SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

QUESTION BANK

VI SEMESTER (Professional Elective)

1922608 – ARTIFICIAL NEURAL NETWORKS

Regulation – 2019

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Prepared by

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SUBJECT : 1922608-ARTIFICIAL NEURAL NETWORKS

SEM / YEAR: VI Sem / III Year

UNIT I -INTRODUCTION

History Of Neural Networks, Structure And Functions Of Biological And Artificial Neurons, Neural Network Architectures, Characteristics of ANN, Basic Learning Laws and Methods.

PART – A

Q.No	Questions	BT Level	Competence
1.	What is the historical significance of neural networks in the development of artificial intelligence?	BTL1	Remembering
2.	Describe the key components of a biological neuron and their functions.	BTL2	Understanding
3.	How does an artificial neuron differ from a biological neuron?	BTL2	Understanding
4.	Explain the basic architecture of a feedforward neural network.	BTL2	Understanding
5.	What are the main characteristics of Artificial Neural Networks (ANNs)?	BTL2	Understanding
6.	Define supervised learning in the context of neural networks.	BTL1	Remembering
7.	What is the purpose of an activation function in an artificial neuron?	BTL2	Remembering
8.	Define the role of weights in neural networks and how they influence output.	BTL1	Remembering
9.	What are the different types of neural network architectures? Provide examples.	BTL2	Remembering
10.	Define basic learning laws used in training neural networks.	BTL1	Remembering
11.	How does backpropagation work as a learning method in ANNs?	BTL1	Remembering
12.	Compare supervised and unsupervised learning approaches in machine learning.	BTL2	Understanding
13.	What are the advantages and disadvantages of using neural networks for classification tasks?	BTL1	Remembering
14.	Define how pattern recognition is achieved using neural classifiers.	BTL1	Remembering
15.	What is meant by "labelled data" in supervised learning?	BTL1	Remembering
16.	Tell the example of a real-world application where ANNs are effectively used for classification tasks.	BTL1	Remembering
17.	Explain the concept of generalization in the context of neural networks.	BTL2	Understanding
18.	Explain how noise in input data can affect the performance of a neural network model.	BTL2	Understanding
19.	Classify the impact of architecture choice on the performance of an ANN for a specific task (e.g., image recognition)	BTL2	Understanding
20.	How can you design a simple experiment to demonstrate how an artificial neural network (ANN) learns from training data using labeled examples?	BTL1	Remembering
21.	What are the ethical considerations of using neural networks?	BTL 1	Remembering
22.	What is feature extraction in neural networks?	BTL 1	Remembering
23.	What distinguishes convolutional neural networks (CNNs) from traditional feedforward networks?	BTL 1	Remembering
24.	What is the purpose of dropout in neural networks?	BTL 1	Remembering

