SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF INFORMATION TECHNOLOGY

QUESTION BANK

VI SEMESTER
1908607-MACHINE LEARNING TECHNIQUES-I
Regulation – 2019

Academic Year 2024-2025 (Even Semester)

Prepared by

Dr.S.Narayanan, Professor&Head,IT

Mrs.G.Santhiya, Assistant Professor (Sr.G),IT

SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203.

DEPARTMENT OF INFORMATION TECHNOLOGY

QUESTION BANK

SUBJECT :1908607-MACHINE LEARNING TECHNIQUES-I

SEM / YEAR: VI / III

	UNIT I –INTRODUCTION		
	Learning – Machine Learning Foundations –Overview – Design of a Learning system - Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants –Linear Separability – Linear Regression		
	PART-A		
Q.No	**Questions**	**BT Level**	**Competence**
1	Write the different types of machine learning algorithm.	BTL1	Remembering
2	What are the different types of Learning/ Training models in ML?	BTL1	Remembering
3	What is the difference between deep learning and machine learning?	BTL1	Remembering
4	Define the issues in machine learning	BTL1	Remembering
5	Write short notes on concept learning as a search.	BTL1	Remembering
6	Point out few examples of machine learning applications	BTL2	Understanding
7	Discuss about the concept behind ensemble learning.	BTL2	Understanding
8	List the algorithms of concept learning.	BTL1	Remembering
9	Explain the useful perspective on machine learning.	BTL2	Understanding
10	Distinguish between supervised and unsupervised learning	BTL2	Understanding
11	Define Supervised Learning	BTL2	Understanding
12	Explain about Function Approximation Algorithm	BTL2	Understanding
13	Define a Learning System	BTL1	Remembering
14	Analyze how design a learning system help to identify the SPAM mails	BTL2	Understanding
15	Write some applications of Supervised Learning	BTL2	Understanding
16	Generalize the concept of Biased Hypothesis Space	BTL2	Understanding
17	Examine how are these three Hypotheses h1, h2,h3 from Enjoy Sport example related by the >=g relation?	BTL2	Understanding
18	Describe the steps involved in machine learning process.	BTL2	Understanding
19	Discover the Candidate – Elimination algorithm	BTL2	Understanding
20	Define Artificial Neuron model.	BTL1	Remembering
21	List out the applications of ML problems.	BTL1	Remembering
22	When Underfitting and Overfitting will occur.	BTL1	Remembering

23	How Regression differ from classification?	BTL1	Remembering
24	Define Linear Regression.	BTL1	Remembering

	PART-B			
1	Distinguish between Supervised Learning and Unsupervised Learning. Also mention some of the application areas of both.	(13)	BTL3	Applying
2	Discuss in detail how to design a program to learn to play checkers.	(13)	BTL3	Applying
3	Can linear regression be used for classification? Justify.	(13)	BTL5	Evaluating
4	Discuss the importance of linear regression with example.	(13)	BTL5	Evaluating
5	Point out the useful perspective on machine learning.	(13)	BTL3	Applying
6	Discuss about the steps in Designing a Learning System with example.	(13)	BTL3	Applying
7	(i) Describe in detail the rule for estimating training values (ii) State the final design of checkers learning system	(7) (6)	BTL3	Applying
8	(i) Explain in detail the FIND-S: Finding A Maximally Specific Hypothesis (ii) Conclude the key properties of FIND-S algorithm.	(7) (6)	BTL5	Evaluating
9	(i) Demonstrate the concept learning as search? (ii) Describe the General-to-Specific Orderingof Hypotheses.	(6) (7)	BTL3	Applying
10	Explain in detail the Candidate–Elimination Algorithm with an example.	(13)	BTL4	Analyzing
11	Compose about types of Linear Regression and assumptions of Linear Regression.	(13)	BTL6	Creating
12	Describe the Version Spaces and Candidate–Elimination Algorithm with an example.	(13)	BTL3	Applying
13	Recall the following : (i) Compact Representation for Version Spaces. (ii) The LIST-THEN-ELIMINATE Algorithm.	(7) (6)	BTL3	Applying
14	Examine the Separating Hyper plane Theorem.	(13)	BTL3	Applying
15	Briefly describe about linear Regression with suitable example.	(13)	BTL3	Applying
16	Explain the importance of Linear Seperability.	(13)	BTL3	Applying
17	Explain how Linear Discriminant Analysis can be performed.	(13)	BTL3	Applying
	PART-C			
1	Describe the perspective issues in machine learning.	(15)	BTL5	Evaluating
2	Explain mistake bound model for learning and apply it to FIND-S algorithm.	(15)	BTL6	Creating

