SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)
SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

QUESTION BANK

VIII SEMESTER

1904801 DEEP LEARNING

Regulation – 2019

Academic Year 2025 – 2026 (EVEN)

Prepared by

Ms. VIJAYPRIYA (AP O.G. / CSE)

SRM VALLIAMMAI ENGINEERING COLLEGE

SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)
SRM Nagar, Kattankulathur-603203
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

QUESTION BANK

SUBJECT :1904801 DEEP LEARNING
SEM/YEAR : VIII/IV

UNIT - I: INTRODUCTION TO MACHINE LEARNING BASICS			
Scalars – Vectors – Matrices – Tensors – Identity and Inverse Matrices – Linear Dependence and Span – Eigen Decomposition – Probability – Random Variables – Conditional Probability – Expectation – Variance – Covariance –Bayes' Rule – Supervised Learning Algorithm – Unsupervised Learning Algorithm –Stochastic Gradient Descent.			
PART – A			
Q.No	**Question**	**BT Level**	**Competence**
1	What is Deep Learning?	BTL-1	Remember
2	Differentiate scalar and vector.	BTL-2	Understand
3	Discuss Normal distribution	BTL-2	Understand
4	What is Auto encoder?	BTL-1	Remember
5	List out the special kind of matrices.	BTL-1	Remember
6	What is representation learning?	BTL-1	Remember
7	Discuss unsupervised learning algorithm	BTL-2	Understand
8	State the Bayes rule.	BTL-1	Remember
9	List out some supervised learning algorithms.	BTL-1	Remember
10	Give the Difference between deep learning and machine learning	BTL-2	Understand
11	Discuss about supervised learning algorithms.	BTL-2	Understand
12	Give Venn diagram for Deep Learning.	BTL-2	Understand
13	Describe Stochastic Gradient Descent	BTL-1	Remember
14	Give the various concepts of probability	BTL-2	Understand
15	Discuss about scalars	BTL-2	Understand
16	Differentiate Independence and Conditional Independence.	BTL-2	Understand
17	Give detail description of vectors	BTL-2	Understand
18	List the historical trends in Deep Learning.	BTL-1	Remember

SRM VALLIAMMAI ENGINEERING COLLEGE

19	What are the applications of deep learning?	BTL-1	Remember
20	What are the main differences between AI, Machine Learning, and Deep Learning?	BTL-1	Remember
21	Define Stochastic Gradient Descent with merits and demerits.	BTL-1	Remember
22	Give Venn diagram for Deep Learning.	BTL-2	Understand
23	Discuss about matrix inverse.	BTL-2	Understand
24	Define Random Variable.	BTL-1	Remember
	PART – B		
1	Explain identity matrix and inverse matrix. Derive the conditions for the existence of an inverse matrix and discuss its applications.(13)	BTL-4	Apply
2	Evaluate the suitability of supervised and unsupervised learning algorithms for solving real-world problems involving uncertain data.(13)	BTL-5	Evaluate
3	Explain the architecture and types of Auto encoders. (13)	BTL-3	Analyze
4	Explain eigenvalues and eigenvectors. Describe eigen decomposition and analyze its role in dimensionality reduction techniques.(13)	BTL-4	Apply
5	Derive Bayes' Rule and analyze its importance in probabilistic reasoning and decision-making (13)	BTL-4	Analyze
6	**i.** Demonstrate linear dependence and independence of vectors.(7) **ii.** Explain span of vectors. (6)	BTL-3	Analyze
7	Analyze and write short notes on the following. i. Vectors. (6) ii. Matrices.(7)	BTL-4	Apply
8	Explain the following in detail. i. Eigen Decomposition. (7) ii. Tensors.(6)	BTL-4	Apply
9	Assess the following. **i.** Expectation .(5) **ii.** Variance.(4) **iii.** Covariance. (4)	BTL-5	Evaluate
10	Extrapolate conditional probability and Develop a summary of various common probability distribution. (13)	BTL-6	Create
11	Explain and derive Bayes' rule. Illustrate its application in machine learning classification problems.(13)	BTL-4	Analyze
12	i. Illustrate the importance of principal components analysis. (6) ii. Explain support vector machines in detail. (7)	BTL-3	Apply
13	Explain supervised learning algorithm. (13)	BTL-4	Analyze