	PART – B		
1.	Explain the historical evolution of neural networks, highlighting key milestones and their modern AI technologies.	BTL5	Evaluate
2.	Compare and contrast biological neurons with artificial neurons, focusing on their structures, functions, and roles in processing information.	BTL5	Evaluate
3.	Elaborate on various types of neural network architectures (e.g., feedforward, convolutional, recurrent) and their specific applications in real-world scenarios.	BTL6	Creating
4	Analyze the characteristics that make ANNs suitable for pattern recognition tasks, including adaptability and learning capabilities through examples from literature or case studies.	BTL4	Analyze
5	Discover the basic learning laws used in ANNs (e.g., Hebbian learning, Delta rule) and explain how they influence weight adjustments during training processes.	BTL5	Evaluate
6	Explain how backpropagation works as a learning algorithm for training multi-layered neural networks, including its mathematical basis and practical implications.	BTL5	Evaluate
7	Assess the limitations and challenges faced by traditional ANN models, including issues like overfitting or vanishing gradients, and discuss potential solutions or advancements that address these challenges.	BTL5	Evaluate
8	Discuss how different activation functions (e.g., sigmoid, ReLU) affect the performance and training dynamics of ANNs.	BTL6	creating
9	Design a simple multi-layer perceptron model for a specific classification task (e.g., handwritten digit recognition), detailing architecture choices, activation functions, and training methods used.	BTL6	Creating
10	Criticize assess how supervised learning approaches can be integrated with unsupervised techniques to enhance overall model performance in complex tasks.	BTL5	Evaluate
11	Analyze the characteristics that make ANNs suitable for pattern recognition tasks, including adaptability and learning capabilities through examples from literature or case studies.	BTL4	Analyze
12	Discover the basic learning laws used in ANNs (e.g., Hebbian learning, Delta rule) and explain how they influence weight adjustments during training processes.	BTL4	Analyze
13	Explain how backpropagation works as a learning algorithm for training multi-layered neural networks, including its mathematical basis and practical implications.	BTL5	Evaluate
14	Assess the limitations and challenges faced by traditional ANN models, including issues like overfitting or vanishing gradients, and discuss potential solutions or advancements that address these challenges.	BTL5	Evaluate
	PART C		
1.	Describe the role of weights and biases in artificial neural networks, detailing how they are initialized, adjusted during training, and their impact on the network's performance.	BTL6	Explain
2.	Explain the concept of overfitting in neural networks, including its causes, consequences, and strategies to mitigate it, such as regularization techniques and cross-validation.	BTL5	Evaluating
3.	Assess the impact of different optimization algorithms (e.g., SGD, Adam, RMSprop) on the training efficiency and convergence of neural networks, including their advantages and disadvantages.	BTL5	Evaluating
4.	Compare and contrast various neural network architectures (e.g., CNNs, RNNs, GANs) in terms of their suitability for different types of tasks, such as image processing, sequence prediction, and generative modeling.	BTL4	Analyaze
5.	Propose a comprehensive framework for developing a neural network model for a real-world application (e.g., medical diagnosis, sentiment analysis), detailing the data preprocessing, model architecture, training process, and evaluation metrics.	BTL6	Creating
1.	Describe the role of weights and biases in artificial neural networks, detailing how they are initialized, adjusted during training, and their impact on the network's performance.	BTL6	Explain

UNIT II - DATA VISUALIZATION TECHNIQUES

Single Layer Neural Network and Architecture, McCulloch-Pitts Neuron Model, Learning Rules, Perceptron Model, Perceptron Convergence Theorem, Delta learning rule, ADALINE, Multi-Layer Neural Network and architecture, MADALINE, Back Propagation learning, Back Propagation Algorithm

PART – A

Q.No	Questions	BT Level	Competence
1.	What is a single-layer neural network, and how does it function?	BTL1	Remembering
2.	Describe the McCulloch-Pitts neuron model and its significance in neural network history.	BTL2	Understanding
3.	What are learning rules in the context of neural networks?	BTL2	Understanding
4.	Explain the basic concept of the perceptron model.	BTL2	Understanding
5.	What is the Perceptron Convergence Theorem?	BTL2	Understanding
6.	Describe the Delta learning rule and its purpose.	BTL2	Understanding
7.	What is ADALINE, and how does it differ from a perceptron?	BTL2	Understanding
8.	Explain the architecture of a multi-layer neural network.	BTL2	Understanding
9.	What is MADALINE, and what applications does it have?	BTL2	Understanding
10.	Describe the backpropagation learning method in neural networks.	BTL2	Understanding
11.	How does the backpropagation algorithm adjust weights in a neural network?	BTL2	Understanding
12.	What role do activation functions play in perceptrons?	BTL2	Understanding
13.	Define supervised learning and its importance in training neural networks.	BTL1	Remembering
14.	How does a single-layer perceptron classify linearly separable data?	BTL1	Remembering
15.	Define the limitations of the McCulloch-Pitts model.	BTL1	Remembering
16.	Explain how ADALINE handles continuous output values.	BTL2	Understanding
17.	Define "error signal" in the context of supervised learning.	BTL1	Remembering
18.	Define one real-world application of backpropagation in neural networks.	BTL1	Remembering
19.	Show the simple dataset, explain how you would train a perceptron to classify it.	BTL1	Remembering
20.	How varying the learning rate affects convergence speed during training.	BTL1	Remembering
21.	What is a single-layer neural network, and how does it differ from multi-layer neural networks?	BTL2	Understanding
22.	Describe the McCulloch-Pitts neuron model and its significance in the development of artificial neural networks.	BTL1	Remembering
23.	What are the key learning rules used in training neural networks, and how do they influence weight adjustments?	BTL1	Remembering
24.	What is the Perceptron Convergence Theorem, and why is it important in the context of training perceptrons?	BTL1	Remembering

