NEW SCHEME

Reg. No. ☐☐☐☐☐☐☐☐☐☐

Seventh Semester B.E. Degree Examination, January/February 2006
Electrical & Electronics Engineering
Fuzzy Logic Control

Time: 3 hrs.)

(Max.Marks : 100

Note: *Answer any FIVE full questions.*

1. (a) Give the definitions and their representations of different membership functions used in fuzzy logic. **(5 Marks)**

   (b) Define the terms with suitable examples :
   i) Support
   ii) $L-$ cut
   iii) Convexity
   iv) Height of the fuzzy set. **(8 Marks)**

   (c) For the given two fuzzy sets
   $$A = \left\{ \frac{1}{1} + \frac{0.5}{2} + \frac{0.65}{3} + \frac{0.85}{4} + \frac{1}{5} + \frac{0.9}{6} \right\}$$
   $$B = \left\{ \frac{0.2}{1} + \frac{0.4}{2} + \frac{0.9}{3} + \frac{0.65}{4} + \frac{0.8}{5} + \frac{0}{6} \right\}, \text{ find} \quad \textbf{(7 Marks)}$$
   i) $A \cup B$
   ii) $A \cap B$
   iii) $A \cap \overline{B}$
   iv) $B \cap \overline{A}$
   v) $\overline{A} \cup \overline{B}$
   vi) $\overline{A} \cap \overline{B}$

2. (a) Discuss the axioms of s-norms and t-norms. **(5 Marks)**

   (b) What are linguistic variables and linguistic hedges. Explain their relevance in fuzzy logic control. **(7 Marks)**

   (c) Consider two binary relations defined by the following relational matrix :

	V_1	V_2
u_1	0.3	0.9
u_2	1	0
u_3	0.95	0.1

   P =

   and

	w_1	w_2
v_1	0.95	1
v_2	0.1	0.9

   Q =

   Find $R = P \cdot Q$ by
   i) Max-min composition
   ii) Max-product composition. **(8 Marks)**

3. (a) What is approximate reasoning? Describe the general inference rules used in approximate reasoning. (5 Marks)

(b) With a block diagram explain the feature of FKBC. (7 Marks)

(c) Explain :
   i)   PI like
   ii) PD like
   iii) PID like fuzzy controllers. (8 Marks)

4. (a) What is scaling factor? Explain the heuristic method of selecting a scaling factor. (5 Marks)

(b) Explain different ways of assigning membership values. (7 Marks)

(c) What is defuzzification? What are different types of defuzzification methods? Explain. (8 Marks)

5. (a) Explain sliding mode FKBC. (10 Marks)

(b) Determine the defuzzyfier output by centre of gravity defuzzification method, sum of average (centre of sum) and centre of average defuzzification method for given fuzzy sets : (10 Marks)
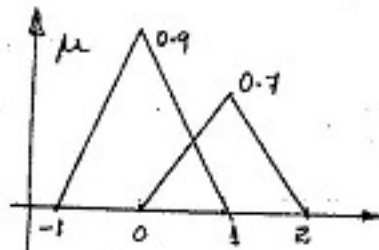

Fig. Q.(5)(b).

6. (a) Identify the possible applications of fuzzy uses in
   i) Computer science   ii) Engineering
   iii) Medicine   iv) Communication
   Explain very briefly. (10 Marks)

(b) Discuss (i) Belief (ii) Plausibility (iii) Possibility measures in fuzzy measurements. (10 Marks)

7. (a) Explain any two important adaptation techniques of a fuzzy system. (10 Marks)

(b) Show that FKBC is a non-linear transfer element of a system controller. (10 Marks)

8. Write short notes on any FOUR of the following :

(a) Different applications of fuzzy logic control

(b) Sugeno FKBC

(c) Fuzzy associative memory (FAM)

(d) Compositions of fuzzy relations

(e) Choice of membership functions. (4×5=20 Marks)

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