# Guru Tegh Bahadur Institute of Technology, New Delhi

**Lecture Plan for Fundamentals of Deep Learning**

# Course Name: B.Tech (AIML) Semester: 5th SUB CODE: AIML 305

No of hours allotted to complete the syllabi: **40**

No of hours allotted per week: **4**

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| **S.No** | **Topic Details** | **No of Hours Planned** | **Reference/text book** |
| 1. | **Unit-I:** |  |  |
|  | Introduction to Deep Learning, Bayesian Learning, Overview of Shallow Machine Learning, Differences between Deep Learning and Shallow Learning,Linear ClassifiersLoss Function and Optimization Techniques- Gradient Descent and batch optimization |  4 2 4 | T1, R1T1, R1T2, R1 |
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| 2. | **Unit-II**Introduction to Neural Networks, Biological Neuron, Idea of Computational unitsMcCulloch-Pitts unit and Thresholding logicArtificial Neural Networks: Single Layer Neural NetworkMultilayer Perceptron and BackpropagationBack propagation through timeArchitectural Design Issues | 2 21221 | T2, R1T2, R1T3, R2T3, R1, R2T3, R1, R2T3, R1, R2 |
| 3. | **Unit-III**Training deep neural networks: Difficulty of training deep neural networksActivation FunctionsEvaluating, Improving and Tuning the ANNHyper parameters vs ParametersGreedy layer wise trainingRecurrent Neural Networks, LSTM, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs | 12111 4 | T2, R1T2, R1T2, R1T1, R2T2, R1T2, R1, R2 |
| 4.  | **Unit-IV**Con**v**olution Neural Networks, Building blocks of CNN, Pooling Layers, Convolution Neural Network Architecture Transfer Learning Well Known Case Studies: LeNet, AlexNet, VGG-16, ResNet, InceptionNetApplication of CNN in vision, Speech and Audio-Video. | 3142 | T3, R1, R2T3, R1, R2T2, R1, R2T3, R1, R2 |

## Text Books:

[T1] Richard O.Duda, “Pattern Classification”, Wiley,2022

[T2] Adam Gibson and Josh Patterson,” Deep Learning: A Practical approach”, 2017

[T3] Deep Learning, lan Goodfellow and Yoshua Bengio and Aaron Courville, MIT Press, 2016

## Reference Books:

[R1] Charu C. Aggarwal, “Neural Networks and Deep Learning”, 2018

[R2] Duda , R.O. and Hart, P.E., Pattern Classification. John Wiley & Sons,2006.