<table>
<tr><td>3</td><td>Following are the set of training examples for the Target Concept of ’Japanese Economy Car’.
Features: (Country of Origin, Manufacturer, Color, Decade, Type).
<table><tr><th>Origin</th><th>Manufacturer</th><th>Color</th><th>Decade</th><th>Type</th><th>Example Type</th></tr><tr><td>Japan</td><td>Honda</td><td>Blue</td><td>1980</td><td>Economy</td><td>Positive</td></tr><tr><td>Japan</td><td>Toyota</td><td>Green</td><td>1970</td><td>Sports</td><td>Negative</td></tr><tr><td>Japan</td><td>Toyota</td><td>Blue</td><td>1990</td><td>Economy</td><td>Positive</td></tr><tr><td>USA</td><td>Chrysler</td><td>Red</td><td>1980</td><td>Economy</td><td>Negative</td></tr></table>
Describe in brief the ‘Hypothesis Space Search’ by Find-S algorithm for the training examples of the Target Concept “Enjoy Sport”. Initialize h to the Most Specific Hypothesis.</td><td>(15)</td><td>BTL5</td><td>Evaluating</td></tr>
<tr><td>4</td><td>Explain in detail the Inductive Bias of Candidate Elimination algorithm.</td><td>(15)</td><td>BTL6</td><td>Creating</td></tr>
<tr><td>5.</td><td>i) What is Linear Regression and list out the properties of Linear Regression.
ii) Describe in detail about Linear Regression and find a linear regression equation by evaluating following two sets of data:
<table><tr><td>x</td><td>2</td><td>4</td><td>6</td><td>8</td></tr><tr><td>y</td><td>3</td><td>7</td><td>5</td><td>10</td></tr></table></td><td>(7)

(8)</td><td>BTL5</td><td>Evaluating</td></tr>
</table>

<table>
<tr><td></td><td colspan="3">UNIT II- LINEAR MODELS</td></tr>
<tr><td></td><td colspan="3">Linear model for classification - Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines.</td></tr>
<tr><td></td><td colspan="3">PART-A</td></tr>
<tr><td>Q.No</td><td>Questions</td><td>BT Level</td><td>Competenc e</td></tr>
<tr><td>1</td><td>What is Multi-layer Perceptron.</td><td>BTL1</td><td>Remembering</td></tr>
<tr><td>2</td><td>Explain how Back propagation Works?</td><td>BTL2</td><td>Understanding</td></tr>
<tr><td>3</td><td>Discuss what type of unit shall we use as the basis for constructing multilayer network?</td><td>BTL2</td><td>Understanding</td></tr>
<tr><td>4</td><td>What are Support Vectors?</td><td>BTL1</td><td>Remembering</td></tr>
<tr><td>5</td><td>What is the difference between MLP network and radial basis function network?</td><td>BTL2</td><td>Understanding</td></tr>
<tr><td>6</td><td>Are radial basis function networks supervised or unsupervised?</td><td>BTL1</td><td>Remembering</td></tr>
<tr><td>7</td><td>Discuss about the applications of radial basis function network.</td><td>BTL2</td><td>Understanding</td></tr>
<tr><td>8</td><td>What is propogation in neural network?</td><td>BTL1</td><td>Remembering</td></tr>
<tr><td>9</td><td>State the support vector in SVM?</td><td>BTL2</td><td>Understanding</td></tr>
<tr><td>10</td><td>What is RBF Network?</td><td>BTL1</td><td>Remembering</td></tr>
</table>

