MMSEC-1

Sl.No. : **Total No. of Pages : 3**

III Semester M.Sc. Degree Examination, February- 2024
(SLM Scheme CBCS)
MATHEMATICS
Course-I : Fuzzy Mathematics

Time : 1½ Hours **Max. Marks : 40**

Instruction : ***Compulsorily attend all the sections.***

SECTION - A

Answer any five questions. **[5×2=10]**

Q1) Define α-cut of a fuzzy set and give an example.

Q2) For a fuzzy sets A and B defined on $X = x_1, x_2, x_3, x_4, x_5$ by $A = \frac{0.1}{x_1} + \frac{0.7}{x_3} + \frac{0.9}{x_4} + \frac{1}{x_5}$

$B = \frac{0.3}{x_1} + \frac{0.1}{x_2} + \frac{0.6}{x_3} + \frac{1}{x_4} + \frac{0.5}{x_5}$ Find A, B, $A \cup B$.

Q3) If $A, B \in F(X)$, for any $a, b \in 0,1$. Prove that, ${}^{a+}(A \cup B) = ({}^{a+}A) \cup ({}^{a+}B)$.

Q4) State first decomposition theorem and second decomposition theorem.

Q5) Define standard fuzzy complement.

Q6) For a fuzzy complement C defined by $C(a) = \frac{1-a}{1+la}$, $l \geq 0$. Find the equilibrium point.

Q7) Define fuzzy number give an example.

SECTION - B

Answer any four questions. **[4×5=20]**

Q8) Obtain a fuzzy set which represents the property.

a) Highly educated

b) Little educated

Q9) Define the following.

a) Fuzzy intersection

b) Fuzzy union

c) Fuzzy power set

Q10) If A, B$\in$F(X), for any a,b $\in$ 0,1 prove the following.

a) ${}^{a+}A \leq {}^{a}A$

b) ${}^{a}(A \text{ I } B) = ({}^{a}A) \text{ I } ({}^{a}B)$

c) ${}^{a}(A \cup B) = ({}^{a}A) \cup ({}^{a}B)$

Q11) If C is a continuous fuzzy complement, then prove that C has unique equilibrium point.

Q12) Prove that the standard fuzzy union is the only idempotent t-conorm.

Q13) Obtain the fuzzy number for the following.

a) $A(x) = \sin x \quad 0 \leq x \leq P$

$A(x) = 0 \quad$ Otherwise

b) $B(x) = x \quad 0 \leq x \leq 1$

$= 0 \quad$ Otherwise

SECTION - C

Answer any one question. **[1×10=10]**

Q14) Prove the following.

a) Let A and B be two family of fuzzy sets prove that $A \leq B$ iff $A \cap B = A$ and $A \cup B = B$.

b) If A and B are fuzzy set defined on X then show that

$|A| + |B| = |A \cup B| + |A \cap B|$

Q15) Show that, a function $g_p : 0,1 \to \mathbb{R}$ defined by $g_p(a) = 1 - (1-a)^p$ $P > 0$ is an incrasing generator. Find its pseudo inverse and obtain a class of t-conorms generated by g_p.

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