Registration No.: | | | | | | | | | | |

Total Number of Pages: 02

Course: M.SC.I
Sub_Code: FMCE606

6th Semester Regular Examination: 2024-25
SUBJECT: Fuzzy & Rough Set Theory
BRANCH(S): M.Sc.I(MC)
Time: 3 Hours
Max Marks: 70
Q.Code: S216

Answer Question No.1 (Part-I) which is compulsory, any five from rest (Part-II)
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) What is Fuzzy Inference?
b) Write the difference between Crips set and Fuzzy set.
c) What is meant by characteristic function?
d) Define Reflexivity and Symmetry of a binary fuzzy relation on a single set.
e) Define TrFN.
f) What are fuzzy propositions?
g) What is cardinality of a fuzzy set?
h) Define Dilation, Concentration, and Contrast intensification on fuzzy sets.
i) List the advantages of fuzzy logic control systems.
j) What are fuzzy singleton rules?

Part-II

Long Answer Type Questions (Answer Any five)

Q2 **a)** What are fuzzy membership functions? Explain them with examples. **(5 + 5)**

b) Justify the statement with suitable example - “Partial membership is allowed in fuzzy sets”.

Q3 **a)** Let fuzzy sets A and B be given as A = 0.5/3 + 1/5 + 0.6/7 + 0.8/8 and B = 1/3 + 0.5/5 + 0.1/7 + 1/8, where the universe of discourse being X = {3, 5, 7, 8}. Now, obtain the following: **(5 + 5)**

i. A + B, the Algebraic Sum
ii. A.B, the Algebraic Product
iii. S (A, B) the subset hood measure
iv. E (A, B) the equality measure.

b) Compare and contrast classical logic and fuzzy logic.

Q4 **a)** Explain in detail the methods employed for converting fuzzy form into crisp form. **(5 + 5)**

b) Draw the profile of membership function for a fuzzy set called “Tall men”. Take your own values for different heights.

Q5 **a)** Discuss in detail the operations and properties of fuzzy set. Represent the fuzzy set operations using Venn Diagram. **(5 + 5)**

b) Define max min transitivity of a binary fuzzy relation. Prove that the max-min composition on a binary fuzzy relation is associative.

Q6 **a)** If A and B are two fuzzy sets with membership functions **(5 + 5)**
μA(x) = {0.2, 0.5, 0.6, 0.1, 0.9}
μB(x) = {0.1, 0.5, 0.2, 0.7, 0.8}
Then find out the value of μA ∩B.

b) If A and B are two fuzzy sets with membership functions
μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then find out the value of μ Complement A∪B(x).

Q7 **a)** Obtain the subset hood and equality measures $S(A,B)$ and $E(A,B)$ among the following fuzzy sets. **(5 + 5)**
$A = 0.1/0.1 + 0.2/0.2 + 0.3/0.3 + 0.4/0.4 + 0.5/0.5$
$B = 0.2/0.1 + 0.2/0.2 + 0.4/0.3 + 0.4/0.4 + 0.6/0.5$

b) Draw the graph for the fuzzy relation given by the following matrix

R	a	b	c	d
A	1	0.8	0.7	1
B	0.8	1	0.7	0.8
C	0.7	0.7	1	0.7
D	1	0.8	0.7	1

Q8 Explain any two of the followings. **(5 + 5)**

a) Fuzzy decision making
b) Fuzzy integrations
c) Fuzzy logic in database and information systems
d) Fuzzy Pattern Recognition