Graphic Era
HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

Mid Term (Even) Semester Examination 2025

Roll no.....

Name of the Course and semester: M.Tech(CSE)&*IV*

Name of the Paper: Soft Computing

Course Code: MCS 401

Time: 1.5 Hour

Maximum Marks: 50

Note

(i) All Questions are compulsory.

(ii) Each question carries 10 marks.

Q.1 **(10 Marks)**

(a) Artificial Neural Networks (ANNs) are inspired by biological neurons. Explain the differences and similarities between biological neurons and artificial neurons, emphasizing their computational significance. CO1

OR

(b) What are the key ANN terminologies? Discuss the importance of network architecture, setting of weights, and activation functions in training a neural network. CO1

Q.2 **(10 Marks)**

(a) Describe the McCulloch-Pitts neuron model and its significance in ANN development. Implement an example where it is used to solve a binary classification problem. CO1

OR

(b) Discuss the Hebbian Learning rule in detail. Provide an example of how this rule is applied in neural networks and justify its practical significance. CO1

Q.3 **(10 Marks)**

(a) Differentiate between Perceptron learning rule and Delta learning rule. Explain their convergence properties and suitability for solving classification problems. CO1

OR

(b) Activation functions play a key role in ANN learning. Explain the characteristics of different activation functions (Sigmoid, Tanh, ReLU, Leaky ReLU, Softmax) and their impact on network performance. CO1

Q.4 **(10 Marks)**

(a) What are feedback networks? Explain the concept of Hopfield Networks and their application in pattern recognition. CO2

OR

(b) Explain the working and significance of the Radial Basis Function Network (RBFN). Compare its performance with a Backpropagation Network (BPN). CO2

Q.5 **(10 Marks)**

(a) Explain the architecture and training process of the Backpropagation Network (BPN). How does the gradient descent algorithm help optimize weights? CO2

OR

(b) Compare Self-Organizing Maps (SOM) with Learning Vector Quantization (LVQ). Explain their limitations in the context of unsupervised learning. CO2