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PAPER CODE	AI → U315-246B (ESE) AIML → U315-254B (ESE)

(AY: 2025-26) December 2025 (ENDSEM) EXAM

TY (SEMESTER - I)

COURSE NAME:	**Branch: CSE-AI and CSE-AIML**	**COURSE CODE:**	**CA31234B and CM31234B**
Soft Computing			

T.Y (Pattern 2023)

Time: [1Hr 30 Min] **[Max. Marks: 40]**

(*) Instructions to candidates:

1) **Figures to the right indicate full marks. Use of scientific calculator is allowed**
2) **Use suitable data wherever required**
3) **All questions are compulsory. Solve any two sub question each from Questions 1 and 2**
4) **Solve any one sub question (2 marks) from Questions 3 ,4 ,5 and 6 and sub question of 4 marks is compulsory from questions 3,4,5,and 6**

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) Explain the working of a biological neuron and how it inspired the artificial neuron model architecture.	[4]	1	2
	b) Compare and contrast soft computing with hard computing techniques.	[4]	1	2
	c) How does fuzzy logic and neural networks algorithms are useful in solving real word problems? Explain with one example each.	[4]	1	2
Q2	a) Explain the concept of a fuzzy set. How does it differ from a crisp set? Explain with suitable example.	[4]	2	3
	b) Explain the significance of membership function. Describe triangular, trapezoidal, Gaussian and Sigmoid membership function (write mathematical equation).	[4]	2	3
	c) Explain the concept of Equality and containment of Fuzzy set with one example each (consider continuous and discrete function/data).	[4]	2	3
Q3	a) Why hybrid systems are necessary in solving complex real-world problems? Give one example. **OR**	[2]	3	2
	b) Explain with example What are the benefits of combining neural networks and fuzzy systems into a hybrid system?	[2]	3	2

	c) How would you implement a Neuro-Fuzzy system for controlling an air conditioning system based on temperature and humidity inputs?	[4]	3	3
Q4	a) Interpret the role of the objective function in guiding the optimization process. **OR**	[2]	4	2
	b) Explain the difference between decision variables and parameters in classical optimization methods.	[2]	4	2
	c) What is the importance of Selection process in Genetic algorithm? Describe two selection strategies in detail used in Genetic Algorithm.	[4]	4	4
Q.5	a) Explain the concept of definability in the context of rough sets with suitable example. **OR**	[2]	5	2
	b) Differentiate between upper and lower approximations in rough sets.	[2]	5	2
	c) Elaborate in detail, the usefulness of rough sets in dealing with imprecise or incomplete information.	[4]	5	3
Q.6	a) How the Particle Swarm Optimization algorithm update particle positions and velocities. **OR**	[2]	6	2
	b) What is the importance of pheromone level in guiding the path to the ants?	[2]	6	2
	c) Describe the process of updating the positions of Wolfs in GWO algorithm with mathematical equitation.	[4]	6	4

Note: Blooms taxonomy levels

1. Remember 2. Understand 3. Apply 4. Analyze 5. Evaluate 6. Create