



## Assignment Cover Page

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PRN : <i>VML22C813</i>	Admission No. .... <i>7982</i> ....		
Subject Name :- <i>Soft computing</i>		Subject Code:- <i>CST444</i>	
Assignment Title/No : <i>02</i>			
Name of the faculty: <i>Prswathi T.V</i>			
Assignment Submitted on <i>23/2/26</i>			
<b>Late submission rules :</b> Max mark will reduced to 50% for 1-5 working day's delay, no mark will be awarded thereafter.			
I am hereby confirming that this assignment is my own and I haven't adopted any unfair means in any steps of its preparation to enhance my performance in this assignment.			
Date : <i>23/2/26</i>		<i>Nandana</i> Sign with Name	
Assignment subdivision	Maximum Mark	Marks awarded	Remarks
A			
B			
C			
<u>Feed back/suggestions :</u>			
Name and sign of the faculty			

- ? Define membership function and state its importance in fuzzy logic. Explain the features of fuzzy membership functions with proper diagrams
- A membership function is a curve that defines how each point in the input space (the universe of discourse) is mapped to a membership value (or degree of membership) between 0 & 1.
    - If an element has a value 1, it is entirely in the set.
    - If it has a value of 0, it is not in the set @ all.
    - Any value in b/w (eg 0.6) represents a partial membership.

For a fuzzy set A, the membership function is denoted as  $M_A(x)$ .

$$M_A(x): x \rightarrow [0,1]$$

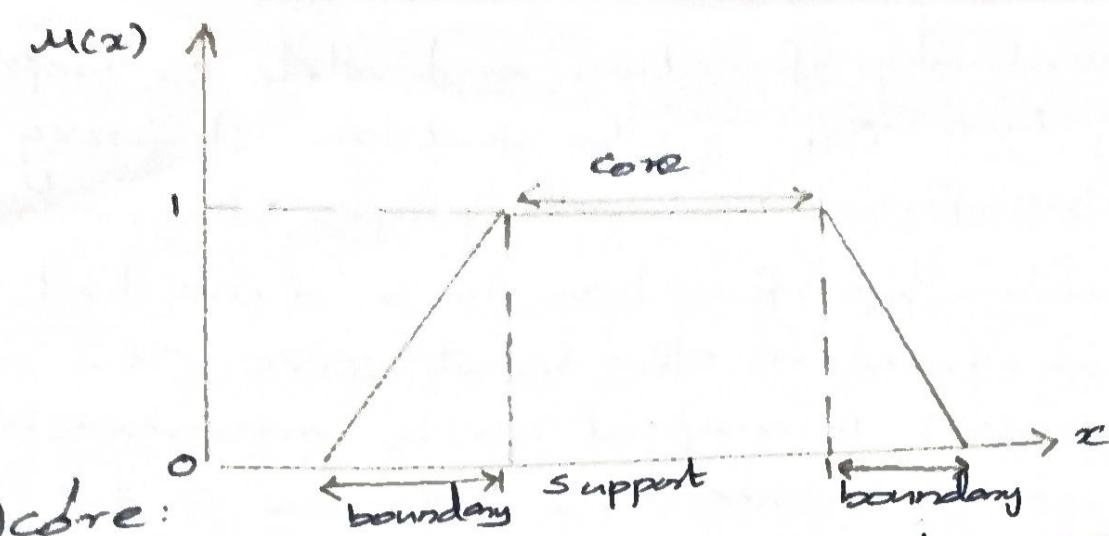
Importance of fuzzy logic:

1. Handling uncertainty: It allows the system to model "vague" human concepts like warm, or fast, that don't have sharp boundaries
2. Fuzzification: It serves as the first step in a fuzzy inference system, converting a "crisp" input data into fuzzy linguistic terms.
3. Smooth transitions: MFs prevent abrupt changes in system behaviour. Instead of a heater suddenly snapping from "off" to "on" an MF allows for a gradual increase in power as the room cools
4. Mathematical foundation: It provides the quantitative framework needed to perform logical operation (AND, OR, NOT) on subjective data, making it possible for computers to "reason" like humans.

Features of fuzzy membership functions:

- 1) Core
- 2) support
- 3) Boundary
- 4) cross over

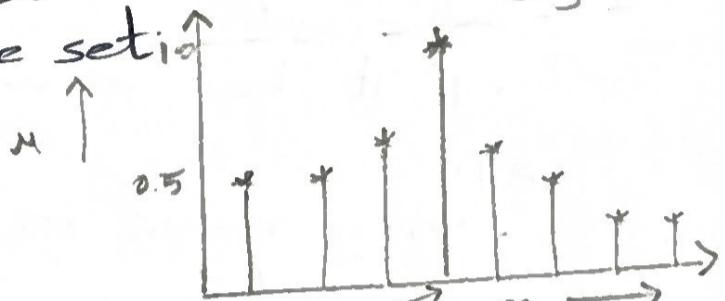
$\mu_A(x)$



1) Core:

For a fuzzy set  $A$ , the core of a membership function is that region of the universe that is characterized by a full membership in the set.

$$\mu_A(x) = 1$$



2) Support:

For any fuzzy set  $A$ , the support of a membership function is the region of the universe that is characterized by a nonzero membership in the set. Hence support consist of all those elements  $x$  of the universe of information such that

$$\mu_A(x) > 0$$

A fuzzy set whose support is a single element

$$\mu_A(x) = 1$$

3) Boundary:

For any fuzzy set  $A$ , the boundary of a membership function is the universe region characterized by a non zero but incomplete membership in the set. Hence the boundary consist of all those elements  $x$  of the universe of information such that

$$0 < \mu_A(x) < 1$$

4) Cross over:

It is defined as the elements of a fuzzy set whose membership value is equal to 0.5.