PART – B

Q.No	Questions	BT Level	Competence
1.	Discuss the architecture and functioning of single-layer neural networks, including thei applications and limitations.	BTL4	Analyze
2.	Compare and contrast the McCulloch-Pitts neuron model with modern artificial neurons, highlighting their features and functionalities.	BTL4	Analyze
3.	Elaborate on various learning rules used in supervised learning, including their mathematical foundations and practical implications.	BTL5	Evaluate
4.	Explain the perceptron model in detail, including its training process, limitations, and scenarios where it is applicable.	BTL3	Apply
5.	Analyze the Perceptron Convergence Theorem and its significance in ensuring that perceptrons can learn linearly separable functions with an example dataset.	BTL4	Analyze
6.	Given a dataset with two features (X1, X2) and binary labels (0 or 1), demonstrate the training process of a perceptron by initializing weights and applying the perceptron learning rule for two iterations.	BTL3	Apply

7.	Discuss ADALINE's architecture and functionality compared to traditional perceptrons, emphasizing its ability to handle continuous outputs with an example calculation.	BTL5	Evaluate
8.	Describe multi-layer neural networks' architecture and how they enable complex function approximation compared to single-layer networks.	BTL4	Analyze
9.	Explain backpropagation as a learning algorithm for multi-layer networks, detailing its steps and mathematical principles involved, using an example to illustrate weight adjustment.	BTL5	Evaluate
10.	Given an actual output of [0.7] and predicted output of [0.5], calculate the mean squared error (MSE) and describe how this error would influence weight adjustments during backpropagation.	BTL3	Apply
11.	Compare the performance of two different learning rules (e.g., Delta rule vs. Perceptron learning rule) on a given dataset with linearly separable classes, discussing implementation and evaluation metrics.	BTL5	Evaluate
12.	Design a multi-layer neural network to solve a specific problem (e.g., digit recognition), detailing architecture choices, activation functions, and training methods used.	BTL6	Create
13.	Analyze how noise in input features might affect training a perceptron model on a binary classification task, suggesting strategies to mitigate its impact on performance.	BTL4	Analyze
14.	Discuss how changing one input feature significantly affects predictions in a multi-layer perceptron trained on house price data, providing calculations or simulations to illustrate this effect.	BTL5	Evaluate
15.	Critically assess the limitations of backpropagation in training deep neural networks, including challenges such as vanishing gradients and potential solutions.	BTL5	Evaluate
16.	Explain the architecture of a single-layer neural network and its components.	BTL4	Analyze
	PART C		
1.	Evaluate the effectiveness of the McCulloch-Pitts neuron model in understanding neural computation.	BTL5	Evaluate
2.	Analyze the learning rules used in the Perceptron model and their impact on training efficiency.	BTL4	Analyze
3.	Explain the Perceptron Convergence Theorem and its significance in neural network training	BTL4	Explain
4.	Discuss the Delta learning rule and its application in training neural networks	BTL5	Discuss
5.	Evaluate the Back Propagation Algorithm and its role in training multi-layer neural networks.	BTL5	Evaluate

UNIT III - VISUALIZING DATA PROCESS

Outstar Learning, Kohenen Self Organization Networks, Hamming Network And MAXNET, Learning Vector Quantization, Mexican hat.