14	Compare supervised and unsupervised learning algorithms with examples.(13)	BTL-4	Analyze
15	Explain the working principle of Stochastic Gradient Descent (SGD). Analyze its advantages over batch gradient descent.(13)	BTL-4	Analyze
16	Explain Probability Mass function and Probability Density function. (13)	BTL-3	Analyze
17	Explain Principal Components Analysis. (13)	BTL-5	Evaluate
	PART – C		
1	Develop short notes on following with respect to deep learning with examples. i) Scalar and Vectors. (8) ii) Matrices. (7)	BTL-6	Create
2	Assess the following with respect to deep learning examples. i) Random Variables. (8) ii) Probability. (7)	BTL-5	Evaluate
3	Develop a supervised learning algorithm and explain in detail.(15)	BTL-6	Create
4	Assess unsupervised learning algorithm.(15)	BTL-5	Evaluate
5	Assess the historical developments in deep learning. (15)	BTL-5	Evaluate
	UNIT - II: DEEP NETWORKS		
	Deep Feed Forward Network: Learning XOR – Gradient Based Learning- Hidden Units – Architecture Design – Back Propagation Algorithms. Regularization for Deep Learning: Parameter Norm Penalties – Regularization and unconstrained Problems – Dataset Augmentation – Noise Robustness – Semi supervised Learning – Challenges in Neural Network Optimization.		
	PART – A		
Q. No	**Questions**	**BT Level**	**Competence**
1	Select different set of layers in Feed forward networks.	BTL-2	Understand
2	Select the default activation function for modern neural networks.	BTL-2	Understand
3	Classify linear models and neural networks.	BTL-2	Understand
4	Describe three generalizations of rectified linear units based on using a non-zero slope.	BTL-1	Remember
5	What is Deep Feed Forward networks?	BTL-1	Remember
6	List reasonably common hidden unit types.	BTL-1	Remember
7	Give the drawback of rectified linear units.	BTL-2	Understand
8	Describe gradient descent.	BTL-2	Understand
9	Give example of a feed forward neural network.	BTL-2	Understand
10	Define chain rule of calculus.	BTL-1	Remember
11	List some classification problems where Data augmentation is used.	BTL-1	Remember

SRM VALLIAMMAI ENGINEERING COLLEGE

12	Define universal approximation theorem for feed forward network.	BTL-1	Remember

13	What critical points or stationary points in derivative illustration of a function?	BTL-1	Remember
14	Describe regularization for deep learning.	BTL-2	Understand
15	State semi supervised learning.	BTL-1	Remember
16	Explain the derivative function used in gradient descent algorithm.	BTL-2	Understand
17	Explain importance of dataset augmentation.	BTL-2	Understand
18	List and write chain rule of calculus.	BTL-1	Remember
19	Describe the reason for calling Feed forward neural networks as networks	BTL-2	Understand
20	Give a computational graph for any function.	BTL-2	Understand
21	Give reason for the term "feed forward" used in the feed forward networks.	BTL-2	Understand
22	Describe XOR operation.	BTL-1	Remember
23	Describe Deep feed forward networks.	BTL-1	Remember
24	What are the application used in Dataset Augmentation	BTL-1	Remember
	PART – B		
1	Justify the application of Dataset Augmentation various tasks (13)	BTL-5	Evaluate
2	Explain cost function in gradient based learning. (6) Explain learning conditional distributions with maximum likelihood. (7)	BTL-3	Apply
3	i. Justify about learning conditional statistics in gradient based learning.(7) ii. Explain linear units for Gaussian Output Distributions.(6)	BTL-5	Evaluate
4	Explain output units of feed forward networks. (13)	BTL-3	Apply
5	i. Explain sigmoid units for Bernoulli Output Distributions.(8) ii. Justify the importance of Rectified linear units in Hidden units. (5)	BTL-5	Evaluate
6	i. Develop Soft max units for Multilayer Output Distributions. (7) ii. Discuss about Hidden Units. (6)	BTL-6	Create
7	i. Analyze and write short notes on Rectified linear units and their generalizations. (7) ii. Compare Logistic Sigmoid and Hyperbolic Tangent. (6)	BTL-4	Analyze
8	i. Write a short notes on Radial Basis function, Soft plus and Hard tanh(7) ii. Write a short notes on Architecture Design. (6)	BTL-4	Analyze
9	i. Develop Back Propagation algorithm. (7) ii. List the regularization steps for deep learning. (6)	BTL-6	Create
10	Explain Universal Approximation Properties and Depth. (13)	BTL-3	Apply
11	Analyze and write short notes on Dataset Augmentation. (13)	BTL-4	Analyze

