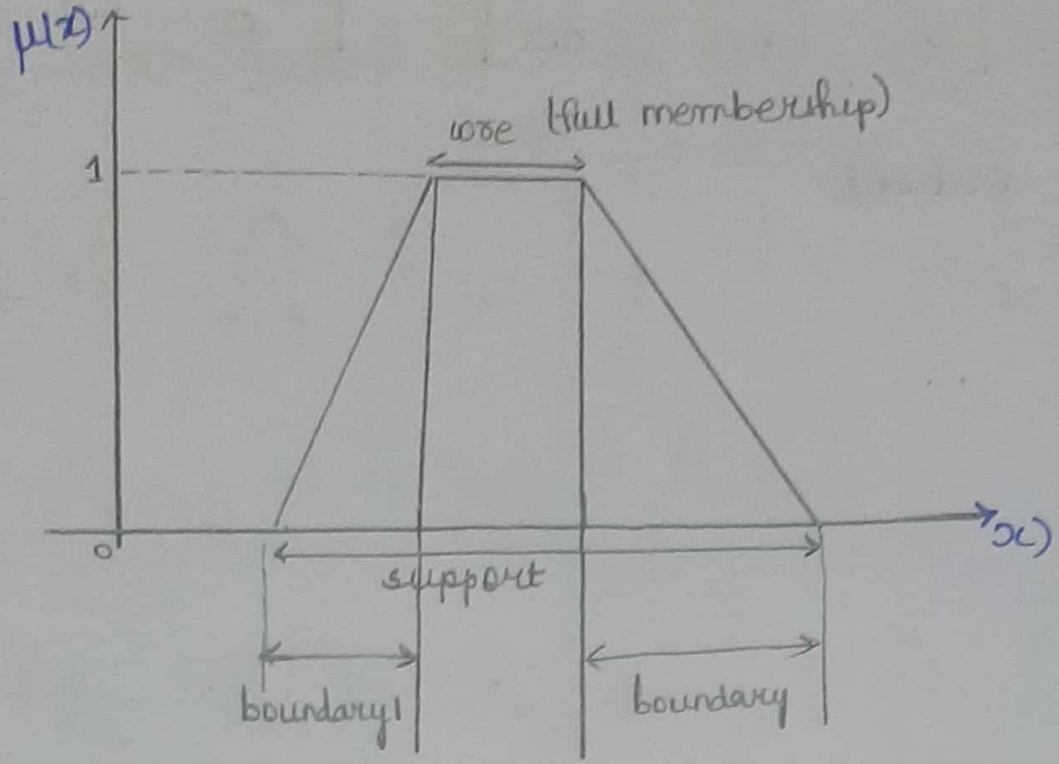
Features of Membership function * imp.



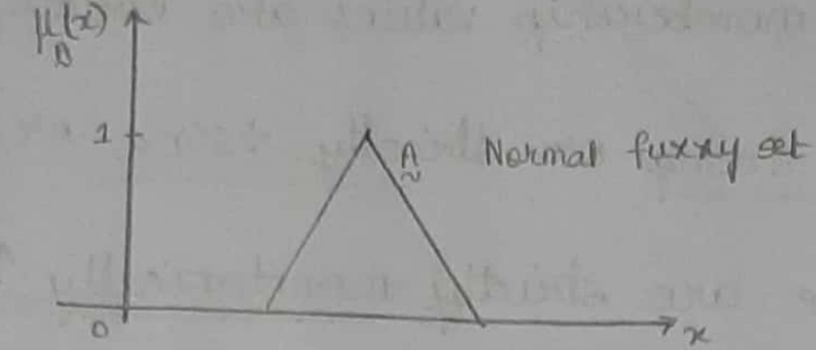
For core $\mu_{\underset{\sim}{A}}(x) = 1$