11	Explain the use of Radial Basis Functions		BTL2	Understanding
12	What is a spline?		BTL1	Remembering
13	Examine the function of interpolation?		BTL2	Understanding
14	Analyze the applications of RBF networks?		BTL2	Understanding
15	Explain what is RBF in machine learning?		BTL2	Understanding
16	State about the curse of dimensionality.		BTL1	Remembering
17	What problem does curse of dimensionality cause?		BTL1	Remembering
18	Identify the How to check curse of dimensionality?		BTL2	Understanding
19	What is the role of hyperplanes in SVM?		BTL1	Remembering
20	What is the geometric intuition behind SVM.		BTL1	Remembering
21	Analyze Radial basis functions network.		BTL2	Understanding
22	What is meant by MLP?		BTL1	Remembering
23	Which algorithms suffer from curse of dimensionality?		BTL1	Remembering
24	What are the Linear models used in classification?		BTL1	Remembering
	PART-B			
1	Recall Multi-layer Perceptron and its uses.	(13)	BTL3	Applying
2	Analyze multi-layer perceptron model with neat diagram.	(13)	BTL4	Analyzing
3	Write Gradient Descent algorithm for training a linear unit.	(13)	BTL3	Applying
4	Consider two perception's defined by the threshold expression $\omega 0 + \omega 1 x 1 + \omega 2 x 2 > 0$, perceptron A has weight values $\omega 0 = 1$, $\omega 1 = 2$, $\omega 2 = 1$ and perceptron B has weight values. $\omega 0 = 0$, $\omega 1 = 2$, $\omega 2 = 1$ True or False? Perceptron A is more-general-than perceptron B	(13)	BTL3	Applying
5	Differentiate between Gradient Descent and Stochastic Gradient Descent.	(13)	BTL2	Understanding
6	Write an algorithm for back propagation algorithm which uses stochastic gradient descent method. Comment on the effect of adding momentum to the network	(13)	BTL6	Creating
7	Evaluate Support Vector Machines in detail. What are advantages and disadvantages of SVM.	(13)	BTL5	Evaluating
8	Explain the Back propagation rule considering the training rule for Output Unit weights and Training Rule for Hidden Unit weights	(13)	BTL3	Applying
9	(i). Elucidate the radial basis functions. (ii). Describe the two stage process of the RBF networks	(7) (6)	BTL4	Analyzing
10	How Face Recognition can be implemented using back propagation neural network? Explain in detail.	(13)	BTL5	Evaluating

11	(i). Explain the radial basis functions. (ii). Describe the two stage process of the RBF networks	(6) (7)	BTL4	Analyzing

12	(i). Explain the needs of back propagation (ii). Describe about best practice of back propagation and disadvantage	(6) (7)	BTL3	Applying
13	Write a note on (i) Perceptron Training Rule (ii) Gradient Descent and Delta Rule	(8) (5)	BTL1	Rememberin g
14	Examine with example the Back Propagation Rule.	(13)	BTL3	Applying
15	Explain in detail about Linear SVM	(13)	BTL3	Applying
16	Explain in detail about non Linear SVM	(13)	BTL3	Applying
17	Explain Curse of Dimensionality and analyze how to overcome the problems caused by it.	(13)	BTL4	Analyzing
	PART-C			
1	Design multi-layer perceptron model with a neat diagram.	(15)	BTL6	Creating
2	Explain the followings w.r.t Back Propagation algorithm • Convergence and Local Minima • Representational Power of Feedforward Networks • Hypothesis Space Search and Inductive Bias • Hidden Layer Representations • Generalization, Overfitting, and Stopping Criterion	(15)	BTL5	Evaluating
3	Write Stochastic Gradient Descent version of the Back Propagation algorithm for feed forward networks containing two layers of sigmoid units	(15)	BTL5	Evaluating
4	Discuss the working behavior of support vector machine with diagrams.	(15)	BTL6	Creating
5	Draw the model and explain the algorithm for Back propogation.Derive necessary equations to determine back propogation error.	(15)	BTL5	Evaluating

