

Duration: 3 Hours

Total Marks: 80

N.B.: (1) Question No. 1 is compulsory.

(2) Attempt any **three** of remaining **five** questions.(3) Assume any suitable **data** if necessary and clearly state it.

1. (a) Define what is meant by artificial intelligence. Explain in details the application of artificial intelligence in finance and business. [10]
 - (b) Explain any two methods for defuzzification using example. [10]
 2. (a) Explain the importance of soft computing in artificial intelligence. Elaborate on the main components of soft computing [10]
 - (b) Analyze Travelling Salesman Problem and identify suitable Genetic Algorithm components for it.
 3. (a) Explain the working principle, encoding methods and fitness function utilized in Genetic Algorithms and explain its algorithmic steps using flowchart [10]
 - (b) Explain how neural network topology is designed. Also state the role of bias and learning rate in neural networks. [10]
 4. (a) Difference between traditional algorithms and Genetic Algorithm (GA). Explain the various GA Operators in details [10]
 - (b) Explain Back propagation algorithm in detail. Argue why weights are modified in Neural Networks. [10]
 5. (a) Explain the properties and operations on classical and fuzzy sets and relations. Further elaborate on the membership functions and types of Classical & fuzzy relations. [10]
 - (b) For fuzzy relations \tilde{A} and \tilde{B} defined as follows: [10]
- $$\tilde{A} = \begin{bmatrix} 0.1 & 0.3 & 0 \\ 0.8 & 1 & 0.3 \end{bmatrix} \quad \tilde{B} = \begin{bmatrix} 0.8 & 0.2 & 0 \\ 0.2 & 1 & 0.6 \\ 0.5 & 0 & 0.4 \end{bmatrix}$$
- Computer max-min composition and min-max composition.
6. Write a short note on any **two** of the following [20]
 - (a) State space search
 - (b) Supervised and unsupervised learning
 - (c) Ant colony optimization
 - (d) Hybrid systems and its classification