SRM VALLIAMMAI ENGINEERING COLLEGE

12	Develop a data set and demonstrate Noise Robustness. (13)	BTL-6	Create
13	Explain in detail about chain rule of calculus. (13)	BTL-3	Apply

14	Illustrate Computational graphs. (13)	BTL-4	Analyze
15	Explain the applications of Dataset Augmentation. (13)	BTL-3	Analyze
16	Explain Multi-Task Learning. (13)	BTL-3	Analyze
17	Assess Computational graphs with necessary diagrams. (13)	BTL-5	Evaluate
PART – C			
1	Develop a Deep Feed forward network and explain. (15)	BTL-6	Create
2	Assess the routines to implement forward propagation computation. (15)	BTL-5	Evaluate
3	Assess the difference between linear models and neural networks. (15)	BTL-5	Evaluate
4	Develop your own scenarios to demonstrate computational graph. (15)	BTL-6	Create
5	Develop Chain Rule of Calculus. (15)	BTL-6	Create

UNIT - III: CONVOLUTIONAL NETWORKS

The Convolution Operation – Motivation – Pooling – Variants of the Basic Convolution Function – Structured Outputs – Data types – Efficient Convolution Algorithm – Random or Unsupervised Features.

Q.No	Questions	BT Level	Competence
PART – A			
1	Describe an essential feature of any convolutional network implementation is the ability to implicitly zero-pad the input V	BTL-2	Understand
2	Discuss about the output layer of convolutional network is whether usually relatively inexpensive to learning layer.	BTL-2	Understand
3	What is convolutional networks?	BTL-1	Remember
4	Duplicate a chart that demonstrates convolution with a stride.	BTL-1	Remember
5	Explain how pooling handles inputs of varying size?	BTL-2	Understand
6	Define convolution?	BTL-1	Remember
7	List three important ideas that help to improve a machine learning system.	BTL-1	Remember
8	What is unshared convolution?	BTL-2	Understand
9	Define primary visual cortex.	BTL-1	Remember
10	How to reduce the cost of convolutional network training?	BTL-2	Understand
11	Recognize the idea behind reverse correlation.	BTL-2	Understand
12	Discuss about parameter sharing in neural network.	BTL-2	Understand

SRM VALLIAMMAI ENGINEERING COLLEGE

13	Give three properties of V1 that a convolutional network layer is designed to capture.	BTL-2	Understand
14	Explain feature map.	BTL-2	Understand
15	Explain how a convolutional layer have a property called equi-variance to translation?	BTL-2	Understand