support $\mu_{\underset{\sim}{A}}(x) > 0$

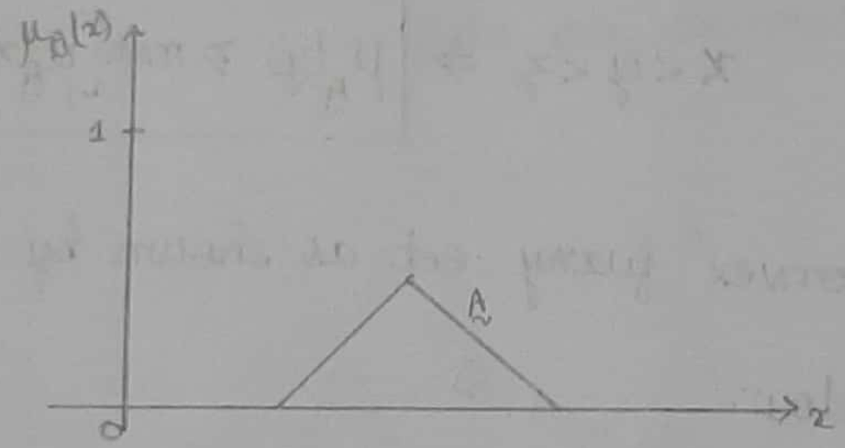
Boundary $0 < \mu_{\underset{\sim}{A}}(x) < 1$

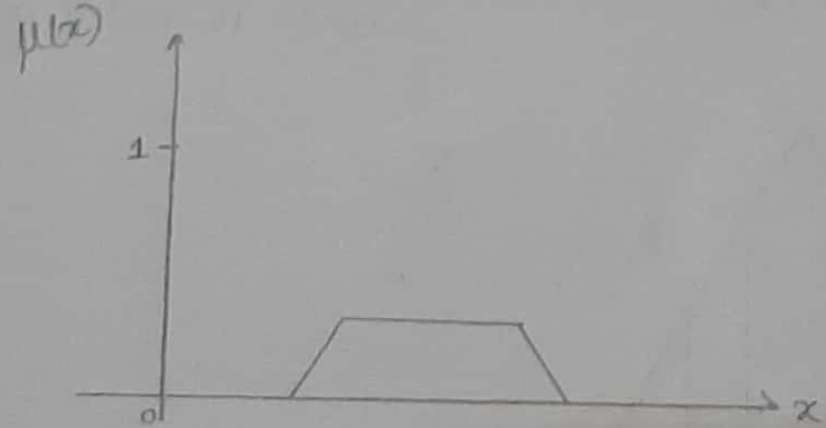
NORMAL FUZZY SET-

- A fuzzy set in which atleast one element is having full membership is called Normal fuzzy set.



- A subnormal fuzzy set in which no element have full membership.



