) Let A be a fuzzy set on the universe of discourse X and is defined as
A= {(x1, 0.8), (x2, 0.3), (x3, 0.5)}
B be a fuzzy set on the universe of discourse Y and is defined as
B= {(y1, 0.4), (y2, 0.7), (y3, 0.2), (y4, 0.7)}
And C be a fuzzy set on the universe of discourse Z and is defined as
C= {(z1, 0.6), (z2, 0.5), (z3, 0.9)}

a) Define two fuzzy relations R and S over A x B and B x C, respectively
b) Calculate Max-Min composition T = R o S

3+3+5=11

Q.2) a) Consider the fuzzy sets A, B and C defined on universal discourse X={0, 1, 2, 3, 4, 5} by their membership functions as follows:

$$\mu_A(x) = \frac{x}{x+2},\ \mu_B(x) = 2^{-x} \text{ and } \mu_C(x) = \frac{1}{1+2x}$$

Find (i) $A \cup (B \cap C)$ (ii) Bounded difference of A and B

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b) Define and illustrate the trapezoidal membership function, specified by four parameter (10, 20, 60, 95). Find the value of membership value for x = 70.

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Q.3) Design a fuzzy logic controller using Mamdani's approach to determine the wash time of domestic washing machine, assume that inputs are dirt and grease on clothes. Use 4 descriptor for dirt (i.e., VSD, SD, MD, HD) and 3 descriptor for grease (i.e., SG, MG, HG) and 5 descriptors for output variable of wash time (i.e., VST, ST, MT, HT, VHT). Use triangular membership functions for fuzzy classes and CoG method for defuzzification operations. The set of rules for fuzzy logic tables are given below.

	SG	MG	HG
VSD	VST	VST	ST
SD	VST	ST	MT
MD	ST	MT	HT
HD	MT	HT	VHT

The both inputs are given in the scale of 0 to 100 and output should be in the range 0 to 60 min. Find the wash time in minutes when grease is 50 and dirt is 60.

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Q.4) a) Define the followings in respect to Rough set

i) Lower and Upper approximation set

ii) Dispensable and Indispensable attributes

4+3=7

b) Let R be an information systems with conditional attributes A, B, C. Three equivalence classes are given as follov

$U/IND(A) = \{\{x1, x4, x5\}, \{x2, x8\}, \{x3\}, \{x6, x7\}\}$

$U/IND(B) = \{\{x1, x3, x5\}, \{x6\}, \{x2, x4, x7, x8\}\}$

$U/IND(C) = \{\{x1, x5\}, \{x2, x7, x8\}, \{x6\}, \{x3, x4\}\}$

Determine core and Reducts of R.

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