PART – A

Q.No	Questions	BT Level	Competence
1.	What is Outstar Learning, and how does it differ from traditional supervised learning?	BTL1	Remembering
2.	Describe the architecture of a Kohonen Self-Organization Network.	BTL2	Understanding
3.	What is the primary function of a Hamming Network in neural computing?	BTL2	Understanding
4.	Explain the concept of MAXNET and its application in neural networks.	BTL2	Understanding
5.	Define Learning Vector Quantization (LVQ) and its purpose in unsupervised learning.	BTL2	Understanding
6.	What is the Mexican Hat function, and how is it used in neural networks?	BTL1	Remembering
7.	Define Outstar Learning adjust weights in a neural network?	BTL1	Remembering
8.	Describe the role of the activation function in Kohonen Self-Organization Networks.	BTL2	Understanding
9.	What is competitive learning, and how does it relate to Kohonen networks?	BTL1	Remembering
10.	Explain how Hamming Networks handle error correction.	BTL1	Understanding
11.	What are the key characteristics of Learning Vector Quantization?	BTL1	Remembering
12.	Define the significance of clustering in unsupervised learning.	BTL1	Remembering
13.	Tell does the Mexican Hat function contribute to feature extraction?	BTL1	Remembering
14.	Define a real-world application of Outstar Learning.	BTL1	Remembering
15.	What distinguishes MAXNET from other neural network models?	BTL1	Remembering
16.	Explain how Kohonen networks can be used for pattern recognition.	BTL3	Apply
17.	What is the role of prototypes in Learning Vector Quantization?	BTL1	Remembering
18.	How does unsupervised learning differ from supervised learning?	BTL2	Understanding
19.	Tell one advantage of using Hamming Networks for pattern matching.	BTL1	Remembering
20.	Classify the weight adjustment occurs in the context of the Mexican Hat function.	BTL1	Remembering
21.	Define Outstar Learning and its primary purpose in neural networks.	BTL2	Understanding
22.	What is a Kohonen Self-Organization Network and its main application?	BTL1	Remembering
23.	Briefly explain the Hamming Network and its function in pattern recognition.	BTL2	Understanding
24.	Describe the concept of Learning Vector Quantization in neural networks.	BTL1	Remembering

PART – B

Q.No	Questions	BT Level	Competence
1.	Discuss Outstar Learning rule in detail, including its mathematical formulation and applications in neural networks.	BTL5	Evaluate
2.	Analyze the architecture and functioning of Kohonen Self-Organization Networks, including their training process and use cases.	BTL5	Evaluate
3.	Compare and contrast Hamming Networks and MAXNET, focusing on their structures, functionalities, and applications.	BTL5	Evaluate
4.	Elaborate on Learning Vector Quantization (LVQ), detailing its algorithmic steps and effectiveness in clustering tasks.	BTL5	Evaluate
5.	Explain the Mexican Hat function's role in neural networks, including its mathematical representation and applications in spatial filtering.	BTL5	Evaluate
6.	Provide a comprehensive overview of competitive learning within Kohonen networks, including examples of its implementation.	BTL5	Evaluate