	UNIT III- TREE AND PROBABILISTIC MODELS		
	Decision trees – learning decision trees – Constructing Decision Trees -ranking and probability estimation trees – Regression trees – clustering trees – learning ordered rule lists – learning unordered rule lists – descriptive rule learning – association rule mining – first -order rule learning- Gaussian Mixture Models- Nearest Neighbor Methods –K mean Algorithms- Vector Quantization – Self Organizing Feature Map.		
	PART-A		
Q.No	**Questions**	**BT Level**	**Competence**
1	Why use Decision Trees?	BTL1	Remembering
2	How does the Decision Tree algorithm Work?	BTL1	Remembering
3	Define Decision Tree algorithm in a training set.	BTL2	Understanding
4	Define Regression Trees.	BTL1	Remembering
5	Categorize the main element of CART.	BTL2	Understanding

6	Examine the approaches of avoiding overfitting data.	BTL2	Understanding
7	What is the entropy of a Data set.	BTL1	Remembering

8	Define Gini index.	BTL2	Understanding
9	Recall about information Gain.	BTL1	Remembering
10	Define FOIL algorithm.	BTL2	Understanding
11	Explain Hierarchical clustering	BTL2	Understanding
12	List the type of Clustering Methods	BTL2	Understanding
13	What is Apriori Algorithm?	BTL1	Remembering
14	How does Association Rule Learning work?	BTL1	Remembering
15	Explain the Applications of Association Rule Learning.	BTL2	Understanding
16	Discuss about the aim of Vector Quantization?	BTL2	Understanding
17	Construct the steps of SOM.	BTL2	Understanding
18	Discuss about Data compression types	BTL2	Understanding
19	Explain about Vector Quantization	BTL2	Understanding
20	Where are self-Organizing maps used?	BTL2	Understanding
21	What are the stages in self organizing map?	BTL1	Remembering
22	What is the principle of vector quantization?	BTL1	Remembering
23	List out the advantages of Gaussian mixture model.	BTL2	Understanding
24	What is the use of KNN algorithm?	BTL1	Remembering
	PART-B		
1	Experiment with Classification tree and solution. (13)	BTL3	Applying
2	Analyze about CART. (13)	BTL4	Analyzing
3	Recall the issues in Decision tree learning? How are they overcome? (13)	BTL3	Applying
4	Define an algorithm to construct decision tree. (13)	BTL3	Applying
5	Distinguish between the FOIL and other algorithms. (13)	BTL3	Applying
6	Construct a decision tree for the following data. (13)	BTL6	Creating

	<table><tr><th>Class label (risk)</th><th>Collateral</th><th>Income</th><th>Debt</th><th>Credit history</th></tr><tr><td>high</td><td>none</td><td>low</td><td>high</td><td>bad</td></tr><tr><td>high</td><td>none</td><td>middle</td><td>high</td><td>unknown</td></tr><tr><td>moderate</td><td>none</td><td>middle</td><td>low</td><td>unknown</td></tr><tr><td>high</td><td>none</td><td>low</td><td>low</td><td>unknown</td></tr><tr><td>low</td><td>none</td><td>upper</td><td>low</td><td>unknown</td></tr><tr><td>low</td><td>adequate</td><td>upper</td><td>low</td><td>unknown</td></tr><tr><td>high</td><td>none</td><td>low</td><td>low</td><td>bad</td></tr><tr><td>moderate</td><td>adequate</td><td>upper</td><td>low</td><td>bad</td></tr><tr><td>low</td><td>none</td><td>upper</td><td>low</td><td>good</td></tr><tr><td>low</td><td>adequate</td><td>upper</td><td>high</td><td>good</td></tr><tr><td>high</td><td>none</td><td>low</td><td>high</td><td>good</td></tr><tr><td>moderate</td><td>none</td><td>middle</td><td>high</td><td>good</td></tr><tr><td>low</td><td>none</td><td>upper</td><td>high</td><td>good</td></tr><tr><td>high</td><td>none</td><td>middle</td><td>high</td><td>bad</td></tr></table>			
7	Applying the K-Means algorithm, find two clusters in the following data. <table><tr><td>x</td><td>185</td><td>170</td><td>168</td><td>179</td><td>182</td><td>188</td><td>180</td><td>180</td><td>183</td><td>180</td><td>180</td><td>177</td></tr><tr><td>y</td><td>72</td><td>56</td><td>60</td><td>68</td><td>72</td><td>77</td><td>71</td><td>70</td><td>84</td><td>88</td><td>67</td><td>76</td></tr></table>	(13)	BTL3	Applying
8	Explain EM algorithm for Gaussian mixtures	(13)	BTL3	Applying
9	Outline an algorithm for agglomerative hierarchical clustering.	(13)	BTL3	Applying
10	How DBSCAN algorithm use for clustering.	(13)	BTL3	Applying
11	Describe an algorithm for divisive hierarchical clustering.	(13)	BTL3	Applying
12	(i). Explain the EM algorithm. (ii) Explain the detail Estimating Means of k Gaussians.	(5) (8)	BTL5	Evaluating
13	Make use of K- Means algorithm to find 2 cluster in following data. <table><tr><td>No.</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>x_1</td><td>1.0</td><td>1.5</td><td>3.0</td><td>5.0</td><td>3.5</td><td>4.5</td><td>3.5</td></tr><tr><td>x_2</td><td>1.0</td><td>2.0</td><td>4.0</td><td>7.0</td><td>5.0</td><td>5.0</td><td>4.5</td></tr></table>	(13)	BTL4	Analyzing
14	Use decision tree to classify the students in a class based on their academic performance	(13)	BTL6	Creating
15	Examine K-nearest neighbour algorithm. Why is it known as instance-based Learning?	(13)	BTL3	Applying
16	Formulate the working procedure of Self organizing Feature Map with an example.	(13)	BTL6	Creating
17	Analyze association rule mining with example.	(13)	BTL4	Analyzing
	PART-C			
1	Recommend the EM algorithm and explain the general form of EM algorithm	(15)	BTL5	Evaluating

