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

CLASS: IMSC **SEMESTER :VII**
BRANCH: Mathematics & Computing **SESSION : MO/2023**

SUBJECT: MA406 FUZZY MATHEMATICAL PROGRAMMING

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)	Let A= $\{a_1, a_2, a_3, a_4\}$ and the fuzzy sets involved to represent the concept of high salary, interesting job, close driving distance and high perks. Let G be goal in terms of the available jobs in set A. The first constraint C_1 requiring the job to be interesting is expressed in terms of set A. The second constraint C_2 requiring the driving distance be close is expressed in terms of A G={.11/a1+.3/a2+.48/a3+.8/a4}; C_1=.4/a1+.6/a2+.2/a3+.2/a4; C_2=.1/a1+.9/a2+.7/a3+1/a4. What fuzzy decision you can take about the concept of desirable job.	[5]	1,2,3	1
Q.1(b)	What is law of absorption in context of fuzzy sets. Explain with an example. Also define symmetric difference of two fuzzy sets A and B.	[5]	1,1,2,3,1	
Q.2(a)	Consider a LPP as Max $Z=.4x_1+.3x_2$ Subject to: $x_1+x_2 \le 400$ $2x_1+x_2 \le 500$ $x_1, x_2 \ge 0$ Given $Z^0=130$, $Z^1=160$,$p_1=100$ and $p_2=100$. Using Werner's method construct the membership function for the objective function and constraints. Also graphically show the membership functions of both.	[5]	2,1,2,3,2	
Q.2(b)	Also formulate the FLPP of 2(a) by Werner's method and explain its difference from Verdegay's method.	[5]	2,1,2,3,2	
Q.3(a)	Formulate the following LPP with Zimmermann's approach. Max Z=x+y Subject to: 2x-5y<=10 5x-2y<=30 x,y>=0 Let $b_0=6$,$p_0=1$,$p_1=2$,$p_2=3$.	[5]	3,1,2,3,3	
Q.3(b)	Also construct & graph the membership functions of the constraints and objective functions with this approach.	[5]	3,1,2,3,3	
Q.4(a)	Discuss the interactive fuzzy linear programming problem by striking the similarity between the three methods	[5]	4,1,2,3,4	
Q.4(b)	Also discuss the purpose of the method explaining the concept of membership functions & formulations by discussing the dissimilarity between the methods.	[5]	4,1,2,3,4	
Q.5(a)	Consider the possibilistic LPP as Max Z=(20,25,33)x+(12,18,27)y Subject to: 12x+32y<=750 19x+7y<=380 x,y>=0. Formulate the objective functions using Lai and Hwang's approach.	[5]	5,1,2,3,5	
Q.5(b)	Define the PIS and NIS of the objective functions defined in Lai and Hwangs Method. Also explain the construction of membership functions. How is the construction of membership function different from those of methods discussed in interactive linear programming-I	[5]	5,1,2,3,5	

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