# IMPORTANT QUESTIONS(UNITWISE)

**SUBJECTNAME: MACHINE LEARNING     SUB CODE: CS601PC**

**YEAR:2024-25                          SEM: III-II**

## UNIT-I
### PART-A

| S.No. | Coverage | Questions |
|-------|----------|-----------|
| 1 | UNIT-I | What is Machine Learning? |
| 2 | UNIT-I | List any two types of Machine Learning with examples. |
| 3 | UNIT-I | What is a concept learning task? |
| 4 | UNIT-I | Define version space in the context of concept learning. |
| 5 | UNIT-I | What is the role of a perceptron in ML? |
| 6 | UNIT-I | Explain the term linear separability. |
| 7 | UNIT-I | What is a maximally specific hypothesis? |
| 8 | UNIT-I | Mention two issues faced in the design of a learning system. |
| 9 | UNIT-I | Define linear discriminants. |
| 10 | UNIT-I | Write a short note on linear regression. |
| | | **PART B** |
| 11 | UNIT-I | Define Machine Learning. Explain its various types with examples. |
| 12 | UNIT-I | Describe the architecture of the human brain and a biological neuron. How do these concepts inspire Machine Learning? |
| 13 | UNIT-I | Explain the components of a Learning System. What are the main perspectives and issues in Machine Learning? |
| 14 | UNIT-I | What is a Concept Learning Task? Illustrate with an example. |
| 15 | UNIT-I | Explain Concept Learning as a Search Problem. How are hypotheses represented in the hypothesis space? |
| 16 | UNIT-I | Describe the process of finding a Maximally Specific Hypothesis with a suitable example. |
| 17 | UNIT-I | What is Version Space? Explain the Candidate Elimination Algorithm with its working steps. |
| 18 | UNIT-I | Write about the Perceptron algorithm. How does it work for linearly separable data? |
| 19 | UNIT-I | Explain the concept of Linear Separability in Machine Learning. Why is it important? |
| 20 | UNIT-I | Discuss Linear Regression in detail. How is it different from classification algorithms? |

# UNIT-II
## PART-A

| S.No. | Coverage | Questions |
|-------|----------|-----------|
| 1 | UNIT-II | What is a Multi-layer Perceptron (MLP)? |
| 2 | UNIT-II | State the purpose of the backpropagation algorithm. |
| 3 | UNIT-II | Mention any two applications of MLP. |
| 4 | UNIT-II | What is a Radial Basis Function (RBF)? |
| 5 | UNIT-II | Define the curse of dimensionality. |
| 6 | UNIT-II | What is interpolation in the context of ML models? |
| 7 | UNIT-II | Define a basis function. |
| 8 | UNIT-II | What is a Support Vector Machine (SVM)? |
| 9 | UNIT-II | Mention one key difference between MLP and RBF networks. |
| 10 | UNIT-II | Why is it difficult to train multi-layer neural networks? |
| | | **PART B** |
| 11 | UNIT-II | Explain the architecture of a Multi-layer Perceptron (MLP). How does it differ from a single-layer Perceptron? |
| 12 | UNIT-II | Discuss the Backpropagation algorithm. How does it help in training neural networks? |
| 13 | UNIT-II | Describe the forward and backward passes in Multi-layer Perceptron training. |
| 14 | UNIT-II | Explain how Multi-layer Perceptron is used in real-world applications. Provide suitable examples. |
| 15 | UNIT-II | Derive the Backpropagation rule mathematically. |
| 16 | UNIT-II | What is a Radial Basis Function (RBF) Network? How does it handle the Curse of Dimensionality? |
| 17 | UNIT-II | Compare Radial Basis Functions with Splines for interpolation tasks. |
| 18 | UNIT-II | Explain the architecture and working principle of a Support Vector Machine (SVM). |
| 19 | UNIT-II | What is the Curse of Dimensionality? How does it affect machine learning models? |
| 20 | UNIT-II | Describe the process of interpolations using Basis Functions. How are they used in RBF Networks? |