<table>
<tr><td>2</td><td>What is decision tree. Construct the decision trees to represent the following Boolean functions:
a) A∩B
b) A∪[B∩C]
c) A x or B
d) [A∩B]∪[C∩D]</td><td>(15)</td><td>BTL6</td><td>Creating</td></tr>
<tr><td>3</td><td>Give decision trees to represent the following boolean functions:
i. A ∧¬B
ii. A V [B ∧C]
Consider the following set of training examples:
<table><tr><th>Instance</th><th>a1</th><th>a2</th><th>Classification</th></tr><tr><td>1</td><td>T</td><td>T</td><td>+</td></tr><tr><td>2</td><td>T</td><td>T</td><td>+</td></tr><tr><td>3</td><td>T</td><td>F</td><td>-</td></tr><tr><td>4</td><td>F</td><td>F</td><td>+</td></tr><tr><td>4</td><td>F</td><td>T</td><td>-</td></tr><tr><td>6</td><td>F</td><td>T</td><td>-</td></tr></table>i. What is the entropy of this collection of training examples with respect to the target function classification.
ii. What is the information gain of a2 relative to these training example.</td><td>(15)</td><td>BTL5</td><td>Evaluating</td></tr>
<tr><td>4</td><td>Give Decision trees for the following set of training examples
<table><tr><th>Day</th><th>Outlook</th><th>Temperature</th><th>Humidity</th><th>Wind</th><th>Play Tennis</th></tr><tr><td>D1</td><td>Sunny</td><td>Hot</td><td>High</td><td>Weak</td><td>No</td></tr><tr><td>D2</td><td>Sunny</td><td>Hot</td><td>High</td><td>Strong</td><td>No</td></tr><tr><td>D3</td><td>Overcast</td><td>Hot</td><td>High</td><td>Weak</td><td>Yes</td></tr><tr><td>D4</td><td>Rain</td><td>Mild</td><td>High</td><td>Weak</td><td>Yes</td></tr><tr><td>D5</td><td>Rain</td><td>Cool</td><td>Normal</td><td>Weak</td><td>Yes</td></tr><tr><td>D6</td><td>Rain</td><td>Cool</td><td>Normal</td><td>Strong</td><td>No</td></tr><tr><td>D7</td><td>Overcast</td><td>Cool</td><td>Normal</td><td>Strong</td><td>Yes</td></tr><tr><td>D8</td><td>Sunny</td><td>Mild</td><td>High</td><td>Weak</td><td>No</td></tr><tr><td>D9</td><td>Sunny</td><td>Cool</td><td>Normal</td><td>Weak</td><td>Yes</td></tr><tr><td>D10</td><td>Rain</td><td>Mild</td><td>Normal</td><td>Weak</td><td>Yes</td></tr><tr><td>D11</td><td>Sunny</td><td>Mild</td><td>Normal</td><td>Strong</td><td>Yes</td></tr><tr><td>D12</td><td>Overcast</td><td>Mild</td><td>High</td><td>Strong</td><td>Yes</td></tr><tr><td>D13</td><td>Overcast</td><td>Hot</td><td>Normal</td><td>Weak</td><td>Yes</td></tr><tr><td>D14</td><td>Rain</td><td>Mild</td><td>High</td><td>Strong</td><td>No</td></tr></table></td><td>(15)</td><td>BTL6</td><td>Creating</td></tr>
</table>

