PC - 483

(514) M.A./M.Sc. MATHEMATICS (FOURTH SEMESTER)

Examination JUNE 2020

Compulsory/Optional

Group-

Paper-IV

FUZZY SETS AND THEIR APPLICATIONS-II

Time:- Three Hours | Maximum Marks: 080

Minimum Passing Mark- 29

नोट : दोनों खण्डों से निर्देशानुसार उत्तर दीजिए। प्रश्नों के अंक उनके दाहिनी ओर अंकित हैं।

Note: Answer from Both the Section as Directed. The Figures in the right-hand margin indicate marks.

Section - A

1. Answer the following questions: 2X5

(a) Define Dempster's rule of combination.

(b) Define Possibility distribution function.

(c) What do you understand by fuzzy implications?

(d) For the function f(a) = log(1+a), a ∈ [0,1], find the fuzzy compliment.

(e) Write the fuzzy compliment.

2. Answer the following questions: 2X5

(a) Explain fuzzy Restriction.

(b) What do you understand by fuzzy rule based system.

(c) Write difference between Export system are fuzzy logic control.

(d) Write multi person decision making.

(e) Explain fuzzy ranking method.

Section - B

Answer the following questions: 12X5

3. (a) Explain in Belief measure.

(b) Show that every measure 'POS' on a finite power set P(x) is uniquely determined by a possibility distribution function $r = X \rightarrow [0,1]$ via the formula

OR

POS (A) = $\frac{max}{x \in A} r(x)$ for each $A \in P(x)$. (a) Calculate the joint basic assignment m_1, m_2, z for the focal elements C, RUD, &

DUC from the table given below. Also determine bel_1 , bel_2 for then focal elements:

Focal elements	M_1	M_2
R	.05	.15
D	0	0
C	.05	.05
RUD	.15	.2
RUC	.1	.2
DUC	.05	.1
RUDUC	.6	1

(b) Prove that a belied measure 'bel' on a finite power set P(X) is a probability measure if and only if the associated basic probability assignment function μ is

given by $\mu(\{x\}) = bel(\{x\})$ *and* $\mu(A) = 0$ for all subsets of X that not singleton.

4. (a) Prove that $B'_2 \leq B'_4 \leq B'_1 = B'_3$.

(b) Prove that the system of fuzzy relation equation given by $\check{B} = \check{A} \overset{i}{o} R, c(\check{A}) = c(\check{B}) \overset{i}{o} R^{-1}$, has a solution or R if and only if $R = (\check{A} \overset{wi}{o} \check{B}) \cap \left[c(\check{B}) \overset{wi}{o} c(\check{A})\right]^{-1}$ is the greatest solution.

OR

(a) Explain multi conditional approximate reasoning.

(b) Let f be a function defined by f(a) = c^a for all a$\in$ [0,1], find the fuzzy intersection fuzzy implication and fuzzy compliment generated by f.

5. (a) Let $T(p) = 0.8, T(q) = 0.65$, then determine $T(P^c), T(p \wedge q)$ *and* $p \Rightarrow q$,

(b) Find B' and conclude "Ψ *is* B", when

$$A = \frac{.6}{x_1} + \frac{1}{x_2} + \frac{.9}{x_3}, B = \frac{.6}{y_1} + \frac{1}{y_2} \text{ and } A' = \frac{.5}{x_1} + \frac{.9}{x_2} + \frac{1}{x_3}.$$

OR

Explain in fuzzy Propositions.

6. Discuss various defuzzification method used in fuzzy control.

OR

Explain fuzzy logic control of air Conditioner controller.

7. Let us assume that each individual of a group of eight decision markers has total preference ordering Pi $(i \in N)$ on a set alterative $X = \{w, x, y, z\}$ *as* follows

$$P_1 = \{w, x, y, z\}$$
$$P_2 = P_3 = \{z, y, x, w\}$$
$$P_3 = P_7 = \{x, w, y, z\}$$
$$P_4 = P_8 = \{w, z, x, y\}$$
$$P_6 = \{z, w, x, y\}$$

Using the membership function $S(x_i, x_j) = \frac{N(x_i, x_j)}{n}$, for the fuzzy group performance, find the fuzzy performance relation. Also find $\alpha - cuts$ of this fuzzy relations and group level of agreement concerning the social choice by total ordering (w, x, y, z).

OR

Solve the following LPP,

$\max z = 0.5x_1 + 0.2x_2$

Such that $x_1 + x_2 \leq B_1$,

$2x_1 + x_2 \leq B_2$, $x_1, x_2 \geq 0$

Where $B_1(x) = \begin{cases} 1 & for\ x \leq 300 \\ \frac{400-x}{100} & for\ 300 < x \leq 400 \\ 0 & for\ x > 400 \end{cases}$

And $B_2(x) = \begin{cases} 1 & for\ x \leq 400 \\ \frac{500-x}{100} & for\ 400 < x \leq 500 \\ 0 & for\ x > 500 \end{cases}$