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

CLASS: IMSC **SEMESTER : V**
BRANCH: MATHEMATICS **SESSION : MO/2023**

SUBJECT: MA303 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.

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Q.1(a)	Using the standard operations of fuzzy sets define a person who is not young and not old is a middle-aged person. Is normality and convexity lost when we operate on fuzzy sets by the standard operations of fuzzy sets. What are those standard operations.	[5]	1,1,2,3,1
Q.1(b)	If $X=\{5,15,25,35,45,55,65,75,85\}$, $A=\{(5,0),(15,0.2),(25,1),(35,.8),(45,.4),(55,.1),(65,0),(75,0),(85, 0)\}$ then find Support (A), $A_{0.4}$ & $A_{0.4}$'.	[5]	1,1,2,3,1
Q.2(a)	Find $A_\alpha(.)B_\alpha$ and values at $\alpha=0$ & $\alpha=1$, given $A_\alpha=[4\alpha+1,-3\alpha+9]$ & $B_\alpha=[\alpha+2,-3\alpha+8]$.	[5]	
Q.2(b)	Let R,S be defined on the sets $\{1,3,5\}X\{1,3,5\}$ .Let $R:\{(x,y)\|y=x+2\}$, $S:\{(x,y)\|x<y\}$.Using max-min composition find R0S.What is SOR equal to.	[5]	
Q.3(a)	Using the concept of lattice of fuzzy number prove that MAX(A,B)=MAX(B,A)	[5]	
Q.3(b)	Determine whether the fuzzy sets defined by the following functions is a fuzzy number or not. $B(x)=\begin{cases} x \text{ for } 0\le x\le 1 \\ 0 \text{ otherwise} \end{cases}$	[5]	
Q.4(a)	Show that $(P\Rightarrow Q)=(\sim P \vee Q)$	[5]	4,1,2,3,4
Q.4(b)	Write predicate logic statements for i. Sita likes anything which Ram likes. ii. Alia likes some of which Ram likes	[5]	4,1,2,3,4
Q.5(a)	Consider five travel packages a_1, a_2, a_3, a_4, a_5 from which we want to choose one. Their costs are Rs.1000, Rs.3000, Rs.10,000, Rs.5000 and Rs.7000 respectively. Their travel times in hours are 15,10,28,10 and 15 respectively. Assume that they are viewed as interesting with the degrees 0.4,0.3,1,0.6,0.5 respectively. Define your own fuzzy set of acceptable costs and your own fuzzy set of acceptable travel times.	[5]	5,1,2,3,5
Q.5(b)	Also determine the fuzzy set of interesting travel packages whose costs and travel times are acceptable and use this set to choose one of the five travel packages.	[5]	5,1,2,3,5

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