**:: Unit I: Introduction & Statistical Learning**

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**1. What is Artificial Intelligence (AI), and how is it different from Machine Learning (ML)?**

**2. How does Deep Learning (DL) differ from ML?**

**3. What are the different types of Machine Learning systems?**

**4. Explain the main challenges of Machine Learning.**

**5. What is Supervised Learning? Give examples.**

**6. What is Unsupervised Learning? Give examples.**

**7. What is the difference between Supervised and Unsupervised Learning?**

**8. What is the Training Loss and Test Loss in Machine Learning?**

**9. What are the tradeoffs in Statistical Learning?**

**10. Explain the concept of Overfitting and Underfitting.**

**11. What is the Bias-Variance tradeoff?**

**12. What is Empirical Risk Minimization (ERM)?**

**13. What is the Sampling Distribution of an estimator?**

**14. What is Cross-Validation, and why is it used?**

**15. What is a Confusion Matrix in Machine Learning?**

**16. Explain the importance of Feature Scaling in Machine Learning.**

**17. What is Normalization and Standardization?**

**18. What is Hyperparameter Tuning?**

**19. What is the difference between a Parameter and a Hyperparameter?**

**20. What is Model Selection, and how do you choose the best model?**

**:: Unit II: Supervised Learning (Regression & Classification)**

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**21. What is Regression in Machine Learning?**

**22. What are the different types of Regression techniques?**

**23. Explain Linear Regression with an example.**

**24. What is the difference between Simple and Multiple Linear Regression?**

**25. What is Logistic Regression? How is it different from Linear Regression?**

**26. What are Generalized Linear Models?**

**27. What is the role of the Sigmoid Function in Logistic Regression?**

**28. What are Distance-Based Methods in Machine Learning?**

**29. How does the K-Nearest Neighbors (KNN) algorithm work?**

**30. What is the Curse of Dimensionality in KNN?**

**31. What is a Decision Tree, and how does it work?**

**32. How does Naïve Bayes work? Why is it called "Naïve"?**

**33. What are the assumptions of Naïve Bayes?**

**34. What is Support Vector Machine (SVM)?**

**35. How does SVM perform Classification?**

**36. What are the advantages and disadvantages of SVM?**

**37. What is Binary Classification? Give examples.**

**38. What is Multiclass Classification? How is it different from Binary Classification?**

**39. What is MNIST, and why is it important in ML?**

**40. What is the difference between Classification and Ranking?**

**:: Unit III: Ensemble Learning & Support Vector Machines**

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**41. What is Ensemble Learning?**

**42. Why do we use Ensemble Methods in Machine Learning?**

**43. What is a Voting Classifier?**

**44. What is the difference between Hard Voting and Soft Voting?**

**45. What is Bagging? How does it work?**

**46. What is Pasting in Ensemble Learning?**

**47. How does a Random Forest work?**

**48. What are the advantages of using Random Forest?**

**49. What is Boosting?**

**50. Explain the concept of AdaBoost.**

**51. What is Gradient Boosting?**

**52. How does XGBoost improve Gradient Boosting?**

**53. What is Stacking in Ensemble Learning?**

**54. What is Bootstrap Aggregation in Machine Learning?**

**55. What is the difference between Bagging and Boosting?**

**56. What is a Linear SVM?**

**57. What is a Nonlinear SVM?**

**58. What is the Kernel Trick in SVM?**

**59. How does SVM perform Regression?**

**60. What are some real-world applications of SVM?**

**:: Unit IV: Unsupervised Learning & Dimensionality Reduction**

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**61. What is Unsupervised Learning?**

**62. What are the different types of Clustering techniques?**

**63. How does K-Means Clustering work?**

**64. What are the limitations of K-Means?**

**65. How does Clustering help in Image Segmentation?**

**66. What is DBSCAN, and how does it work?**

**67. What is the difference between K-Means and DBSCAN?**

**68. How is Clustering used in Preprocessing?**

**69. What is Semi-Supervised Learning?**

**70. What is Gaussian Mixture Model (GMM)?**

**71. What is the Curse of Dimensionality?**

**72. What are the main approaches for Dimensionality Reduction?**

**73. What is Principal Component Analysis (PCA)?**

**74. How does PCA help in reducing dimensions?**

**75. How does Randomized PCA differ from traditional PCA?**

**76. What is Kernel PCA, and when is it used?**

**77. What is LDA (Linear Discriminant Analysis)?**

**78. How is Feature Selection different from Dimensionality Reduction?**

**79. What is T-SNE (t-Distributed Stochastic Neighbor Embedding)?**

**80. What are the advantages and disadvantages of PCA?**

**:: Unit V: Neural Networks & Deep Learning**

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**81. What is a Neural Network?**

**82. What are the basic components of an Artificial Neural Network (ANN)?**

**83. What is the difference between a Perceptron and a Multi-Layer Perceptron (MLP)?**

**84. What are Activation Functions? Why are they important?**

**85. What are some common Activation Functions used in Neural Networks?**

**86. What is Backpropagation in Neural Networks?**

**87. What is the role of Optimizers in Deep Learning?**

**88. What is the difference between SGD (Stochastic Gradient Descent) and Adam Optimizer?**

**89. What is the purpose of Dropout in Neural Networks?**

**90. How does Batch Normalization help in Deep Learning?**

**91. What is Keras, and how is it used for Deep Learning?**

**92. How can we implement an MLP using Keras?**

**93. What is TensorFlow, and why is it popular for Deep Learning?**

**94. What is the role of GPUs in Deep Learning?**

**95. How do we load and preprocess data in TensorFlow?**

**96. What is Data Augmentation in Deep Learning?**

**97. What is Transfer Learning, and why is it useful?**

**98. What are CNNs (Convolutional Neural Networks)?**

**99. What are RNNs (Recurrent Neural Networks)?**

**100. What is the difference between CNNs and RNNs?**