

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION MO/2022)

CLASS: IMSC
BRANCH: MATHEMATICS

SEMESTER :VII
SESSION :MO/2022

SUBJECT:MA406 FUZZY MATHEMATICAL PROGRAMMING
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 will be supplied to the candidates

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- Q.1(a) Distinguish between α cuts and strong α cuts. [2]
- Q.1(b) Let fuzzy set $A=\{(x_1,.2),(x_2,.7),(x_3,.4)\}$ and fuzzy set $B=\{(y_1,0.5),(y_2,0.6)\}$ be two fuzzy sets defined on the universe of discourse $X=\{x_1,x_2,x_3\}$ and $Y=\{y_1,y_2\}$ respectively. Find the fuzzy relation R. [3]
- Q.1(c) Define Extension Principle. Determine the fuzzy set B induced by A and $f(x)=x^2$. [5]
 $A=\{(-2,.8),(-5,.5),(0,.8),(1,1.0),(2,.4),(3,.1)\}$
- Q.2(a) What is Fuzzy Linear Programming problem. [2]
- Q.2(b) What is Verdegay's method . Show with example how membership functions are constructed for such method. [3]
- Q.2(c) Formulate the LPP into FLPP by using Verdegay's method. Take the tolerance as 8 and 18 for the problem [5]
- $\text{Max } Z=3x_1+4x_2$
Subject to:
 $4x_1+2x_2 \leq 80$
 $2x_1+5x_2 \leq 180$
 $x_1, x_2 \geq 0$
- Q.3(a) What is LPP with fuzzy resources and objectives. [2]
- Q.3(b) Discuss about Zimmermann's symmetric model [3]
- Q.3(c) Formulate the following LPP with Zimmermann's approach. [5]
 $\text{Max } Z=x+y$
Subject to:
 $2x-5y \leq 10$
 $5x-2y \leq 30$
 $x,y \geq 0$
Let $b_0=6, p_0=1, p_1=2, p_2=3$.
- Q.4(a) What is interactive fuzzy Linear programming [2]
- Q.4(b) Discuss the differences of Zimmermann's, Werner's, Chana's and Verdegay's approach [3]
- Q.4(c) Discuss the Carlsson and Korhonen's approach of Interactive fuzzy linear Programming-II. [5]
- Q.5(a) What is Linear programming with imprecise objective coefficients [2]
- Q.5(b) Consider the possibilistic LPP as [3]
 $\text{Max } Z=(24,25,26)x+(17,18,19)y$
Subject to:
 $12x+32y \leq 750$
 $19x+7y \leq 380$
 $x,y \geq 0$.
Formulate the objective function using Lai and Hwang's approach.
- Q.5(c) Write a note on lai and Hwang's Approach for solving fuzzy linear programming problem. [5]