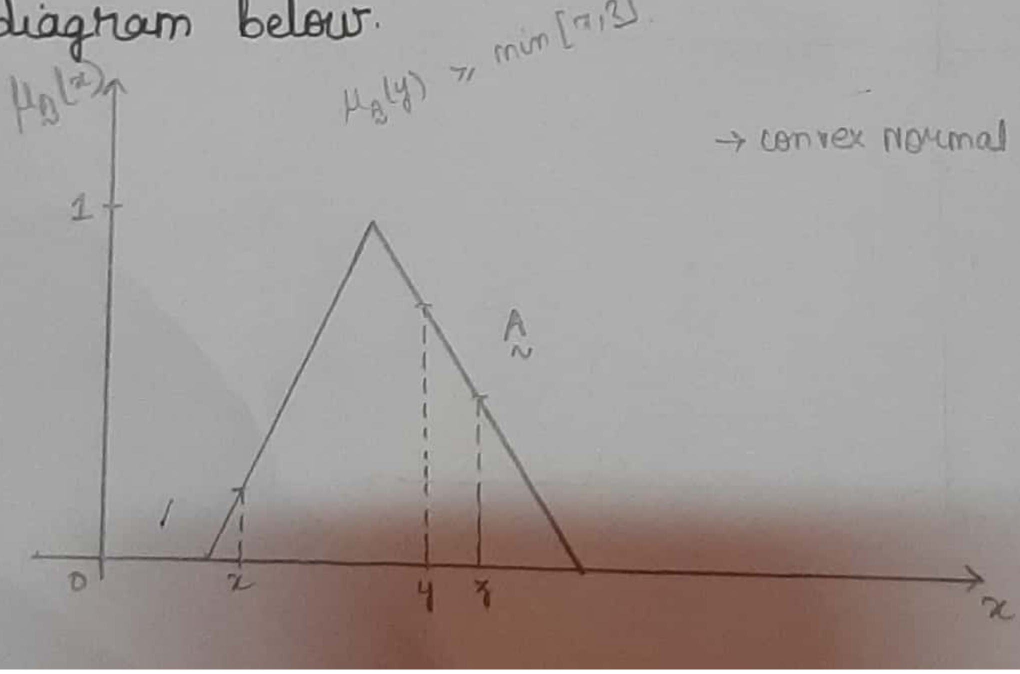


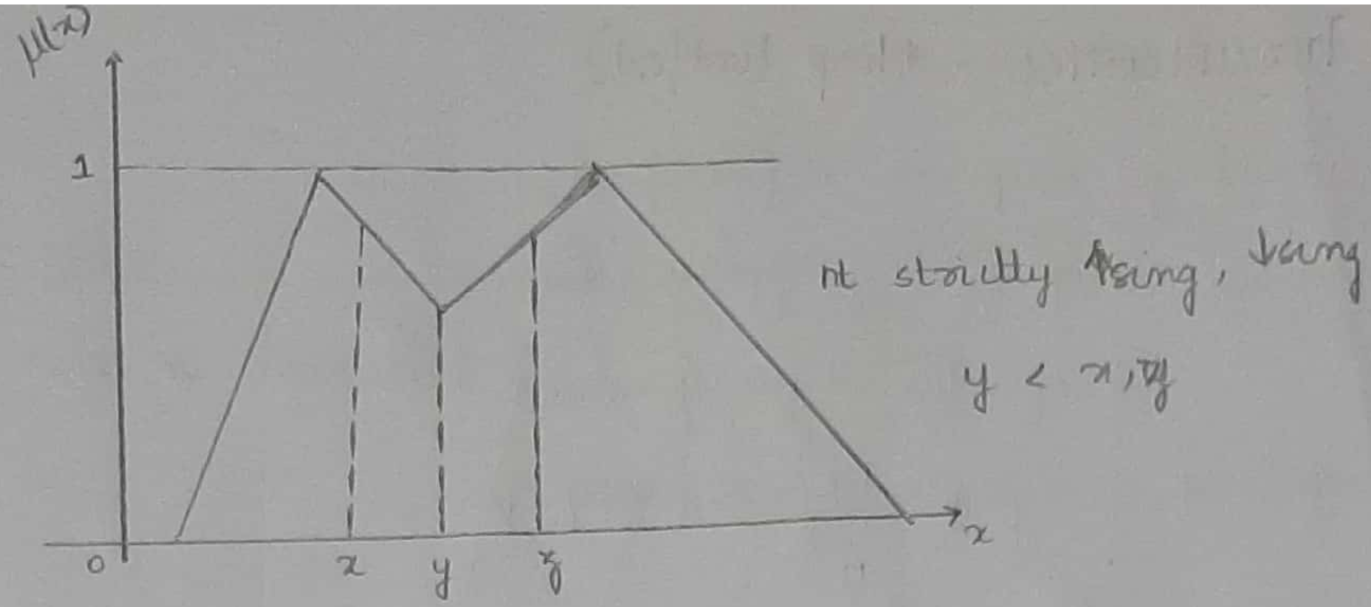
CONVEX FUZZY SET-

- A convex fuzzy set is defined by a membership funct whose membership values are strictly monotonically ↑sing or strictly ↓sing or whose membership value are strictly monotonically ↑sing & then strictly monotonically ↓sing with ↑sing values of elements in the universe.

