BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: IMSC **SEMESTER : V**
BRANCH: MATHEMATICS **SESSION : MO/2025**

SUBJECT: MA303R1 FUZZY LOGIC

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Show that the following sets satisfy the law of contradiction and law of excluded middle. $X = \{1,2,3,4,5,6,7\}$ $A = \{1,2,3,4\}$ Is it followed by the fuzzy sets? If so give an example.	[5]	1	1,2,3
Q.1(b)	Let A=a/1.0 + b/0.8+ c/0.5+d/0.1 defined on X={a,b,c,d}. Find all its α-cut set, strong α-cuts. Find the scalar cardinality of the fuzzy set. Is the set convex ?.	[5]	1	1,2,3
Q.2(a)	A= [-3,5], B=[2,6], C=[-4,7]. Find $A(\vee)B$, $A(\Lambda)C$,$A(*)B$,$A(+)B$.	[5]	2	1,2,3
Q.2(b)	Define triangular fuzzy numbers with various arithmetic operations on them. Also define α-cut of a triangular fuzzy numbers.	[5]	2	1,2,3
Q.3(a)	Define: 1.Fuzzy Max-Min composition 2.Fuzzy cardinality 3.Fuzzy Composition of relations	[5]	3	1,2,3
Q.3(b)	Let R, S be defined on the sets {2,4,6} X {2,4,6}. Let R: {(x,y)|y=x+2}, S: {(x,y)|x<y}. Using max-min composition find R0S.What is SOR?	[5]	3	1,2,3
Q.4(a)	Show that $(P \Rightarrow Q)=(\sim P \vee Q)$.Also define the three rules for inferring facts.	[5]	4	1,2,3
Q.4(b)	Write predicate logic statements for i. Sunil likes anything which Ram likes. ii. Sunil likes somethings of which Ram likes.	[5]	4	1,2,3
Q.5(a)	Define Fuzzy decision. Also define Fuzzy Linear Programming.	[5]	5	1,2,3
Q.5(b)	Formulate the following LPP with fuzzy objectives and fuzzy constraints with tolerances $p_1=7$, $p_2=3$. Other values can be assumed as $p_0=a$ and $b_0=b$. Max $Z=x_1+x_2$ Subject to: $x_1+x_2 \le 5$ $5x_1+x_2 \le 4$ $x_1, x_2 \ge 0$.	[5]	5	1,2,3

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