

2018**M.Sc.****4th Semester Examination****APPLIED MATHEMATICS WITH OCEANOLOGY AND
COMPUTER PROGRAMMING****PAPER—MTM-402 (Unit-I)****Subject Code—21***Full Marks : 25**Time : 1 Hour**The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.**Illustrate the answers wherever necessary.***(Fuzzy Sets and their Applications)**Answer Q. No. 1 and any *two* from the rest.

1. Answer any *two* questions : 2×2
- (a) Write two possible membership functions for the fuzzy number "close to 7".
- (b) Explain convex fuzzy set with example.

(Turn Over)

- (c) Suppose $X = \{-3, -2, -1, 0, 1, 2, 3\}$,
 $Y = \{0, 1, 2, 3\}$ be two universal sets and a functions $f :$
 $x \rightarrow x$ define by $y = f(x) = |x|$.

Find $f(\tilde{A})$, where

$$\tilde{A} = \frac{0.3}{-2} + \frac{0.2}{-1} + \frac{0.1}{0} + \frac{0.1}{1} + \frac{0.6}{2} + \frac{1}{3}.$$

2. (a) What are the types of uncertainty? Explain each type with an example. 3
- (b) Show that fuzzy sets do not satisfied laws of contradiction and excluded middle. 5
3. (a) Let \tilde{A} and \tilde{B} be two fuzzy numbers with membership functions.

$$\mu_{\tilde{A}}(x) = \begin{cases} 0 & \text{for } x \leq 1 \\ (x-1)/2 & \text{for } 1 < x \leq 3 \\ 1 & \text{for } 3 < x < 4 \\ (5-x) & \text{for } 4 \leq x < 5 \\ 0 & \text{for } x \geq 5 \end{cases}$$

$$\mu_{\tilde{B}}(x) = \begin{cases} 0 & \text{for } x < 2 \\ (x-2)/3 & \text{for } 2 < x < 5 \\ (7-x)/2 & \text{for } 5 < x < 7 \\ 0 & \text{for } x > 7 \end{cases}$$

Using α -cut and addition rule of interval numbers, determine the membership function of $\tilde{A} + \tilde{B}$. 5

(b) Define multi-objective fuzzy linear programming problem. Given an example of it. 3

4. (a) What does mean by "Symmetric" and "Non-symmetric" fuzzy linear programming problems? 2

(b) Discuss Werners' approach to solve a linear programming problem. 6

[Internal Assessment : 05 Marks]