Eg: Let the elements x, y & z be in the fuzzy set $\underset{\sim}{A}$ then the relation $x < y < z \Rightarrow \boxed{\mu_{\underset{\sim}{A}}(y) \geq \min[\mu_{\underset{\sim}{A}}(x), \mu_{\underset{\sim}{A}}(z)]}$

Let $\underset{\sim}{A}$ be the convex fuzzy set as shown by its Venn diagram below.

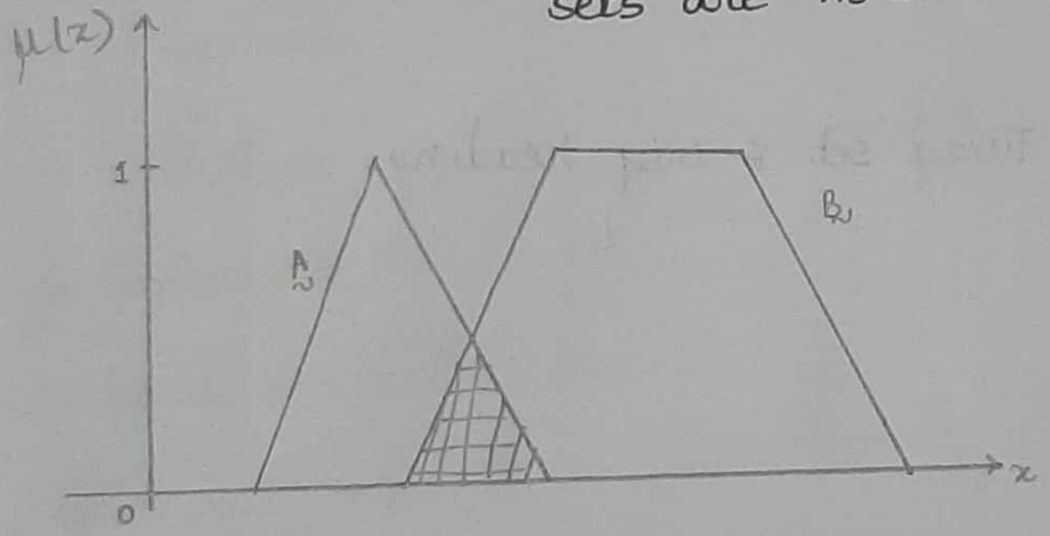


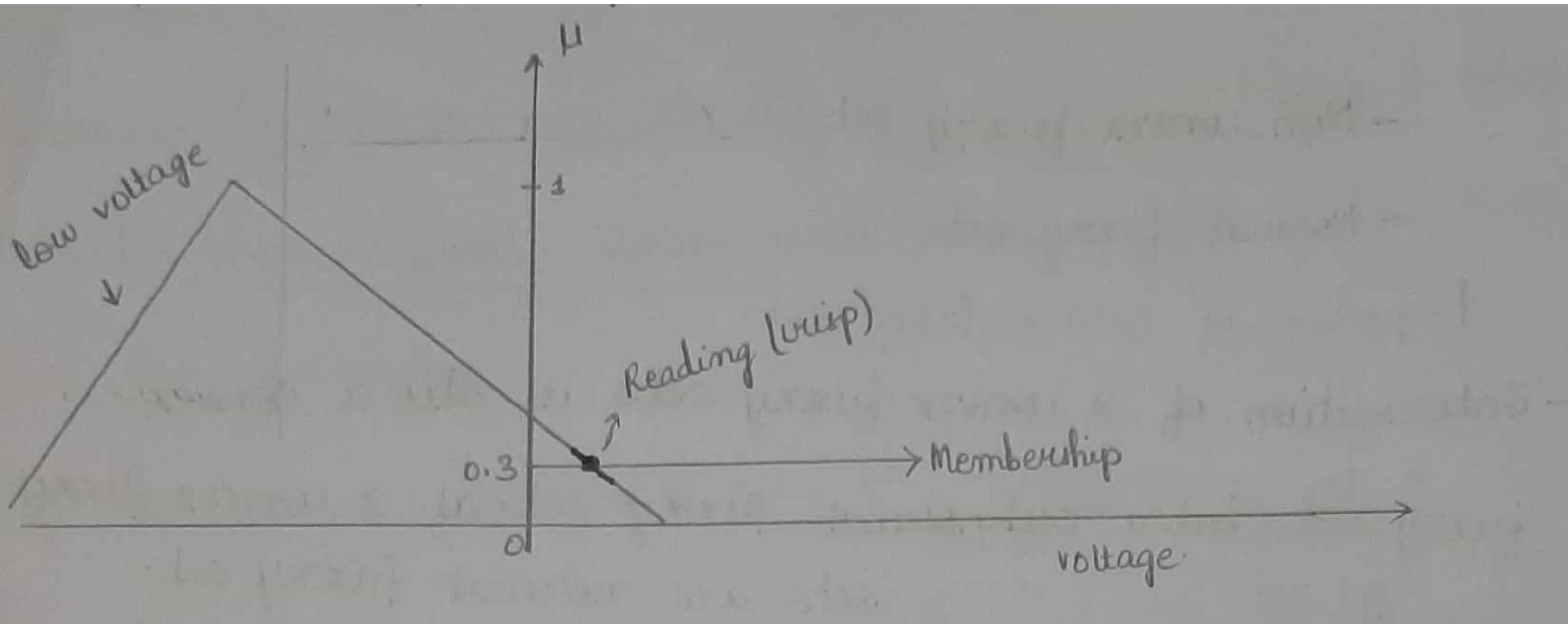


- Non convex fuzzy set
- Normal fuzzy set

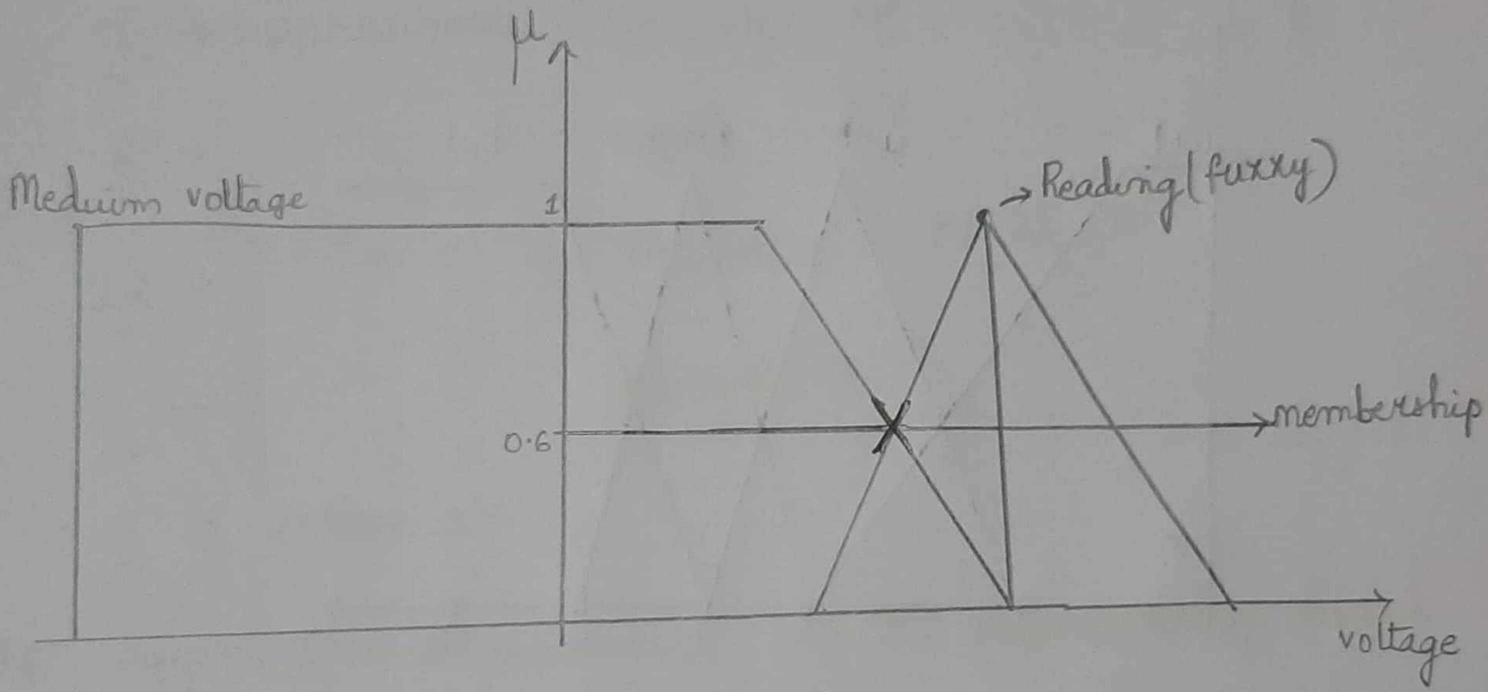
Properties of convex fuzzy set.