5.	Use the k-means algorithm and Euclidean distance to cluster the following 8 examples into 3 clusters: A1=(2,10),A2=(2,5),A3=(8,4),A4=(5,8),A5=(7,5),A6=(6,4),A7=(1,2), A8=(4,9) Suppose that the initial seeds (centers of each cluster) are A1, A4 and A7. Run the k-means algorithm for 1 epoch only. At the end of this epoch show: **a)** The new clusters (i.e. the examples belonging to each cluster)and the centers of the new clusters **b)** Draw a 10 by 10 space with all the 8 points and show the clusters after the first epoch and the new centroids. **c)** How many more iterations are needed to converge? Draw the result for each epoch.	(6) (5) (4)	BTL6	Creating

	UNIT IV- EVOLUTIONARY AND GRAPHICAL MODELS		
	Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators –Using Genetic Algorithms –Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Directed graphical models Undirected graphical models- Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods.		
	PART-A		
Q.No	**Questions**	**BT Level**	**Competence**
1	What is an evolutionary algorithm?	BTL1	Remembering
2	What are the business benefits of evolutionary algorithms?	BTL1	Remembering
3	Define Markov Chain Monte Carlo Methods	BTL1	Remembering
4	Explain about Genetic Operators	BTL2	Understanding
5	Points out how the learn rule sets differ from genetic algorithm.	BTL2	Understanding
6	Discuss about evolutionary computation.	BTL2	Understanding
7	What is sampling?	BTL2	Understanding
8	What is the markov property of a discrete Markov process?	BTL2	Understanding
9	Examine how MCMC used in machine learning?	BTL2	Understanding
10	Explain directed graphical model?	BTL2	Understanding
11	Show what is an undirected graphical model?	BTL1	Remembering
12	Analyze the main types of graphical Modelling?	BTL2	Understanding
13	Draw the state transition diagram for Markov system.	BTL2	Understanding
14	Assess Bayesian networks with an example	BTL2	Understanding

15	Define Bayes Theorem.	BTL1	Remembering

16	Name the Bayes optimal classification	BTL2	Understanding
17	Explain the Markov random fields usage.	BTL2	Understanding
18	Experiment with maximum number of edges in a Bayesian network(BN) with n nodes? Prove that a valid BN containing this number of edges can be constructed (remember that the structure of a BN has to be a Directed Acyclic Graph).	BTL2	Understanding
19	Construct a bayesian network simulating a teacher entering and leaving the class.	BTL2	Understanding
20	Show what is hidden Markov model with example?	BTL2	Understanding
21	Why do we need sampling?	BTL2	Understanding
22	What is a graphical model?	BTL1	Remembering
23	Define Bayesian networks.	BTL1	Remembering
24	What is meant by tracking methods in machine learning?	BTL1	Remembering

PART-B

1	Construct the Bayseian network and define the necessary CPTs for the given scenario we have a bag of three biased coins a, b and with probabilities of coming up heads of 20%, 60%and 80%respectively. One coin is drawn randomly from the bag (with equal likelihood of drawing each of the three coins) and then the coin is flipped three times to generate the outcomes X1, X2 andX3	(13)	BTL6	Creating
2	Identify the working principle of genetic algorithm and explain the main feature of genetic algorithm	(13)	BTL3	Applying
3	(i). Explain the foundation of genetic algorithm (ii).Explain the operators of genetic algorithms and give brief about applications	(13)	BTL2	Understanding
4	Describe Hidden Markov Model and its applications in AI.	(13)	BTL1	Remembering
5	Explain how Hidden Markov Models are used in speech recognition.	(13)	BTL2	Understanding
6	What is the basic problem associated with a Hidden Markov model?	(13)	BTL1	Remembering
7	Analyze the Coin tossing with Hidden Markov models	(13)	BTL4	Analyzing

