

Seventh Semester B.E. Degree Examination, Dec. 07 / Jan. 08
Fuzzy Logic Control

Time: 3 hrs.

Max. Marks:100

Note : Answer any FIVE full questions.

- 1 a. Define the terms: fuzzy set, membership function, support, α -cut and convexity of fuzzy sets. (10 Marks)
- b. Given two fuzzy sets $A = \left\{ \frac{1.0}{2} + \frac{0.5}{3} + \frac{0.3}{4} + \frac{0.2}{5} \right\}$ and $B = \left\{ \frac{0.5}{2} + \frac{0.7}{3} + \frac{0.2}{4} + \frac{0.4}{5} \right\}$.
 Find i) B/A ii) $A \cap B$ iii) $A \cup \bar{A}$ iv) $\bar{B} \cap B$ and v) $\overline{A \cap B}$. (10 Marks)
- 2 It is proposed to control the speed of a DC shunt motor under no-load conditions as shown in Fig.Q2. Initially R_1 is in cut-in position. Using fuzzy relations, determine:
 i) The minimum and maximum level of R_1 ii) The minimum and maximum value of I_a .
 Assume the no-load speed of the motor as 1500 rpm. (20 Marks)

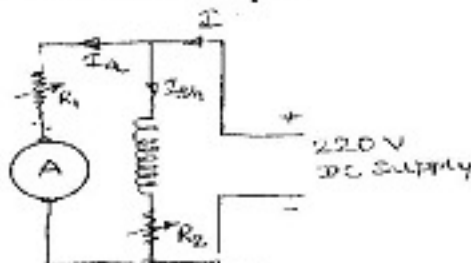


Fig.Q2

- 3 a. Giving a suitable example, bring out the concept of a linguistic variable. (08 Marks)
- b. What is a fuzzy proposition? With suitable examples interpret the connectives AND and OR used in fuzzy propositions. (06 Marks)
- c. Differentiate between the generalized Modus-Ponens rule of inference and the compositional rule of inference. (06 Marks)
- 4 a. Give the general structure of FKBC. Explain the design steps involved in FKBC. (12 Marks)
- b. Explain the different ways of assigning membership values. (08 Marks)
- 5 a. Explain i) PI ii) PD and iii) PID like fuzzy controllers. (10 Marks)
- b. What are the measures of fuzzy measurement? (10 Marks)
- 6 a. Given three fuzzy sets as shown in Fig.Q6(a), find z^* using i) COG and ii) COS. (10 Marks)

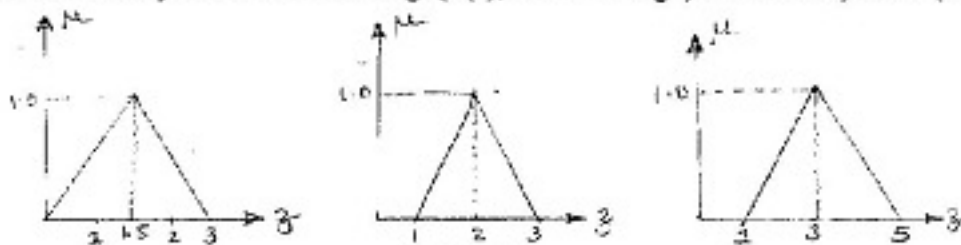


Fig.Q6(a)

- b. Compare and evaluate the different defuzzification methods. (10 Marks)
- 7 a. What is scaling factor? Explain a method of selecting a scaling factor. (10 Marks)
- b. Discuss: i) Belief ii) Plausibility iii) Possibility iv) Probability measures in fuzzy measurements. (10 Marks)
- 8 Write short notes on the following:
 a. Fuzzy applications b. Fuzzy associative memory
 c. Extension principle d. Sliding mode FKBC. (20 Marks)