Intersection of 2 convex fuzzy sets is also a convex fuzzy set but a subnormal fuzzy set. if 2 convex fuzzy sets are normal fuzzy set.





(a) ~~crisp set~~ Fuzzy set & crisp reading.



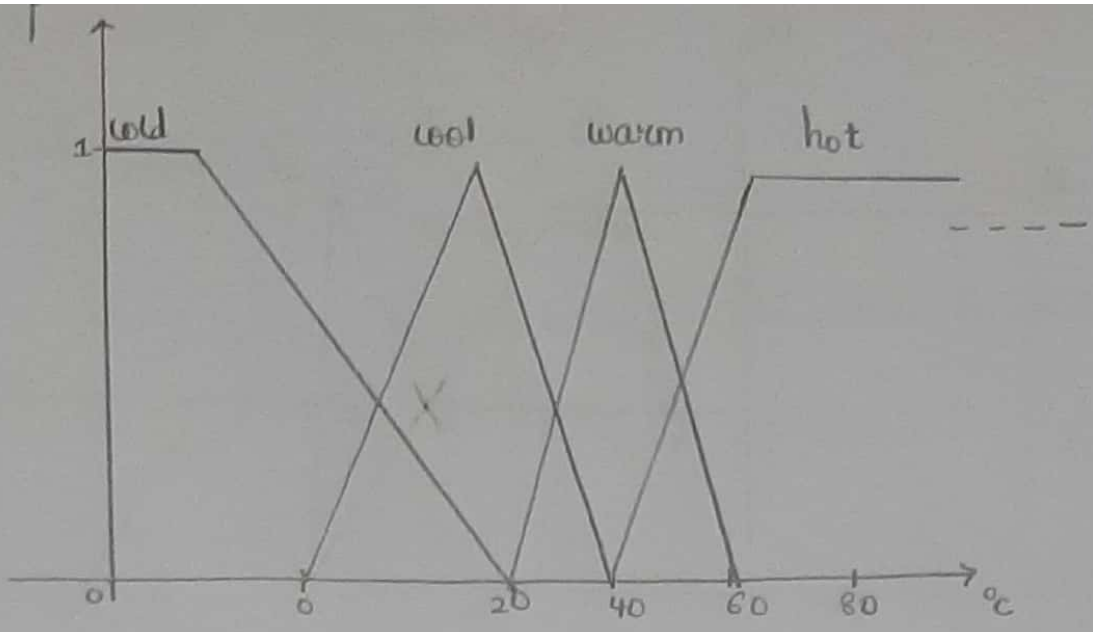
(b) Fuzzy set & Fuzzy reading.

