EXPERIMENT 10

AIM : WAP to implement fuzzy logic.

THEORY : Fuzzy Logic is a computational approach that deals with **reasoning under uncertainty**. Unlike classical logic which uses binary true (1) or false (0), fuzzy logic allows values **between 0 and 1**, representing **degrees of truth**.It is based on **fuzzy sets** and is used to handle vague or imprecise information, much like human reasoning.

CODE :

```
def cold_membership(temp):
    if temp <= 10:
        return 1.0
    elif 10 < temp < 20:
        return (20 - temp) / 10.0
    else:
        return 0.0


def warm_membership(temp):
    if 15 <= temp <= 25:
        return (temp - 15) / 10.0
    elif 25 < temp <= 35:
        return (35 - temp) / 10.0
    else:
        return 0.0


def hot_membership(temp):
    if temp <= 30:
```

```
        return 0.0
    elif 30 < temp < 40:
        return (temp - 30) / 10.0
    else:
        return 1.0

def calculate_fan_speed(temp):
    cold = cold_membership(temp)
    warm = warm_membership(temp)
    hot = hot_membership(temp)

    # Weighted average (centroid method)
    if cold + warm + hot == 0:
        return 0  # Avoid division by zero

    fan_speed = (cold * 0 + warm * 50 + hot * 100) / (cold + warm + hot)

    print("\nFuzzy Membership Values:")
    print(f"Cold : {cold:.2f}")
    print(f"Warm : {warm:.2f}")
    print(f"Hot  : {hot:.2f}")
    print(f"\nCalculated Fan Speed: {fan_speed:.2f}%")
    return fan_speed
```

```
# Main program

if _name_ == "_main_":

    temp = float(input("Enter temperature (in Celsius): "))

    calculate_fan_speed(temp)
```

```
Enter temperature (in Celsius): 25

    Fuzzy Membership Values:
    Cold : 0.00
    Warm : 1.00
    Hot  : 0.00

    Calculated Fan Speed: 50.00%
```