

GANPAT UNIVERSITY
B. Tech. Semester: VII (BM&I) Engineering
CBCS Regular Examination Nov – Dec 2015
2BM705 Neural Networks & Fuzzy Logic

Time: 3 Hours

Total Marks: 70

- Instruction:**
1. All the questions are compulsory.
 2. Write each section in separate answer book.
 3. Figures on right indicate marks.
 4. Answer should be brief and to the point.

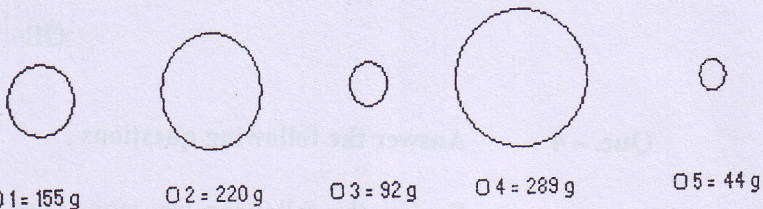
Section - I

- Que. – 1** **Answer the following questions:** 12
- a) What is alpha cut? Explain resolution identity using alpha cut. 02
 - b) Enlist and explain the fuzzy system design steps. 04
 - c) Define 'Membership function'. Explain triangular membership function along with its mathematical proof. 06

OR

- Que. – 1** **Answer the following questions:** 12
- a) Explain the concept of mapping of input space to output space using different examples. 02
 - b) What is the structure of fuzzy rule? Give the example of fuzzy rule and crisp rule. Make comment on it. 04
 - c) Explain the concept of Right Hand side computation in fuzzy inference engine. 06

- Que. – 2** **Answer the following questions:** 11
- a) Assume that orange of various sizes are to be classified for the packaging purpose. Size is determined by weight. Represent for both crisp and fuzzy logic. 06



Oranges are labeled from O 1 to O 5 along with their weight in grams. Draw the complement of membership value. Also draw the union and intersection of fuzzy set.

- b) Draw and explain interdependencies among basic problems and system analysis problems in fuzzy logic. How it is used in the field of medicine for diagnostic purpose? 05

OR

Que. - 2 Answer the following questions: 11

- a) Design a fuzzy rule for control the automatic washing machine along with membership value for following variables. Also represents output using defuzzification. 08

Input Variables:

Laundry Quantity (small medium large) Range (0 to 6 kg)

Laundry Dirtiness (low medium high) Range (0 to 100 %)

Output Variables:

Washing Time (verysmall small medium large) Range (0 to 30 minutes)

Quantity of Detergent (low medium high) Range (0 to 270 gram)

- b) Differentiate normal and subnormal fuzzy by using appropriate example. 03

Que. - 3 Answer the following questions: 12

- a) Define t-norms and t-conforms operator. 02

- a) Define following terms: 04

i) Linguistic variable

ii) Support

iii) Core

iv) Cross over point

- b) What is the evaluation of antecedent of fuzzy variable? Explain the evaluation for single input data point using appropriate example. 06

Section - II

Que. - 4 Answer the following questions : 12

- a) What are the differences between Biological and Artificial Neural Network? Explain in detail. 06
- b) Write a MATLAB program to implement Sine function using feed forward back propagation neural network. 06

OR

Que. - 4 Answer the following questions : 12

- a) Explain the following key terms used to represent the artificial neural network. 06
1. Weights
 2. Activation function
 3. Bias
- b) Explain the limitations of single layer perceptron with the help of example. How to overcome this limitation. 06

Que. – 5

Answer the following questions :

11

- a) Classify the two dimensional input patterns given below, using Hebbian learning rule. (I-J letters) 06

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*	*	*

*	*	*
	*	
*	*	

- b) Write a MATLAB program to implement AND function using perceptron neural network. 05

OR

Que. – 5

Answer the following questions :

11

- a) Using the Hebb rule, find the weights required to perform the following classification: vectors $[1 \ 1 \ 1 \ 1]$ and $[-1 \ 1 \ -1 \ -1]$ are member of class (with target value 1); vectors $[1 \ 1 \ 1 \ -1]$ and $[1 \ -1 \ -1 \ 1]$ are not members of class (with target value -1). 06
- b) How the boundary region (decision boundary) is determined using linear separability concept? Explain with the help of example. 05

Que. – 6

Explain the architecture and training algorithm of the following types of artificial neural network. 12

1. Hebbian Network
2. Perceptron
3. Adaline

END OF PAPER