FUZZIFICATION METHODS : (O

- There are many ways to
variables, they are

1. Intuition
2. Inference
3. Rank ordering
4. Neural networks.

1. INTUITION -



2. INFERENCE -

conclude

Eg - Identi

Let A, B & C be inner angles of triangle &

$A \geq B \geq C \geq 0$ & universe of Δ^{le} is

defined by U

$$U = \{ (A, B, C) \mid A \geq B \geq C \geq 0 ; A + B + C = 180^\circ \} \rightarrow ①$$

- We can define number of geometric shape ~~to~~ identify for any collection of angles w.r.t the constraint in eq ①

- We can identify following 5 type of Δ^{le}

$\underset{\sim}{I} \rightarrow$ approximate isosceles Δ^{le}

$\underset{\sim}{R} \rightarrow$ " right Δ^{le}

$\underset{\sim}{IR} \rightarrow$ " isosceles & right Δ^{le}

$\underset{\sim}{E} \rightarrow$ " equilateral Δ^{le}

$\underset{\sim}{T} \rightarrow$ other Δ^{le}

- For approximate isosceles Δ^{le} the membership funct is defined as

$$\mu_{\underset{\sim}{I}}(A,B,C) = 1 - \frac{1}{60^\circ}\min(A-B, B-C)$$

- For eg if $A=B$ or $B=C$, the membership value in the approximate isosceles Δ^{le} will be $\mu_{\underset{\sim}{I}} = 1$ & if

$A = 120^\circ$, $B = 60^\circ$, $C = 0^\circ$ then $\mu_{\underset{\sim}{I}} = 0$

- For a fuzzy right angle Δ^{le} the membership funct is defined as

$$\mu_{\underset{\sim}{R}}(A,B,C) = 1 - \frac{1}{90^\circ}|A-90^\circ|$$

- For approximate isosceles & right angle Δ^{le} the membership is defined by logical intersection of isosceles & right angles Δle memberships

i.e $\underset{\sim}{IR} = \underset{\sim}{I} \cap \underset{\sim}{R}$

which is given by

$$\mu_{\underset{\sim}{I}R}(A,B,C) = \min\left[\mu_{\underset{\sim}{I}}(A,B,C),\ \mu_{\underset{\sim}{R}}(A,B,C)\right]$$

$$\mu_{\underset{\sim}{IR}}(A,B,C) = 1 - \max\left[\frac{1}{60}\min(A-B, B-C),\ \frac{1}{90}|A-90°|\right]$$

- For a fuzzy equilateral Δle the m.s funct is given by

$$\mu_{\underset{\sim}{E}}(A,B,C) = 1 - \frac{1}{180°}(A-C)$$

- For the set of "all the other Δles" the compliment of logical union of all the above three cases i.e.

$$\underset{\sim}{T} = \left(\overline{\underset{\sim}{I} \cup \underset{\sim}{R} \cup \underset{\sim}{E}}\right) = \overline{\underset{\sim}{I}} \cap \overline{\underset{\sim}{R}} \cap \overline{\underset{\sim}{E}}$$

i.e $$\mu_{\underset{\sim}{T}}(A,B,C) = \min\left\{1-\mu_{\underset{\sim}{I}}(A,B,C),\ 1-\mu_{\underset{\sim}{E}}(A,B,C),\ 1-\mu_{\underset{\sim}{R}}(A,B,C)\right\}$$

$$= \frac{1}{180°}\min\left\{3(A-B),\ 3(B-C),\ 2|A-90°|,\ [A-C]\right\}$$

Scanned with CamScanner

3. RANK ORDERING :

- In this method, the m.s value to a fuzzy variable is assigned by an individual, a commity, a group, a poll & other members
- Reference is determined by pair wise comparision & these determines the ordering of m.s value.