7.	Discuss how Outstar Learning can be applied to solve practical problems in pattern recognition or clustering.	BTL5	Evaluate
8.	Evaluate the effectiveness of Hamming Networks for error correction in communication systems, providing examples to illustrate their utility.	BTL5	Evaluate
9.	Analyze how MAXNET can be utilized for resource allocation problems within networked systems.	BTL5	Evaluate
10	Discuss the implications of using Learning Vector Quantization for classification tasks, including its advantages over traditional methods.	BTL5	Evaluate
11.	Explain how unsupervised learning techniques like Kohonen networks can enhance data preprocessing in machine learning workflows.	BTL5	Evaluate
12.	Critically assess the limitations of the Mexican Hat function when used as an activation function in neural networks.	BTL5	Evaluate
13.	Design an experiment using Learning Vector Quantization to classify a given dataset, detailing your approach and expected outcomes while addressing potential challenges.	BTL6	Creating
14.	Analyze the principles of Outstar Learning and discuss its advantages and limitations in neural network training.	BTL4	Analyze
15.	Evaluate the architecture and functioning of Kohonen Self-Organization Networks, including their applications in clustering.	BTL4	Analyze
16.	Discuss the Hamming Network and MAXNET, focusing on their learning mechanisms and use cases in neural computation.	BTL4	Analyze
17.	Explain the concept of the Mexican Hat function and its significance in neural networks, particularly in relation to spatial organization.	BTL5	Explain
PART C			
1.	Evaluate the effectiveness of Learning Vector Quantization compared to traditional neural network training methods, including practical applications.	BTL5	Evaluate
2.	Analyze the role of Outstar Learning in supervised learning scenarios, discussing its impact on convergence and performance.	BTL4	Analyze
3.	Discuss the implications of using Kohonen Self-Organization Networks in real-world applications, including their strengths and weaknesses.	BTL5	Evaluating
4.	Explain the mathematical foundation of the Mexican Hat function and its application in neural networks, including examples of its use in data processing.	BTL5	Evaluating
5.	Analyze the differences and similarities between Hamming Networks and Learning Vector Quantization, focusing on their architectures, learning processes, and applications in pattern recognition.	BTL4	Analyze

UNIT IV- INTERACTIVE DATA VISUALIZATION			
Counter Propagation Network -Full Counter Propagation network, Forward Only Counter Propagation Network, Adaptive Resonance Theory (ART) -Architecture, Algorithms.			
PART – A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	What is a Counter Propagation Network (CPN), and what are its main components?	BTL1	Remembering
2.	Define the architecture of a Full Counter Propagation Network.	BTL1	Remembering
3.	What distinguishes a Forward Only Counter Propagation Network from a Full Counter Propagation Network?	BTL1	Remembering
4.	Explain the role of the Kohonen layer in a Counter Propagation Network.	BTL1	Understanding
5.	What is the purpose of the Grossberg layer in CPNs?	BTL1	Remembering
6.	Define Adaptive Resonance Theory (ART) in the context of neural networks.	BTL1	Remembering
7.	What are the two main phases of training in a Counter Propagation Network?	BTL1	Remembering
8.	Summarize the competitive learning is implemented in Kohonen networks.	BTL1	Understanding
9.	What is the significance of bidirectional mapping in Counter Propagation Networks?	BTL 1	Understanding
10.	Explain how CPNs can be used for function approximation.	BTL 2	Remembering
11.	What is the primary function of Hamming network in neural computing?	BTL 1	Understanding
12.	State one application of Adaptive Resonance Theory (ART).	BTL 1	Understanding
13.	How does the learning algorithm in ART differ from traditional backpropagation?	BTL 1	Understanding
14.	What is the Mexican Hat function, and how is it used in neural networks?	BTL 1	Understanding
15.	Describe one advantage of using CPNs over traditional feedforward networks.	BTL 2	Remembering
16.	How does weight adjustment occur in a Full Counter Propagation Network?	BTL 1	Understanding
17.	Explain stability-plasticity trade-off within ART	BTL 2	Remembering
18.	What types of problems are best suited for Adaptive Resonance Theory?	BTL 1	Understanding
19.	How CPNs can handle multimodal data processing	BTL 1	Understanding
20.	Explain how learning rate affects training within Counter Propagation Networks.	BTL 2	Remembering
21.	What is the primary advantage of using Counter Propagation Networks in neural computing?	BTL1	Remembering
22.	Identify the key differences between supervised and unsupervised learning in the context of CPNs.	BTL1	Remembering
23.	What role does the activation function play in a Counter Propagation Network?	BTL2	Understanding
24.	How does the structure of a Kohonen layer contribute to the learning process in CPNs?	BTL1	Remembering
PART – B			
1.	Discuss architecture & functioning within Full Counter Propagation Networks detailing their training process & applications	BTL4	Discuss
2.	Compare & contrast Full Counter Propagation Networks with Forward Only Counter Propagation Networks focusing on strengths & weaknesses	BTL6	compare
3.	Elaborate on Adaptive Resonance Theory (ART) including architecture algorithms & practical applications within unsupervised learning	BTL1	Remembering

