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Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: ECE3207 **Course Name:** Fuzzy Logic and its Engineering Applications

Semester: Fifth Semester **Max. Marks:** 50 **Weightage:** 50%

CO - Levels	CO1	CO2	CO3
Marks	22	24	44

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	Explain the difference between a crisp set and a fuzzy set.	2	CO1	BT2
2	From your intuition, draw membership function for 'Medium speed of the Car' and write it's fuzzy set.	2	CO2	BT2
3	Explain the terms support and core of a membership function	2	CO2	BT2
4	Write a fuzzy rule for controlling fan speed based on room temperature.	2	CO3	BT2
5	Write the Zadeh's implication relation for the statement IF Height is TALL, THEN Speed is HIGH.	2	CO3	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	For evaluating students' academic performance, let ***U={40,50,60,70,80,90}*** High-performing students ***A={0/40+0.2/50+0.5/60+0.8/70+1/80+1/90}*** Scholarship-eligible students ***B={0/40+0.1/50+0.4/60+0.7/70+1/80+1/90}*** Find the fuzzy sets for: (a) Students who are high-performing **or** scholarship-eligible (b) Students who are high-performing **and** scholarship-eligible (c) Students who are **neither high-performing nor scholarship-eligible** (d) For the above Fuzzy sets, show that ***(A∩B)'=A' ∪ B'***	10	CO1	BT2
7	Fuzzy sets *A = 0.9/1+0.6/2+0.3/3+0.9/4+0.4/5* and *B = 0.5/1+0.4/2+0.3/3+0.9/4+0.5/5* (i) Compute Equality measure and Subsethood measure. (ii) *Show that the above fuzzy sets obey DeMorgan's laws.*	10	CO1	BT2

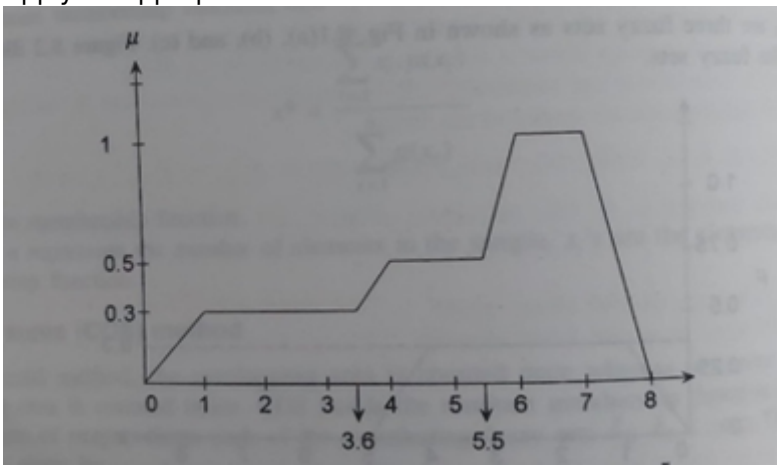
PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT

PTO (Please Turn Over)

8	(a) Using the Principles of Fuzzy logic, prove Law of Excluded Middle (BT2) (CO1) (4) (b) Illustrate the concept of Defuzzification on an aggregated fuzzy set using Mean of the Maxima. (BT2) (CO2) (3) (c) Differentiate between Lamda cut sets and Strong Lamda cut sets with suitable examples (BT2) (CO3) (3)	10	CO3	BT2
9	(a) Fuzzy set A is given as $\mu A\ (x) = 2x/(x+2);\quad x=1,2,3,4,5$ Apply concentration and dilation operations on Fuzzy set A (BT2) (CO1) (4) (b) Illustrate how the centroid is computed in defuzzification of a fuzzy set. (BT2) (CO2) (3) (c) Given the linguistic variables 'Slow', 'Fast'. Write the expression for the linguistic statement: The car is "Very very Fast and not very slow" (BT2) (CO3) (3)	10	CO3	BT2

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	A survey of 80 people was conducted to analyze preferences among five online learning platforms: Coursera (C), Udemy (U), edX (E), Skillshare (S), and Pluralsight (P). Compared with Coursera: 22–P, 18–U, 27–E, 31–S Compared with Udemy: 28–C, 64–E, 55–S, 62–P Compared with edX: 19–C, 16–U, 48–S, 53–P Compared with Skillshare: 33–C, 25–U, 32–E, 49–P Compared with Pluralsight: 52–U, 61–E, 47–S, 58–C Using the rank ordering method, construct the fuzzy membership function and identify the most preferred platform.	10	CO2	BT3
11	Three variables of interest in power Transistors are the amount of current that can be switched, the voltage that can be switched and the cost. The following membership functions are developed: *Average current in amperes=I = 0.4/0.8+0.7/0.9+1/1+0.8/1.1+0.6/1.2* *Average voltage in volts =V = 0.4/30+0.7/45+1/60+0.8/75+0.6/90* *Cost of a transistor in rupees =C = 0.4/0.5+1/0.6+0.8/0.7* (a) Find the fuzzy Cartesian product $P=V \times I; T=I \times C$. What would this relation, T represent physically? (b) Using max-min composition, find $E=P$ o T . What would this relation, E represent physically?	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	The aggregated fuzzy set of three fuzzy sets is given below. Apply an appropriate defuzzification method to obtain scalar output. 	10	CO3	BT3

13	A smart air-conditioning system uses **room temperature** and **humidity** to control cooling. Let X={1,2,3,4,5,6} represent temperature levels and Y={1,2,3,4,5,6} represent cooling levels. Given: A=High Temperature={0/1+0.3/2+0.6/3+0.9/4+1/5+0.7/6} B=High Cooling={0/1+0.2/2+0.5/3+0.8/4+1/5+0.9/6} C=Medium Cooling={0.2/1+0.5/2+0.8/3+1/4+0.7/5+0.4/6} Determine the implication relation using **Zadeh's implication**: **i)** IF temperature is A THEN cooling is B **ii)** IF temperature is A THEN cooling is B ELSE cooling is C **iii)** IF temperature is A AND cooling is B THEN output is C	10	CO3	BT3