8	Write the FOIL algorithm for learning rule sets and explain the purpose of outer loop and the function of the inner loop.	(13)	BTL5	Evaluating
9	(i) Point out about the common operators for Genetic algorithm. (ii) State about the various crossover with diagram.	(7) (6)	BTL3	Applying
10	(i). What are the uses of hidden Markov model in machine learning? Explain the hidden markov model advantages and disadvantages. (ii). Explain the applications of hidden markov model.	(7) (6)	BTL3	Applying
11	Recall discrete Markov processes and General case	(13)	BTL3	Applying

12	State the principle of hidden Markov models and explain different types of HMM with neat sketch in detail.	(13)	BTL3	Applying
13	Analyze the Markov Chain Monte Carlo Methods in detail.	(13)	BTL4	Analyzing
14	Explain Gradient Ascent Training of Bayesian Networks.	(13)	BTL5	Evaluating

15	Discuss Genetic Algorithm with an example. Explain mutatations,crossover, Chromosomes,generations.	(13)	BTL5	Evaluating
16	What is sampling? Explain in detail about different sampling techniques.	(13)	BTL3	Applying
17	What is Graphical model? Outline the different types of graphical model.	(13)	BTL3	Applying
	PART-C			
1	Assess the parallelizing Genetic Algorithms with an example.	(15)	BTL5	Evaluating
2	Formulate the models of evolution and learning in Genetic algorithm.	(15)	BTL6	Creating
3	Choose two destinations with different routes connecting them. Apply genetic algorithm to find the optional path based on distance.	(15)	BTL4	Applying
4	Solve discrete Markov process with three statesS1,S2 and S3. Suppose we have the following10 observation sequences each of length 5: $O_1: \quad S_1\ S_2\ S_1\ S_1\ S_1$ $O_2: \quad S_2\ S_1\ S_1\ S_3\ S_1$ $O_3: \quad S_3\ S_1\ S_3\ S_2\ S_2$ $O_4: \quad S_1\ S_3\ S_3\ S_1\ S_1$ $O_5: \quad S_3\ S_2\ S_1\ S_1\ S_3$ $O_6: \quad S_3\ S_1\ S_1\ S_2\ S_1$ $O_7: \quad S_1\ S_1\ S_2\ S_3\ S_2$ $O_8: \quad S_2\ S_3\ S_1\ S_2\ S_2$ $O_9: \quad S_3\ S_2\ S_1\ S_1\ S_2$ $O_{10}: \quad S_1\ S_2\ S_2\ S_1\ S_1$	(15)	BTL6	Creating
5.	Write down the mechanism of Bayesian Networks and their advantages with the help of a simple example.	(15)	BTL6	Creating

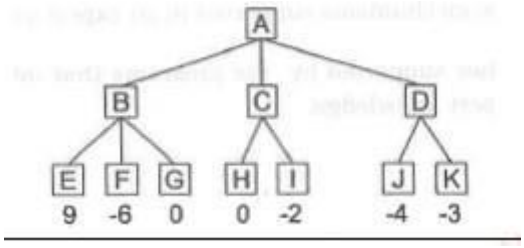
	UNIT V- ADVANCED LEARNING		
	Sampling –Basic sampling methods- Monte Carlo- Reinforcement Learning- Model-Based Learning- Temporal Difference Learning Exploration Strategies- Deterministic and Non deterministic Rewards Actions Computational Learning Theory - Mistake bound analysis, sample complexity analysis, VC dimension. Occam learning, applications in game playing –applications in robot control.		
	PART-A		
Q.No	**Questions**	**BT Level**	**Competence**
1	A teacher puts students' names in a hat and chooses without looking to get a sample of students. What type of sample is this?	BTL1	Remembering

