**UNIT 1**

1. **Machine Learning.**
2. **Under Fitting.**
   1. **To Address Under-fitting:**
      * **Increase the complexity of the model.**
      * **Increase the amount of the training data.**
      * **Regularization.**
3. **Overfitting.**
   1. **To address Over fitting.**
      * **Regularization**
      * **Early Stopping.**
      * **Cross-validation.**
4. **Estimators**
   1. **Types:**
      * **Maximum Likelihood Estimation (MLE):**
      * **Bayesian Estimation**
      * **Gradient Descent-based Estimations.**
5. **Bias.**
6. **Variance.**
7. **Maximum Likelihood Estimation.**
   1. **Steps**
      * **Define a Likelihood Function.**
      * **Maximize the Likelihood Function.**
      * **Interpret the Result.**
8. **Bayesian Statics**
9. **Supervised Learning.**
10. **Unsupervised Learning.**
    1. **Types:**
       * **Clustering Algorithm.**
       * **Dimensionality reduction.**
11. **Stochastic Gradient Decent**
    1. **Algorithm (Steps)**
       * **Initialization.**
       * **Compute the Loss Function.**
       * **Compute the Gradient.**
       * **Update the Parameters.**

**UNIT 2**

1. **Feed-forward Networks**
   1. **Components:**
      * **Input Player**
      * **Hidden Layer**
      * **Output Layer**
   2. **Advantages vs Disadvantages.**
   3. **Application**
      * **NLP**
      * **Speech Recognition**
      * **Image Recognition**
   4. **Limitations.**
2. **Gradient-based Learning.**
3. **Hidden Units.**
4. **Architecture Design**
   1. **Types of Architectures:**
      * **Convolution Neural Networks (CNNs).**
      * **Recurrent Neural Networks (RNNs).**
      * **Long Short-Term Memory Networks (LSTMs).**
      * **Autoencoders.**
      * **Transformer Networks.**
5. **Computational Graphs.**
   1. **Components:**
      * **Nodes.**
      * **Edges.**
      * **Directed Acyclic Graph (DAG).**
      * **Backpropagation.**
6. **Back-Propagation**
7. **Regularization**
   1. **Types:** 
      * **L1 Regularization (Lesso).**
      * **L2 Regularization (Ridge).**
      * **Dropout.**
      * **Batch Normalization.**
      * **Early Stopping.**
8. **Parameter Penalties**
   1. **Types:**
      1. **Write Regularization type.**

1. **Data Augmentation**
   1. **Augmentation techniques:**
      * **Horizontal Flipping.**
      * **Vertical Flipping.**
      * **Rotation**
      * **Scaling**
      * **Cropping.**
      * **Adding noise.**
2. **Multi-task Learning**
   1. **Type of mul-task learning approaches:**
      * **Hard Parameter Sharing.**
      * **Soft Parameter Sharing.**
      * **Task-Specific Layers.**
3. **Bagging**
   1. **Steps:**
      * **Bootstrap Sampling.**
      * **Model Training.**
      * **Aggregation.**
4. **Dropout.**
5. **Adversarial.**
6. **Optimization.**
   1. **Techniques:**
      * **Batch Normalization.**
      * **Momentum**
      * **Weight Decay.**

**Unit 3**

1. **Convolution Neural Networks:**
   1. **Layers:**
      * **Convolutional Layers.**
      * **Pooling Layers.**
      * **Fully Connected Layers.**
   2. **Types:**
      * **Standard Convolution.**
      * **Valid Convolution.**
      * **Same Convolution.**
2. **Pooling**
   1. **Types:**
      * **Max Pooling.**
      * **Average Pooling. 3. Global Average Pooling.**
3. **Basic Convolution Function.**
4. **Convolution Algorithm:**
   1. **Types:**
      * **Standard Convolution.**
      * **Valid Convolution.**
      * **Same Convolution.**
5. **Unsupervised features and Neuroscientific.**
   1. **Types:**
      * **Autoencoders.**
      * **Generative Adversarial Networks (GANs).**
      * **Variational Autoencoders (VAEs).**

**UNIT 4**

1. **Sequence Modelling.**
2. **Recurrent Neural Networks (RNNs).**
   1. **Types:**
      * **One – one**
      * **One to many**
      * **Many to one**
      * **Many to many.**
3. **Bidirectional RRNs.**
   1. **Steps Architectures:**
      * **Forward Pass.**
      * **Backward Pass**
      * **Output Combination.**
4. **Encoder-Decoder Sequence -to-sequence Architectures:**
5. **Deep Recurrent Networks:**
6. **Recursive Neural Networks (RNNs).**
7. **Echo State Networks (ESNs).**

**Unit 5**

1. **Boltzmann Machines**
   1. **Types:**
      * **Binary Boltzmann Machines.**
      * **Multi-Layer Boltzmann Machines.**
      * **Convolutional Boltzmann Machines**
2. **Restricted Boltzmann Machines.**
   1. **Types:**
      * **Binary RBMs.**
      * **Gaussian RBMs.**
      * **Deep Belief Networks (DBNs).**
3. **Deep Belief Networks.**
4. **Deep Boltzmann Machines.**
5. **Sigmoid Belief Networks.**
6. **Directed Generative Networks.**
   1. **Types:**
      * **Variational Autoencoders (VAEs).**
      * **Generative Adversarial Networks (GANs).**
      * **Autoregressive Models.**
      * **Flow-Based Models.**
7. **Drawing Samples from Auto encoders**