**Vidyalankar Institute of Technology**

**Semester VIII – CMPN- Mid Semester Assessment –1**

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| **Date:** 10/02/2025 | **Deep Learning** | **30 Marks/ 1 hr.** |

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| **1** | **Solve any one (10 marks each)** | | **CO** |
|  | A | Simulate an AND, OR, NAND, NOR gate using the McCulloch-Pitts model. | CO1 |
|  | B | The neural network uses linear as an activation function and has bais =0.1. The learning rate (η) is 0.1 and the initial weights w1​=0.5 and w2=−0.5 interact with inputs x1​=1 and x2​=−2. How can the delta rule be applied to adjust these weights if the desired output differs from the actual output y? The desired output (d): 0.8. Calculate the updated weight up to 2 iterations. | CO1 |
| 2 | **Solve any one (10 marks each)** | | |
|  | A | Given X1=1 X2=-1 W = b= Apply   1. Logistic 2. Tanh 3. ReLu 4. Arc Tan 5. Leaky ReLu activation function | CO2 |
|  | B | Given the feedforward neural network shown in the diagram, calculate the error for the output using the following specifications.   1. Activation function: Sigmoid. | CO2 |
| 3 |  | **Solve any one (10 marks each)** | CO2 |
|  | A | Provide the mathematical formulation of the ReLU activation function. Explain why ReLU is commonly used in deep learning models. Discuss the issue of the "dying ReLU" problem. How does this issue arise during training, and what are the potential solutions to mitigate it? |  |
|  | B | Given: Data: x=[1,2,3,4,5], y\_true=[2,4,6,8,10] Initial weights: w0=0.5,w1=0.5. Regularization parameter: λ=0.1.What is the Total loss with L1 regularization for the given data? | CO2 |

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| CO1 | Gain basic knowledge of Neural Networks |
| CO2 | Acquire in-depth understanding of training Deep Neural Network |