2	Infer what is Reward Function in Reinforcement learning?	BTL2	Understanding

3	A large company surveys 100 employees by taking random samples of 10 managers and 90 non-managerial employees. What type of sample is this?	BTL2	Understanding
4	How can we reduce sample complexity?	BTL2	Understanding
5	Organize the key features of reinforcement learning.	BTL2	Understanding

6	Explain sample complexity.	BTL2	Understanding
7	Analyze the importance of Temporal learning.	BTL2	Understanding
8	What is VC dimension of circle?	BTL2	Understanding
9	List some examples of Occam's razor?	BTL1	Remembering
10	How is AI useful in game playing techniques?	BTL2	Understanding
11	Explain the importance of Occam razor.	BTL2	Understanding
12	Identify various Types of Reinforcement Learning Techniques	BTL2	Understanding
13	What are the limitations on the use of Monte Carlo methods for reinforcement learning?	BTL1	Remembering
14	Can you run a nondeterministic algorithm on a deterministic machine instead of a nondeterministic one?	BTL2	Understanding
15	Analyze how is VC dimension calculated?	BTL2	Understanding
16	Which algorithms are used in the mistake bound model of learning?	BTL1	Remembering
17	What is meant by optimal mistake bound?	BTL1	Remembering
18	Illustrate the mistake bound model of learning.	BTL2	Understanding
19	How will you classify a method as Monte Carlo solution method?	BTL2	Understanding
20	Explain about the Reinforcement learning model.	BTL2	Understanding
21	What is mistake bound analysis in machine learning?	BTL1	Remembering
22	What Occam’s Razor means in machine learning?	BTL1	Remembering
23	Compare instance based and model based learning.	BTL2	Understanding
24	What are deterministic rewards?	BTL1	Remembering
	PART-B		
1	What are sampling methods? Give short notes on various sampling methods. (13)	BTL3	Applying
2	Apply Occam's learning in robot control. (13)	BTL3	Applying
3	(i) Recall what is Reinforcement learning? (ii) Define temporal difference learning. (13)	BTL3	Applying
4	Apply Occam's learning in Playing Chess. (13)	BTL3	Applying
5	What is sample complexity and examine about the finite hypothesis? (13)	BTL4	Analyzing

6	Give examples of Occam's razor?	(13)	BTL3	Applying
7	Write Reinforcement learning problem characteristics.	(13)	BTL3	Applying
8	Point out Reinforcement learning technique in detail. Also Mention its applications in the field of Artificial intelligence.	(13)	BTL4	Analyzing
9	What is Reinforcement Learning? Explain Reinforcement learning problem with neat diagram.	(13)	BTL3	Applying

10	How Occam's Razor principle works in Machine learning.	(13)	BTL4	Analyzing
11	What are sampling methods and how do you choose the best one?	(13)	BTL5	Evaluating
12	What is shattering? Explain in detail about shattering using VC dimension.	(13)	BTL3	Applying
13	Differentiate between Deterministic and Non-deterministic Algorithms	(13)	BTL3	Applying
14	Explain Monte Carlo Policy Evaluation.	(13)	BTL5	Evaluating
15	Explain mistake bound analysis with example.	(13)	BTL5	Evaluating
16	Discuss Non Deterministic rewards and actions.	(13)	BTL6	Creating
17	Explain any one of the computational learning model.	(13)	BTL4	Analyzing
	PART-C			
1	Explain VC (Vapnik-Chervonenkis) dimension in detail.	(15)	BTL5	Evaluating
2	Consider a two player game in which the minimax searchprocedure is used to compute the best moves for the first player.Assume a static evaluation function that returns values rangingfrom -10 to 10, with 10 indicating a win for the first player and -10a win for the second player. Assume the following game tree inwhich the static scores are from the first player ‘s point of view.Suppose the first player is the maximizing player and needs tomake the next move. What move should be chosen at this point?Can the search be optimized? 	(15)	BTL6	Creating
3	Assess Temporal Difference Learning model with an example.	(15)	BTL5	Evaluating
4	Discuss Markov Chain Monte Carlo Methods in detail.	(15)	BTL6	Creating
5	Determine model-based machine learning with a case study.	(15)	BTL5	Evaluating

Faculty In-Charge **Verified by** **HOD**