4.	Explain two-phase training process within Counter Propagation Network providing detailed steps for each phase	BTL4	Explain
5.	Discuss significance competitive learning within Kohonen networks contributing towards clustering & pattern recognition tasks	BTL5	Discuss
6.	Discuss significance bidirectional mapping within CPNs including examples where this feature proves particularly useful	BTL5	Discuss
7.	Evaluate effectiveness Adaptive Resonance Theory for real-time learning applications highlighting advantages over traditional methods	BTL5	Evaluate
8.	Describe CPNs applied towards data compression & function approximation providing specific examples illustrating utility	BTL5	Evaluate
9.	Critically assess limitations surrounding Counter Propagation Networks including challenges faced during training & implementation	BTL6	Critically Assess
10	Explore ART addressing issues related stability/plasticity during learning processes including impact on network performance	BTL6	Explore
11.	Provide overview Hamming Networks detailing architecture & applications within error correction & pattern matching tasks	BTL6	overview
12.	Discuss future trends surrounding unsupervised learning techniques particularly focusing advancements related CPNs & ART	BTL5	Discuss
13.	Design experiment utilizing Adaptive Resonance Theory classify given dataset detailing approach expected outcomes potential challenges	BTL5	Discuss
14.	Discuss the implications of using a Forward Only Counter Propagation Network in real-world applications, including its limitations.	BTL5	Discuss
15.	Compare the learning mechanisms of Counter Propagation Networks and Adaptive Resonance Theory, focusing on their adaptability to new data.	BTL6	Compare
16.	Explain the significance of the Grossberg layer in the context of function approximation within CPNs.	BTL4	Explain
17.	Analyze the impact of different learning rates on the performance of Counter Propagation Networks during training.	BTL4	Analyze
PART C			
1.	Evaluate the role of Adaptive Resonance Theory in enhancing the performance of neural networks in dynamic environments.	BTL5	Evaluating
2.	Discuss the challenges faced when implementing Counter Propagation Networks in high-dimensional data spaces, including potential solutions.	BTL6	Discuss
3.	Analyze the effectiveness of CPNs in handling noisy data compared to traditional neural networks.	BTL5	Evaluating
4.	Explore the potential of integrating Counter Propagation Networks with other machine learning techniques for improved performance.	BTL5	Evaluating
5.	Critically assess the role of the Kohonen layer in achieving effective clustering and its limitations in CPNs.	BTL6	Critically Asses

UNIT V -SECURITY DATA VISUALIZATION			
Introduction, Auto Associative Memory ,Hetero Associative Memory, Bidirectional Associative Memory(BAM) -Theory And Architecture, BAM Training Algorithm, Hopfield Network: Introduction, Architecture Of Hopfield Network.			
PART – A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	What is associative memory in the context of neural networks?	BTL1	Remembering
2.	Describe the basic concept of Auto Associative Memory.	BTL2	Understanding
3.	What distinguishes Hetero Associative Memory from Auto Associative Memory?	BTL2	Understanding
4.	Explain the architecture of a Bidirectional Associative Memory (BAM).	BTL2	Understanding
5.	What is the primary function of a Hopfield Network?	BTL2	Understanding
6.	Define the term "content-addressable memory" (CAM).	BTL1	Remembering
7.	How does an Auto Associative Memory retrieve stored patterns?	BTL2	Understanding
8.	Discuss the role of feedback in Auto Associative Memory networks.	BTL4	Analyzing
9.	What are the key components of a Hopfield Network's architecture?	BTL2	Understanding
10.	Define the BAM training algorithm in simple terms.	BTL1	Understanding
11.	How can Auto Associative Memory be used for noise reduction in data?	BTL1	Understanding
12.	Distinguish the retrieval mechanisms of Auto and Hetero Associative Memories.	BTL1	Understanding
13.	Discuss one application of Bidirectional Associative Memory in real-world scenarios.	BTL2	Remembering
14.	Explain how Hopfield Networks function as associative memory systems.	BTL2	Remembering
15.	What is meant by "associative recall" in neural networks?	BTL1	Remembering
16.	Provide an example of how Hetero Associative Memory can be applied in data retrieval tasks.	BTL2	Remembering
17.	Describe the iterative process involved in Hopfield Networks.	BTL2	Understanding
18.	Discuss how BAMs handle incomplete input patterns during recall.	BTL2	Remembering
19.	What is the advantages of using associative memories over traditional memory systems.	BTL1	Understanding
20.	State a simple use case for implementing an Auto Associative Memory network.	BTL1	Understanding
21.	What is the main advantage of using associative memory in neural networks?	BTL1	Understanding
22.	Identify the key difference between content-addressable memory and traditional memory.	BTL2	Remembering
23.	What is the role of weights in associative memory networks?	BTL1	Remembering
24.	How does Hetero Associative Memory differ in its input-output relationship compared to Auto Associative Memory?	BTL2	Understanding
PART – B			
1.	Discuss the theory behind Auto Associative Memory, including its mathematical formulation and practical applications.	BTL4	Analyzing
2.	Compare and contrast Auto Associative Memory and Hetero Associative Memory, focusing on their structures, functionalities, and use cases.	BTL5	Evaluate
3.	Elaborate on the architecture and functioning of Bidirectional Associative Memory (BAM), including its training algorithm and applications.	BTL4	Explain

