

Reg.No.: 

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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN  
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]  
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

**Question Paper Code: 60017**

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2025  
Seventh Semester  
Information Technology  
U19ITV33 - SOFT COMPUTING  
(Regulation 2019)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

**PART – A**

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Why is the McCulloch-Pitts neuron model widely used in logic functions?	2	K1	CO1
2.	Estimate the factors that improve the convergence of learning in Back Propagation Network.	2	K2	CO1
3.	Compare fuzzy set with crisp set.	2	K1	CO2
4.	Consider the Universe of Discourse, $X = \{1,2,3,4,5,6,7,8,9,10\}$ . Two Fuzzy sets are defined as $\mu_{\text{Good}} = \{0.1/6+0.5/7+0.9/8+1/9+1/10\}$ $\mu_{\text{Excellent}} = \{0.2/8+0.6/9+1/10\}$ Construct the Membership function for the term “Good but not Excellent”.	2	K2	CO2
5.	Draw the structure of Boltzmann machine.	2	K1	CO3
6.	How does Genetic Algorithm differ from traditional algorithm?	2	K2	CO3
7.	Infer the role of fitness function in Genetic Algorithm.	2	K2	CO4
8.	Write any two differences between fuzzy-neural hybrid and fuzzy-genetic hybrid system.	2	K2	CO4
9.	List few applications of hybrid fuzzy Genetic algorithm systems.	2	K1	CO5
10.	Define Image Fusion.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11.	a) Discuss in detail about the various types of activation function used in neural network with aid of mathematical representation and its output.  (OR)	13	K1	CO1
	b) Discuss the back propagation learning methods and algorithm in detail.	13	K1	CO1
12.	a) Given a conditional and qualified Fuzzy proposition 'P' of the form. P: If x is A, then y is B is S where 'S' is fuzzy truth qualifier and a fact is in the form "x is A". We want to make an inference in the form "y is B". Develop a method based on the truth- value restrictions for getting the inference.  (OR)	13	K2	CO2
	b) Consider four travel packages offered by Celtic, Club Mahindra, Metro and Himalaya travels. We want to choose one. Their costs are INR 100,000, INR 200,000, INR 150,000 and INR 175,000. Their travel times in hours are 150, 200, 100 and 125 respectively. They are viewed as interesting with degrees 0.4, 0.3, 0.6 and 0.5. Define your own fuzzy set of acceptable travel times. Then determine the fuzzy sets of interesting travel packages whose cost and travel times are acceptable and use this set to choose one of your packages.	13	K2	CO2
13.	a) Compare Counter Propagation Networks with Kohonen's Self Organizing Map in terms of architecture and learning strategy.  (OR)	13	K2	CO3
	b) Illustrate the architecture and learning process of a Cascade Correlation Network in detail.	13	K2	CO3
14.	a) Explain the significance of Genetic algorithm's search space, sequential procedures involved in the cross over and reproduction phase with typical examples.  (OR)	13	K2	CO4
	b) Discuss the basic structure of Holland's Classifier System and explain how it integrates symbolic rule-based reasoning with reinforcement learning.	13	K2	CO4
15.	a) Implement Optimization of Traveling Salesman Problem using Genetic algorithm approach.	13	K1	CO5

(OR)

- b) Illustrate the working of a GA-based Internet search optimization process. Explain How are fitness functions designed for ranking web pages? 13 K1 CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	For aircraft simulator data the determination of certain changes in its operating conditions is made on the basis of hard break points in the match region, we define two fuzzy sets A and B representing the conditions of “near” a mach number of 0.65 and “in the region” of a mach number of 0.65, respectively, as follows.	15	K3	CO5

A= near mach 0.65

$$= \left\{ \frac{0}{0.64} + \frac{0.75}{0.645} + \frac{1}{0.65} + \frac{0.5}{0.655} + \frac{0}{0.66} \right\}$$

B= in the region of mach 0.65

$$= \left\{ \frac{0}{0.64} + \frac{0.25}{0.645} + \frac{0.75}{0.65} + \frac{1}{0.655} + \frac{0.5}{0.66} \right\}$$

For these two fuzzy sets create

- (i)  $A \cup B$  (ii)  $A \cap B$  (iii)  $\overline{A \cup B}$  (IV)  $\overline{A} \cap \overline{B}$

(OR)

- b) Consider a Kohonen self-organizing net with two cluster units and five input units. The weight vectors for the cluster units are  $w_1 = [ 1.0, 0.8, 0.6, 0.4, 0.2 ]$  &  $w_2 = [ 0.2, 0.4, 0.6, 0.8, 1.0 ]$   
Use the square of the Euclidean distance to find winning cluster unit for the input pattern.  
 $x = [ 0.5, 1.0, 0.5, 0.0, 0.0 ]$   
Using a learning rate of 0.2, find the new weights for the winning unit.