

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
MSc DEGREE EXAMINATION DECEMBER 2024
(First Semester)

Branch - COMPUTER SCIENCE

SOFT COMPUTING

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Which of the following is NOT an example of a soft computing technique? A) Fuzzy logic B) Genetic algorithms C) Neural networks D) Binary search algorithm	K1	CO1
	2	Which of the following is a commonly used activation function in neural networks? A) Logarithmic function B) Rectified Linear Unit (ReLU) C) Square root function D) Division function	K2	CO1
2	3	What is a major application of Recurrent Neural Networks (RNNs)? A) Image recognition B) Time-series prediction and natural language processing C) Exact arithmetic calculations D) Static data classification	K1	CO2
	4	Which of the following is an advantage of reinforcement learning? A) It always converges to the best solution quickly B) It allows an agent to learn by interacting with an environment and receiving feedback in the form of rewards or penalties C) It does not require the exploration of new strategies D) It is only useful for supervised learning problems	K2	CO2
3	5	What is the main inspiration behind Genetic Algorithms? A) Human brain function B) Biological evolution and natural selection C) Classical physics D) Quantum mechanics	K1	CO3
	6	Which of the following is NOT a genetic operator in a genetic algorithm? A) Mutation B) Crossover C) Selection D) Normalization	K2	CO3
4	7	In fuzzy logic, what does the term "fuzzification" refer to? A) Converting a fuzzy set into a classical set B) Defining crisp inputs as fuzzy variables with degrees of membership C) Applying exact logic to approximate values D) Performing arithmetic operations on fuzzy numbers	K1	CO4
	8	Which of the following is an application of fuzzy logic? A) Exact arithmetic calculations B) Control systems in washing machines and air conditioners C) Binary search algorithms D) Matrix multiplication	K2	CO4
5	9	How is a fuzzy relation different from a crisp relation? A) A fuzzy relation allows for partial degrees of membership between 0 and 1, while a crisp relation only allows 0 or 1. B) A fuzzy relation is defined for continuous data, while a crisp relation is defined for discrete data. C) A fuzzy relation operates only in higher dimensions. D) A fuzzy relation uses only binary values for the membership function.	K1	CO5

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	10	What is the purpose of a fuzzy rule-based system in decision making? A) To model binary relationships between variables B) To handle imprecise information and make approximate decisions based on fuzzy logic rules C) To create linear relationships between variables D) To perform exact arithmetic calculations	K2	CO5
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SECTION - B (35 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Compare and contrast hard computing and soft computing. Discuss the advantages and limitations of each approach.	K3	CO1
		(OR)		
	11.b.	Explain the different applications of soft computing techniques in real-world scenarios. How do these techniques help in handling uncertainty and imprecision?		
2	12.a.	Explain artificial neural network architecture. Discuss its applications.	K4	CO2
		(OR)		
	12.b.	Write about Hebbian learning rule and Describe the delta learning rule.		
3	13.a.	What do you understand by Fitness function? Mention the importance of Fitness function in Genetic algorithm. How can Fitness functions be found for any optimization problem?	K5	CO3
		(OR)		
	13.b.	Explain following operators: Selection operator, Crossover operator, Uniform crossover, matrix crossover.		
4	14.a.	Define fuzzy sets and explain how they differ from classical sets. Illustrate your explanation with examples of fuzzy set membership functions.	K4	CO4
		(OR)		
	14.b.	What are the key applications of fuzzy logic in various industries? Choose at least two examples and explain how fuzzy logic is applied to solve practical problems in those fields.		
5	15.a.	Explain the process of fuzzification and defuzzification in fuzzy logic systems. Why are these processes crucial for the operation of fuzzy systems, and how do they influence the final decision or output?	K6	CO5
		(OR)		
	15.b.	What are the main differences between crisp and fuzzy relations when modeling real-world problems? Give examples where fuzzy relations are more suitable than crisp relations in solving practical problems.		

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SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	In a self-driving car system, explain how soft computing techniques can be applied to make decisions in uncertain and dynamic environments, compared to hard computing techniques. Analyze the benefits and challenges of using soft computing over hard computing in this context.	K3	CO1
2	17	In a handwritten digit recognition system, analyze how the architecture of an artificial neural network affects the system's ability to accurately classify digits. Explain how layers and activation functions contribute to the performance of the system.	K4	CO2
3	18	Explain how a genetic algorithm can be applied to a problem and analyze how the different components of GA (selection, crossover, mutation) contribute to finding the optimal solution to your problem.	K5	CO3
4	19	A company is designing a fuzzy logic-based washing machine that automatically adjusts washing time based on the dirtiness of clothes and the load size. Explain how fuzzy logic and fuzzy sets can be applied to this problem, and create a set of fuzzy rules to manage the washing time.	K4	CO4
5	20	Consider a fuzzy rule-based system used in an automatic climate control system for a smart home. Formulate a set of fuzzy rules and explain how the system uses fuzzification and defuzzification to maintain the desired room temperature.	K6	CO5

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