STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(Effective from the academic year 2019-2020)

SUBJECT CODE: 19MT/PE/FT15

M.Sc. DEGREE EXAMINITION – May 2021

BRANCH I – MATHEMATICS

FUZZY SET THEORY AND APPLICATIONS

Time: 90 Minutes **Max Marks: 50**

SECTION – A

ANSWER ALL QUESTIONS ONLY: **(2 ×2 = 4)**

1. If $c(a) = \frac{1}{2}(1+\cos \pi a)$ is a fuzzy complement, show that it is not involutive.
2. Using Extension principle, define a fuzzy function & its inverse for fuzzy sets.

SECTION – B

ANSWER ANY FIVE QUESTIONS ONLY: **(2 × 6 = 12)**

3. If $A(x)=\begin{cases} \frac{(x-25)}{50}, x\in[25,75] \\ \frac{(100-x)}{25}, x\in[75,100] \\ 0\ , elsewhere \end{cases}$ and $B(x)=\begin{cases} \frac{x}{25}, x\in[0,25] \\ \frac{(75-x)}{50}, x\in[25,75] \\ 0\ , elsewhere \end{cases}$

   Find the fuzzy sets representing it diagrammatically and otherwise :

   $\overline{A}$, $\min(A,B)$, $\max(A,B)$.
4. Explain Fuzzy Binary Relation.
5. Find the solutions to the fuzzy equation $A+X=B$.

SECTION – C

ANSWER ANY TWO QUESTIONS ONLY : **(2 × 17 = 34)**

6. a) Write about types of fuzzy sets stating their advantages and disadvantages.
   b) Write a note on the use Linguistic variables in fuzzy set theory. (9+8)

7. a) Define fuzzy complement. Discuss the same using Sugeno class. Obtain the equilibrium of fuzzy complement in this case.
   b) Show that ${}^{\alpha}(A\cap B)={}^{\alpha}A\cap{}^{\alpha}B$ and ${}^{\alpha}(\overline{A})\neq\overline{{}^{\alpha}A}$. Justify. (9+8)

8. a) Derive a necessary and sufficient condition for functions to be membership functions of fuzzy numbers.
   b) For $a,b\in[0,1]$ prove that $u(a,b)\geq\max(a,b)$ and $i(a,b)\leq\min(a,b)$ (9+8)

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