2054
M.E. (Computer Science and Engineering)
Second Semester
CS-8203: Soft Computing
(Common with ME Comp. Sci. Cyber Security CSN 8202)

Time allowed: 3 Hours

Max. Marks: 50

*NOTE: Attempt **five** questions in all, including Question No. 1 (Section-A) which is compulsory and selecting two questions each from Section B-C.*

x-x-x

	Section-A	
1.	a)What is Artificial Intelligence (AI), and how does it relate to Artificial Neural Networks (ANNs)?	10
	b)Differentiate between Perceptron and Adaline networks in terms of their architecture and learning algorithms	
	c)Explain the role of Bidirectional Associative Memory (BAM) in neural network applications.	
	d)Explain how knowledge representation is managed under uncertainty in probabilistic reasoning systems.	
	e) List any four application areas of neuro-fuzzy systems.	
	Section-B	
2.	a)Explain the classification of Artificial Neural Networks (ANNs) based on architecture and learning algorithms. Provide examples of feedforward and recurrent neural networks, highlighting their applications in different domains.	6
	b)Discuss the concept of learning rules in the context of artificial neural networks.	4
3.	a)Obtain the output of the neuron Y for the network shown in the figure using activation functions as (i) Binary Sigmoidal (ii) Bipolar Sigmoidal.	6
	b)Describe the Kohnen Neural Network (KNN) and its application in unsupervised learning tasks such as vector quantization and clustering. How does the KNN algorithm differ from other competitive learning models?	4
4.	a)Describe the concept of Bidirectional Associative Memory (BAM) in neural networks. How does BAM enable associative recall of patterns from partial or noisy inputs?	5
	b)How does LVQ combine unsupervised and supervised learning approaches to classify input patterns into predefined categories?	5
	Section-C	
5.	a)Compare and contrast the learning mechanisms of Boltzmann Machines, Radial Basis Function Neural Networks, and Adaptive Resonance Theory (ART). How do these neural network models differ in terms of architecture, learning algorithms, and applications in machine learning?	7
	b)Describe the architecture of Radial Basis Function (RBF) Neural Networks.	3

P.T.O.

6.	a)Discuss the concept of neuro-fuzzy systems and their advantages in combining neural network learning with fuzzy logic reasoning.	4
	b)Discuss the Bayesian theorem and its role in probabilistic reasoning. How is the theorem used to update beliefs based on new evidence in Bayesian inference?	6
7.	Outline the Traveling Salesperson Problem (TSP) and its significance in combinatorial optimization. How does the problem of finding the shortest tour through a set of cities lend itself to solution using Genetic Algorithms? Explain how a candidate solution (chromosome) is represented in a Genetic Algorithm for solving the TSP. What encoding schemes are commonly used to represent tours and paths in TSP optimization with GAs? Perform different types of crossover techniques. Write suitable objective function for solving this problem.	10

x-x-x