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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS- 2026

M.Tech-II Semester (CSE)

COURSE CODE (CREDITS): 22M11CI211 (03) MAX MARKS: 25

COURSE NAME: Soft Computing

COURSE INSTRUCTOR: ARV MAX. TIME: 1 Hour 30 Min

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculator is allowed.

Q.No	Question	CO	Marks
Q1	Given: Input Matrix X= [1 2] Weight Matrix W= $\begin{bmatrix}0.5 & 0.2\\0.3 & 0.8\end{bmatrix}$ Thresholds: θ= [0.4, 0.5] Find outputs.	2	5
Q2	Consider a linear neuron $y=w_1x_1+w_2x_2+b$. The inputs x= [2, 1], weights w= [0.25, 0.5], bias b=0.1 and Target t=1.9. Compute output for the linear neuron and squared error using $E=1/2 * (t-o)^2$.	2	5
Q3	Following are the well-known activation functions to define a perceptron. • log-sigmoid function • Piecewise linear function a) Write down the expressions for the above-mentioned activation functions. b) Clearly identify the parameters that control the transfer of input to output in each activation function. c) Draw the graph of each activation function and show how the graph changes with the change of parameter of the activation function.	2	5 [2+1+2]
Q4	Explain, with the help of an example, why single-layer networks can solve the AND problem but fail on XOR, motivating the need for multi-layer feedforward networks.	2	5

Q5	Consider a 2–1–1 neural network (2 inputs, 1 hidden neuron, 1 output neuron) with log sigmoid activation.
	
	Given:
	
	• Inputs: x1=1, x2=0
	• Target output: T=1
	• Learning rate: η=0.1
	
	Initial weights:
	
	• Input → Hidden:
	  ○ w1=0. 2 (from x1)
	  ○ w2=0. 3 (from x2)
	• Hidden → Output:
	  ○ w3=0.4
	
	Biases:
	
	• Hidden neuron: b_h=0.1
	• Output neuron: b_o=0.1
	
	Perform one iteration of backpropagation and find updated weights.
		2	5