

Reg. No: .....

Name: .....

**APJ Abdul Kalam Technological University**

Seventh Semester B.Tech (Honours) Degree Examination, December 2019

**Course code:05CS 6001****Course Name: -COMPUTATIONAL INTELLIGENCE**

Time: 3 Hours

Max Marks: 60

I.

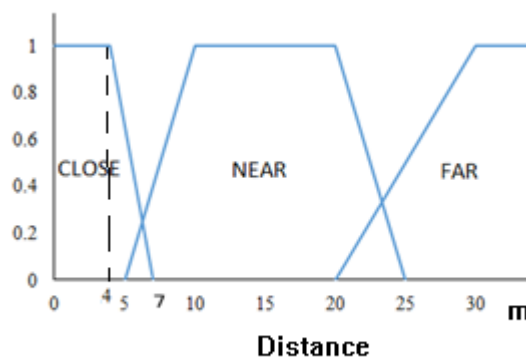
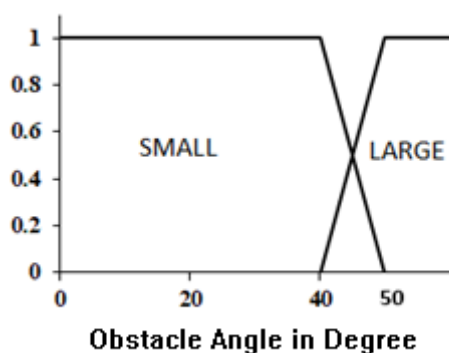
- a) Consider the set of students
- $S = \{\text{John, Ramesh, Alice, Diya, Job}\}$
- .

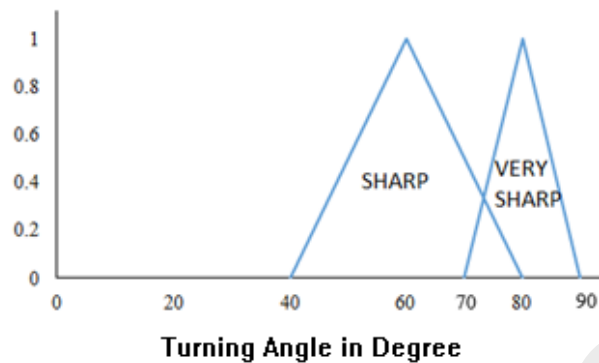
Let Hardworking Students  $H = \left\{ \frac{0.7}{\text{John}} + \frac{0.6}{\text{Ramesh}} + \frac{0.9}{\text{Alice}} + \frac{0.8}{\text{Diya}} + \frac{0.6}{\text{Job}} \right\}$  andIntelligent Students  $I = \left\{ \frac{0.4}{\text{John}} + \frac{0.7}{\text{Ramesh}} + \frac{0.8}{\text{Alice}} + \frac{0.4}{\text{Diya}} + \frac{0.9}{\text{Job}} \right\}$ 

Use appropriate concentration, dilation, union, intersection operations to find Students who are hard working or Intelligent, Hardworking but not Intelligent, Highly Intelligent. (5 Marks)

- b) Consider a fuzzy system for obstacle avoidance in a computer vision system. The inputs are distance from the obstacle and angle from the obstacle. Membership functions and rules for deciding the angle type in which the steering should be turned is shown below. Compute the angle of turn if angle from the obstacle is 20 degree and distance is 6m using mean of maxima method. (7 Marks)

ANGLE \ DISTANCE	CLOSE	NEAR	FAR
	SMALL	Very Sharp	Sharp Turn
LARGE	Med Turn	Mild Turn	Zero Turn





II.

- a) What you meant by competitive learning in ANN? (5 Marks)
- b) Find the weights required to perform the following classification using perceptron network. Assume learning rate as 1 and initial weights as 0.

X1	X2	t
1	1	1
1	-1	-1
-1	1	-1
-1	-1	-1

(7 Marks)

III.

- a) Explain the different steps involved in genetic algorithm. (12 Marks)
- b) What you meant by kernel functions in context of SVM? Specify any two kernel functions. (6 Marks)

**OR**

IV.

- a) Explain single point, double point and uniform cross over operations used in genetic algorithm with examples (6 Marks)
- b) How support vector machine can be used to solve linearly and nonlinearly separable classification problem? Explain (12 Marks)

V.

- a) Explain the different types of Ant systems. (10 Marks)
- b) What are the different ways in which pheromone trail updating process can be carried out? Explain. (8 Marks)

**OR**

VI.

- a) Consider the decision making situation defined by following rules:
- R1: If it is a holiday and it is not raining, then I go to the Play Ground
- R2: If it is a holiday and it is raining then I go to Indoor stadium
- R3: If it is not a holiday and it is not raining then I go to school by walk
- R4: If it is not a holiday and it is raining then I go to school by car.
- R5: If I go to the Play Ground, then I play Cricket.
- R6: If I go to the Indoor stadium, then I play Badminton.
- R7: If I play cricket or badminton, then I become tired
- R8: If I go to school by walk or by car, then I will study well.
- R9: If I study well, then I will get a job.

What do you conclude in the following situation “It is a holiday and it is not raining”?  
With a neat diagram show how the rules are followed. (8 Marks)

- b) Explain the structure of Expert Systems. (10 Marks)