



Reg. No. :

Name :

VIII Semester B.Tech. Degree Examination, April 2015
(2008 Scheme)

08.805 (1) : FUZZY SET THEORY AND APPLICATIONS (Elective – III) (R)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions :

1. Define noninteractive fuzzy set.
2. Explain the operations on fuzzy relations.
3. Define core, support and boundary of membership function for a fuzzy set.
4. What is fuzzy number ?
5. Write a note on fuzzy logic.
6. Briefly explain fuzzy rule based system.
7. Write a short note on fuzzy information retrieval systems.
8. Write a note on fuzzy clustering.
9. Explain how fuzzy inference rule is represented in neural networks.
10. Write a short note on fuzzy image processing. **(10x4=40 Marks)**

PART – B

Answer **any one** question from **each** Module :

Module – I



11. a) Explain any three methods of membership value assignments. **10**

b) Let $A = \left\{ \frac{0.1}{2} + \frac{0.3}{3} + \frac{0.3}{4} + \frac{0.5}{6} \right\}$ and $B = \left\{ \frac{0.4}{2} + \frac{0.8}{4} + \frac{0.4}{5} + \frac{0.6}{6} \right\}$.

Verify De Morgan's principles. **10**

OR



12. a) Given three fuzzy sets \underline{B} , \underline{T} and \underline{U} .

10

$$\underline{B} = \left\{ \frac{0.5}{60} + \frac{0.7}{40} + \frac{1.0}{20} \right\}, \quad \underline{T} = \left\{ \frac{0.9}{10} + \frac{0.7}{8} + \frac{0.5}{6} + \frac{0.6}{5} \right\} \text{ and}$$

$$\underline{U} = \left\{ \frac{1}{100} + \frac{0.8}{90} + \frac{0.6}{80} + \frac{0.4}{70} \right\}$$

Define the fuzzy relations as follows :

$$\underline{R} = \underline{B} \times \underline{T}, \quad \underline{S} = \underline{T} \times \underline{U} \text{ and compute } \underline{W} = \underline{R} \circ \underline{S}$$

using i) Max-min composition and ii) Max-product composition.

- b) Check whether R_1 is equivalence relation or not. Is it fuzzy tolerance relation ?

$$R_1 = \begin{bmatrix} 1 & 0.8 & 0 & 0.1 & 0.2 \\ 0.8 & 1 & 0.4 & 0 & 0.9 \\ 0 & 0.4 & 1 & 0 & 0 \\ 0.1 & 0 & 0 & 1 & 0.5 \\ 0.2 & 0.9 & 0 & 0.5 & 1 \end{bmatrix}$$

10

Module – II

13. a) Two fuzzy sets \underline{A} and \underline{B} , both defined on X , are as follows :

$\mu(x_i)$	x_1	x_2	x_3	x_4	x_5	x_6
\underline{A}	0.1	0.6	0.8	0.9	0.7	0.1
\underline{B}	0.9	0.7	0.5	0.2	0.1	0

Express the following λ -cut sets using Zadeh's notation :

i) $\left(\underline{\bar{A}} \right)_{0.7}$

ii) $\left(\underline{A \cup B} \right)_{0.5}$

iii) $\left(\underline{A \cap B} \right)_{0.4}$

iv) $\left(\underline{\bar{A} \cup \bar{B}} \right)_{0.5}$

10

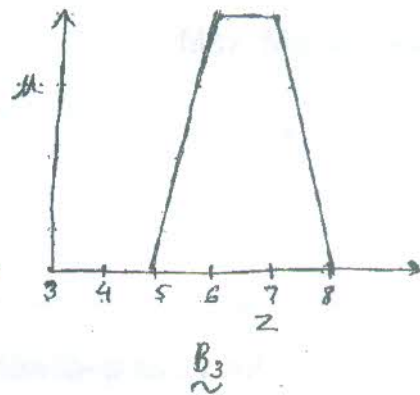
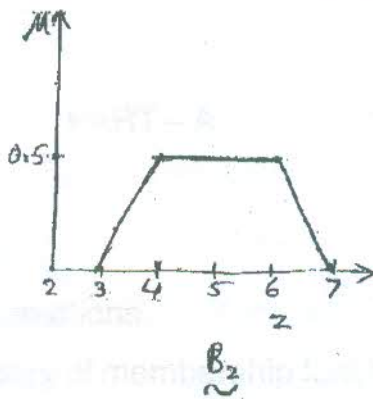
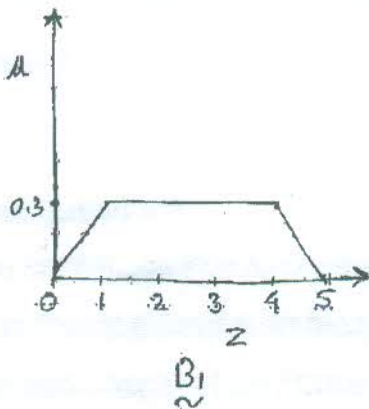
- b) Explain any three defuzzification methods with examples.

10

OR



14. a) Find the logical union of the following fuzzy sets and defuzzify using : 12
- i) Max membership method
 - ii) Weighted average method
 - iii) Mean max method and
 - iv) First (and last) of maxima



- b) Show that any λ -cut relation (for $\lambda > 0$) of a fuzzy tolerance relation results in a crisp tolerance relation. 8

Module – III

15. a) Write a note on fuzzy pattern recognition. 10
- b) Write short notes on : 10
- i) Fuzzy expert system
 - ii) Fuzzy neural networks.

OR

16. a) Explain the design steps of a general fuzzy controller, with a neat diagram. 15
- b) Write a short note on fuzzy databases. 5