

**UNIT 1**

Overview of Artificial Intelligence, Machine Learning, and Deep Learning, History and evolution of deep learning, Applications of deep learning, Perceptron and multi-layer perceptron, Activation functions, Loss functions and their significance, Gradient Descent and Backpropagation, Neural Networks: Deep vs Shallow Networks, Training Deep Networks: Vanishing and Exploding Gradients, Techniques to mitigate gradient issues (Batch Normalization, Gradient Clipping), Optimization algorithms (SGD, Adam, RMSprop), Regularization techniques (L2, Dropout), and Weight Initialization

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<b>UNIT 2</b>	Convolutional Neural Networks, and their significance in image processing, Convolution operations and feature maps. Pooling layers, CNN architectures: LeNet, AlexNet, VGG, ResNet, Inception, Transfer learning and fine-tuning pre-trained models, Object detection and segmentation (YOLO, SSD, Mask R-CNN), Introduction to Generative Adversarial Networks, Autoencoder. Variational Autoencoders.	<b>14</b>
<b>UNIT 3</b>	Recurrent Neural Networks (RNNs), Long Short-Term Memory (LSTM) networks, Gated Recurrent Unit (GRU), Attention Mechanisms and Transformers, Sequence-to-sequence models with attention, and applications in natural language processing.	<b>12</b>
	<b>TOTAL</b>	<b>42</b>