

00A-9NY1W

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

16PECST417042602  
**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
B.Tech Degree S4 (R) Examinations April 2026 (2024 Scheme)



**Course Code: PECST417**  
**Course Name: Soft Computing**

Max. Marks: 60

Duration: 2 hours 30 minutes

**PART A**

*Answer all questions. Each question carries 3 marks*

		CO	Marks
1	List advantages of Soft Computing over Hard Computing. ?	CO1	(3)
2	Draw the architecture of Adaline model?	CO2	(3)
3	Illustrate how fuzzy logic can be used in decision-making systems with an example	CO3	(3)
4	For a fan speed control system, construct suitable Fuzzy If-Then rules and express them in the general form.	CO3	(3)
5	Apply mutation on the chromosome 1001 by flipping the 3rd bit. Show the result.	CO4	(3)
6	Define mutation in Genetic Algorithm.	CO4	(3)
7	Consider a problem involving minimizing cost and maximizing performance. Formulate it as a multi-objective optimization problem and explain the objectives.	CO5	(3)
8	What is meant by trade-off in Multi-objective Optimization Problem?	CO5	(3)

**PART B**

*Answer any one full question from each module. Each question carries 9 marks*

**Module 1**

9	a) Compare and contrast biological neuron and artificial neuron.	CO1	(4)
	b) Discuss supervised, unsupervised and reinforcement learning in Artificial neuron network with diagrams?	CO1	(5)

**OR**

- 10 a) Illustrate the Hebb training algorithm with the help of flow chart? CO2 (5)  
 b) Implement AND function using McCulloch-Pitts neuron (take binary data) CO2 (4)

### Module 2

- 11 a) Explain fuzzy membership functions with graphs. CO3 (5)  
 b) Consider the fuzzy set: CO3 (4)

$$A = \{0.1/x_1, 0.4/x_2, 0.7/x_3, 0.9/x_4, 0.5/x_5\}$$

Find the  $\lambda$ -cuts of the fuzzy set for:

- a)  $\lambda = 0.4$   
 b)  $\lambda = 0.8$

OR

- 12 a) Analyze the working of the Sugeno fuzzy inference model. CO3 (5)  
 b) Given a real-world input (e.g., temperature = 30°C), perform fuzzification and explain how defuzzification produces the final output. CO3 (4)

### Module 3

- 13 a) Given two parent chromosomes, apply suitable crossover techniques in Genetic Algorithm and illustrate how new offspring are generated. CO4 (4)  
 b) Discuss any five terminologies of evolutionary computing. CO4 (5)

OR

- 14 a) Demonstrate selection methods (roulette wheel & tournament). CO4 (5)  
 b) Describe genetic diversity and its importance. CO4 (4)

### Module 4

- 15 a) State Pareto front with example. CO5 (4)  
 b) Discuss applications of multi-objective optimization. CO5 (5)

OR

- 16 a) Apply the PSO algorithm to a simple optimization problem and show how the best solution is obtained. CO5 (5)
- b) Compare Ant colony optimization and Swarm Robotics. CO5 (4)

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