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

CLASS: IMSC **SEMESTER : V**
BRANCH: MATH & COMP. **SESSION : MO/2022**

SUBJECT: MA305 FUZZY LOGIC

TIME: 03 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*. TORA Software to be provided to the candidates in examination Hall.**

Q.1(a) Let $X=\{g_1,g_2,g_3,g_4,g_5\}$ be the respective set of students. Let $A=\{(g_1,.4),(g_2,.5),(g_3,1),(g_4,.9),(g_5,.8)\}$ be the fuzzy set of "smart students" where smart is fuzzy linguistic term.What does the term smartness of g1 is .4 indicates? [2]

Q.1(b) Let $A=\{a,b,c,d,e\}$,$A_1=\{a,b\}$,$A_2=\{c,d\}$and $A_3=\{e\}$.Find the partition of A. Are LOC and LEM followed in crisp sets. [3]

Q.1(c) Let $A=\{(x_1,.2),(x_2,.8),(x_3,.4)\}$,$B=\{(x_1,.4),(x_2,0),(x_3,.1)\}$ .Find i. A*B ii.A'∩B iii.(AÚB)' [5]

Q.2(a) Define max-min composition in terms of crisp relations. [2]

Q.2(b) Let $A=\{(x_1,.3),(x_2,.8),(x_3,.5)\}$ $B=\{(y_1,.5),(y_2,.6)\}$ be two fuzzy sets defined on $X=\{x_1,x_2,x_3\}$ & $Y=\{y_1,y_2\}$.Find the fuzzy relation R. [3]

Q.2(c) Find $A_\alpha(.)B_\alpha$ and values at α=0 & α=1,given $A_\alpha=[4\alpha+1,-3\alpha+9]$ & $B_\alpha=[\alpha+2,-3\alpha+8]$. [5]

Q.3(a) A=[-3,5], B=[2,6],C=[-4,7].Find A(∨)B ,A(∧)C [2]

Q.3(b) Define triangular fuzzy numbers with operations on them. [3]

Q.3(c) Let $A=\{(2,.9),(3,1)\}$,$B=\{(3,.8),(4,.7)\}$.Find A+B. [5]

Q.4(a) Define components for the linguistic variables X whose name is temperature. [2]

Q.4(b) Evaluate truth values of the proposition $(a\wedge(a\rightarrow b))\rightarrow b$. [3]

Q.4(c) Let $X=\{a,b,c,d\}$,$Y=\{1,2,3,4\}$,$A=\{(a,0),(b,.7),(c,.5),(d,1)\}$,$B=\{(1,.2),(2,1),(3,.7),(4,0)\}$, $C=\{(1,0),(2,.3),(3,1),(4,.7)\}$.Determine the implication relations "if x is A THEN y is B". [5]

Q.5(a) What is decision in a fuzzy environment? [2]

Q.5(b) Distinguish between Linear Programming Problem and Fuzzy Linear Programming Problem. [3]

Q.5(c) Formulate the following LPP with crisp objectives and fuzzy constraints with $p_1=6,p_2=4$. [5]

Max $Z=x_1+x_2$
Subject to:
$x_1+x_2\leq 4$
$5x_1+x_2\leq 3$
$x_1,x_2\geq 0$

:::::21/11/2022 M:::::