16	List three stages of a convolutional network.	BTL-1	Remember
17	List out various formats of data that can be used with convolutional networks.	BTL-1	Remember
18	Identify pooling stage in convolutional network.	BTL-2	Remember
19	Classify complex layer terminology and simple layer terminology in convolutional network.	BTL-2	Remember
20	Select three basic strategies for obtaining convolution kernels without supervised training.	BTL-2	Remember
21	Give example for convolution.	BTL-2	Understand
22	Define reverse correlation.	BTL-1	Remember
23	Explain complex layer terminology.	BTL-2	Remember
24	State equi-variance to translation.	BTL-1	Remember
	PART – B		
1	Execute an example function for Convolution operation and explain in detail. (13)	BTL-3	Apply
2	Explain the following with suitable diagram. i. Sparse interactions. (6) ii. Parameter sharing. (7)	BTL-4	Analyze
3	Examine Pooling with suitable example. (13)	BTL-4	Analyze
4	Explain an expression for Unshared convolution with explanation and explain Tiled convolution.(13)	BTL-4	Analyze
5	Explain in detail the variants of the Basic Convolution Function. (13)	BTL-4	Analyze
6	Construct an architecture that show complex layer terminology and Simple layer terminology in convolutional neural network.	BTL-5	Evaluate
7	Implement local connections, convolution and full connections with diagram? (13)	BTL-3	Apply
8	Develop a table with examples of different formats of data that can be used with convolutional networks. (13)	BTL-6	Create
9	Develop in detail about the following. i. Parameter Sharing. (7) ii. Equi-variant representation. (6)	BTL-6	Create
10	Differentiate locally connected layers, tiled convolution and standard convolution with suitable examples and diagram. (13)	BTL-4	Analyze
11	i. Organise short notes Max Pooling. (6) ii. Explain Pooling with down sampling. (7)	BTL-4	Analyze
12	Explain random or Unsupervised Features.(13)	BTL-4	Analyze
13	Illustrate unshared convolution with suitable examples. (13)	BTL-3	Apply

SRM VALLIAMMAI ENGINEERING COLLEGE

14	**i.** Show three properties of V1 that a convolutional network layer is designed to capture. (6) **ii.** Prove the working learned invariances with necessary example and diagram. (7)	BTL-3	Apply
15	Relate parameter sharing. (13)	BTL-4	Analyze

16	Illustrate Equi-variant representation. (13)	BTL-3	Analyze
17	Evaluate the working learned invariances with necessary example and diagram. (13)	BTL-5	Evaluate
	PART – C		
1	Construct a graphical demonstration for sparse connectivity and explain it in detail. (15)	BTL-5	Evaluate
2	Create a graphical demonstration for parameter sharing and explain it in detail. (15)	BTL-6	Create
3	Evaluate variants of the basic convolution function. (15)	BTL-5	Evaluate
4	Construct a convolutional network to demonstrate the effect of zero padding on network size. Explain Neuro scientific basis for Convolutional Networks. (15)	BTL-6	Create
5	Create a table with examples of different formats of data that can be used with convolutional networks. (15)	BTL-6	Create

UNIT - IV: SEQUENCE MODELING: RECURRENT AND RECURSIVE NETS

Unfolding Computational Graphs – Recurrent Neural Networks – Bidirectional RNNs – Encoder Decoder Sequence to Sequence Architectures – Deep Recurrent Networks – Recursive Neural Networks – The Challenge of Long- Term Dependencies – Echo State Networks – The Long-term memory and other Gated RNNs – Optimization for Long Term Dependencies – Explicit Memory.

PART – A

Q.No	Questions	BT Level	Competence
1	What is Recurrent Neural Networks?	BTL-1	Remember
2	What is Encoder?	BTL-1	Remember
3	Give the blocks of decomposition of computation of most Recurrent Neural Networks.	BTL-2	Understand
4	What is Bidirectional Recurrent Neural Networks?	BTL-1	Remember
5	Give the advantage of recursive nets over recurrent nets.	BTL-2	Understand
6	What is decoder?	BTL-1	Remember
7	Describe Recursive Neural Networks.	BTL-1	Remember