4.	Explain how Hopfield Networks operate as content-addressable memory systems, detailing their architecture and retrieval process.	BTL5	Discuss
5.	Evaluate the BAM training algorithm's effectiveness in different scenarios, providing examples to illustrate its utility.	BTL4	Analyzing
6.	Describe how associative memories can be implemented using neural networks, including both feedforward and recurrent architectures.	BTL4	Explain
7.	Analyze the limitations of Hopfield Networks as associative memory systems, including challenges related to capacity and convergence.	BTL5	Discuss
8.	Assess the significance of associative memories in cognitive science and their parallels with human memory processes.	BTL5	Evaluate
9.	Design an experiment using a Hopfield Network to demonstrate its ability to recall patterns from noisy inputs, detailing your approach and expected outcomes.	BTL6	Create
10	Explore how Bidirectional Associative Memories can improve data retrieval systems by allowing for two-way associations between input and output patterns.	BTL4	Analyzing
11.	Critically assess how different types of associative memories can be integrated into machine learning workflows to enhance performance in tasks like classification or clustering.	BTL5	Evaluate
12.	Explain how noise affects the performance of Auto Associative Memories and suggest strategies to mitigate its impact during retrieval processes.	BTL5	Discuss
13.	Provide a comprehensive overview of applications for associative memory networks in fields such as image recognition or natural language processing.	BTL4	Analyze
14.	Discuss future trends in associative memory research, particularly focusing on advancements related to BAMs and Hopfield Networks.	BTL5	Evaluate
15.	Propose a novel application for Hetero Associative Memory that leverages its unique properties for solving a specific problem.	BTL6	Create
16.	Discuss the practical applications of Auto Associative Memory in real-world scenarios, including examples.	BTL5	Discuss
17.	Analyze the training process of Bidirectional Associative Memory (BAM) and its implications for learning efficiency.	BTL4	Analyze
	PART C		
1.	Evaluate the effectiveness of Hetero Associative Memory in applications such as recommendation systems, highlighting its strengths and weaknesses.	BTL5	Evaluating
2.	Discuss the implications of using Hopfield Networks for optimization problems, including their advantages and limitations.	BTL5	Discuss
3.	Analyze the role of associative memory in cognitive modeling, particularly in simulating human memory processes	BTL5	Analyze
4.	Explore the potential of integrating Bidirectional Associative Memory with deep learning techniques to enhance data retrieval.	BTL6	Explore
5.	Critically assess the challenges associated with scaling associative memory networks for large datasets, including potential solutions.	BTL5	Evaluating