# UNIT-III
## PART-A

| S.No. | Coverage | Questions |
|---|---|---|
| 1 | UNIT-III | What is a Decision Tree? |
| 2 | UNIT-III | Mention one advantage of using decision trees. |
| 3 | UNIT-III | Define CART (Classification and Regression Trees). |
| 4 | UNIT-III | What is ensemble learning? |
| 5 | UNIT-III | Distinguish between bagging and boosting. |
| 6 | UNIT-III | What is a Gaussian Mixture Model (GMM)? |
| 7 | UNIT-III | Define K-means clustering. |
| 8 | UNIT-III | What are nearest neighbor methods? |
| 9 | UNIT-III | What is unsupervised learning? Give one example. |
| 10 | UNIT-III | Mention any one way to combine classifiers. |
| | | **PART B** |
| 11 | UNIT-III | What is a Decision Tree? Explain how it is constructed with an example. |
| 12 | UNIT-III | Discuss the differences between Classification Trees and Regression Trees. |
| 13 | UNIT-III | Explain the concept and working of Ensemble Learning. What are its benefits? |
| 14 | UNIT-III | Define Boosting. How does it improve the performance of weak classifiers? |
| 15 | UNIT-III | What is Bagging? Explain its advantages in ensemble learning. |
| 16 | UNIT-III | Discuss different techniques to combine multiple classifiers in ensemble methods. |
| 17 | UNIT-III | Explain Gaussian Mixture Models (GMM). How do they work for clustering tasks? |
| 18 | UNIT-III | Describe the Nearest Neighbor methods. How are they used for classification and regression? |
| 19 | UNIT-III | What is Unsupervised Learning? Compare it with Supervised Learning with examples. |
| 20 | UNIT-III | Explain the K-means Clustering Algorithm with a suitable example and its limitations. |

# UNIT-IV
## PART-A

| S.No. | Coverage | Questions |
|---|---|---|
| 1 | UNIT-IV | What is dimensionality reduction? |
| 2 | UNIT-IV | Define Linear Discriminant Analysis (LDA). |
| 3 | UNIT-IV | What is Principal Component Analysis (PCA) used for? |
| 4 | UNIT-IV | Mention one difference between PCA and Factor Analysis. |
| 5 | UNIT-IV | Define Independent Component Analysis (ICA). |
| 6 | UNIT-IV | What is Locally Linear Embedding (LLE)? |
| 7 | UNIT-IV | What is Isomap used for? |
| 8 | UNIT-IV | What is least squares optimization? |
| 9 | UNIT-IV | Define genetic algorithms. |
| 10 | UNIT-IV | Name any two genetic operators used in evolutionary learning. |
| | | **PART B** |
| 11 | UNIT-IV | What is Dimensionality Reduction? Why is it important in Machine Learning? |
| 12 | UNIT-IV | Explain Linear Discriminant Analysis (LDA) with its working principles and formula. |
| 13 | UNIT-IV | Discuss Principal Component Analysis (PCA). How is it different from LDA? |
| 14 | UNIT-IV | Write about Factor Analysis. How does it help in dimensionality reduction? |
| 15 | UNIT-IV | Explain Independent Component Analysis (ICA) and its applications. |
| 16 | UNIT-IV | Describe Locally Linear Embedding (LLE) and its working principle. |
| 17 | UNIT-IV | Explain the Isomap technique for non-linear dimensionality reduction. |
| 18 | UNIT-IV | What is Least Squares Optimization? How is it used in ML models? |
| 19 | UNIT-IV | Define Genetic Algorithms. Describe its process and key components. |
| 20 | UNIT-IV | Discuss Genetic Operators such as Selection, Crossover, and Mutation used in Genetic Algorithms. |

# UNIT-V
## PART-A

| S.No. | Coverage | Questions |
|---|---|---|
| 1 | UNIT-V | What is Reinforcement Learning (RL)? |
| 2 | UNIT-V | Mention the key elements of an RL system. |
| 3 | UNIT-V | What is the 'Getting Lost' example in RL? |
| 4 | UNIT-V | Define Markov Chain Monte Carlo (MCMC) method. |
| 5 | UNIT-V | What is a proposal distribution? |
| 6 | UNIT-V | Define graphical models in ML. |
| 7 | UNIT-V | What is a Bayesian Network? |
| 8 | UNIT-V | Mention one application of Markov Random Fields (MRFs). |
| 9 | UNIT-V | What is a Hidden Markov Model (HMM)? |
| 10 | UNIT-V | Name any one object tracking method in ML. |
| | | **PART B** |
| 11 | UNIT-V | What is Reinforcement Learning? Explain its basic components with an example. |
| 12 | UNIT-V | Describe the 'Getting Lost' problem in Reinforcement Learning. How is it solved? |
| 13 | UNIT-V | Explain the concept of Markov Chain Monte Carlo (MCMC) methods. |
| 14 | UNIT-V | Discuss the importance of Proposal Distributions in MCMC. |
| 15 | UNIT-V | Explain the working of Markov Chain Monte Carlo in sampling-based learning. |
| 16 | UNIT-V | What are Graphical Models? Explain their types with examples. |
| 17 | UNIT-V | Describe Bayesian Networks and their application in probabilistic inference. |
| 18 | UNIT-V | Explain Markov Random Fields and their difference from Bayesian Networks. |
| 19 | UNIT-V | What are Hidden Markov Models (HMM)? Describe their components and applications. |
| 20 | UNIT-V | Discuss different Tracking Methods used in Machine Learning. Provide suitable examples. |