

APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER



Q. P. Code: PE0821321A-I

(Pages: 2)

Name:

Reg. No:

THIRD SEMESTER M.TECH. DEGREE EXAMINATION DECEMBER 2021

Branch: Electrical and Electronics Engineering

Specialization: Power Electronics

08EE7221(A) SOFT COMPUTING TECHNIQUES

(Common to PE)

Time: 3 hours

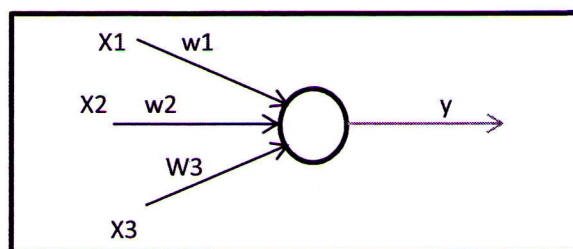
Max. Marks: 60

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q. No.	Module 1	Marks
1. a	Assume two fuzzy sets: $A = \{0.2/x_1 + 0.5/x_2 + 1/x_3\}$ $B = \{0.3/y_1 + 0.9/y_2\}$. Find the fuzzy relation (the Cartesian product).	3
	Answer b or c	
b	What is defuzzification? With suitable diagrams and equations, explain in detail the defuzzification methods.	6
c	With a neat block diagram, explain a fuzzy logic Controller for any real time application.	6

Q. No.	Module 2	Marks
2. a	Consider a single artificial neuron (unit).	3



The network has binary inputs and the activation of the unit is given by unit step function. If $w_1=2$, $w_2=-4$ and $w_3=1$, Determine 1) the input patterns that the network can receive 2) the output if the input is $[1 \ 0 \ 1]^T$.

Answer b or c

b	Explain the architecture and algorithm of the perceptron net used for pattern classification?	6
c	What are the different learning techniques used in neural networks. Explain any three learning rules in detail.	6

Q. No.	Module 3	Marks
3. a	What are the activation functions used in neural networks?	3

Answer b or c

- | | | |
|---|--|---|
| b | Describe the structure of back propagation neural network. Discuss in detail the training algorithm used in BPN. | 6 |
| c | Consider a kohonen net with two cluster units and three input units. The weight vectors for the cluster units are (0.9 0.7 0.6) and (0.4 0.3 0.5). Find the winning cluster for the input vector(0.4 0.2 0.1). Use learning rate as 0.2. Find the new weights for the winning unit. | 6 |

Q. No.	Module 4	Marks
4. a	Differentiate between phenotype and genotype.	3

Answer b or c

- | | | |
|---|--|---|
| b | How is crossover operation performed? Give examples to illustrate various crossover techniques. | 6 |
| c | Improve the solution using GA of the following problem. $f(x) = x^2$ subject to $1 \leq x \leq 31$, by considering the length of the string 5. Show only one iteration by a hand calculation. | 6 |

Q. No.	Module 5	Marks
5. a	What are the advantages of hybrid systems?	4

Answer b or c

- | | | |
|---|--|---|
| b | Write a note on neuro fuzzy hybrid system. Use a suitable example | 8 |
| c | Explain how genetic algorithm can be used for determination of weights in BPN. | 8 |

Q. No.	Module 6	Marks
6. a	How can we use GA in Fuzzy logic controller design?	4

Answer b or c

- | | | |
|---|--|---|
| b | Explain the architecture and computation stages in a Fuzzy Back Propagation network. | 8 |
| c | Explain the working of genetic algorithm based back propagation network. | 8 |