SRM VALLIAMMAI ENGINEERING COLLEGE

8	Predict the concept of gated RNNs.	BTL-2	Understand

9	Classify echo state network and liquid state machines.	BTL-2	Understand
10	Distinguish content based addressing and location based addressing in memory networks.	BTL-2	Understand
11	Classify the different strategies for Multiple Time Scales.	BTL-2	Understand
12	Recognize a block diagram for LSTM.	BTL-2	Understand
13	Identify the important design patterns for recurrent neural networks.	BTL-2	Understand
14	Define echo state networks.	BTL-1	Remember
15	State the advantage of introducing depth in Deep recurrent Networks.	BTL-1	Remember
16	Classify the gradient descent with and without gradient clipping using diagram.	BTL-2	Understand
17	State the major advantages of unfolding process in computational graphs.	BTL-1	Remember
18	State the block diagram of LSTM recurrent network "cell".	BTL-1	Remember
19	What are leaky units?	BTL-1	Remember
20	Explain a schematic diagram of a network with an explicit memory.	BTL-2	Understand
21	Give a block diagram for Long Short Term Memory.	BTL-2	Understand
22	Define echo state networks.	BTL-1	Remember
23	Explain liquid state machines.	BTL-2	Understand
24	Discuss about explicit memory.	BTL-2	Understand
	PART – B		
1	Examine Unfolding Computational Graphs and Bidirectional RNNs. (13)	BTL-4	Analyze
2	Operate the following. i. Teacher Forcing in Recurrent Neural Networks. (7) ii. Networks with Output Recurrence. (6)	BTL-3	Apply
3	i. Construct Echo State Networks. (7) ii. Solve the challenge of Long-Term Dependencies.(6)	BTL-6	Create
4	Illustrate Recurrent Neural Networks in detail.(13)	BTL-3	Apply
5	Evaluate Deep Recurrent Networks in detail.(13)	BTL-5	Evaluate
6	Illustrate Encoder-Decoder sequence-to-sequence Architecture. (13)	BTL-3	Apply
7	Explain Leaky Units and Other Strategies for Multiple Time Scales. (13)	BTL-4	Analyze
8	Point out various features of Echo state networks. (13)	BTL-4	Analyze

9	Explain Optimization for Long-Term Dependencies. (13)	BTL-5	Evaluate
10	Compute the gradient in a Recurrent Neural Network. (13)	BTL-6	Create

11	i. Illustrate Clipping Gradients. (7) ii. Illustrate Regularizing to Encourage Information Flow.(6)	BTL-3	Apply
12	Examine the following. i. Long Short-Term Memory. (7) ii. Other Gated RNNs. (6)	BTL-4	Analyze
13	Explain in detail about the following. i. Adding Skip Connections through Time. (6) ii. Leaky Units and a Spectrum of Different Time Scales .(7)	BTL-4	Analyze
14	Demonstrate Explicit memory. (13)	BTL-3	Apply
15	Create Echo State Networks. (13)	BTL-6	Create
16	Illustrate Bidirectional RNNs.(13)	BTL-3	Analyze
17	Explain challenge of Long-Term Dependencies. (13)	BTL-5	Evaluate
	PART – C		
1	Develop an example for Unfolding Computational Graphs and describe the major advantages of unfolding process. (15)	BTL-6	Create
2	Explain how to compute the gradient in a Recurrent Neural Network.(15)	BTL-5	Evaluate
3	Explain a modeling sequences Conditioned on Context with RNNs. (15)	BTL-5	Evaluate
4	Prepare an example of Encoder- Decoder or sequence-to-sequence RNN architecture.(15)	BTL-6	Create
5	Explain various Gated RNNs. (15)	BTL-5	Evaluate

UNIT - V: DEEP LEARNING APPLICATION

Linear Factor Models – Auto Encoders - Representation Learning – Structured Probabilistic Models for Deep Learning - Monte Carlo Methods.

PART – A

Q.No	Question	BT Level	Competence
1	What is Probabilistic PCA and Factor Analysis?	BTL-1	Remember
2	Define Linear Factor Model.	BTL-1	Remember
3	Give the various generalizations of ICA.	BTL-2	Understand
4	What is Independent Component Analysis?	BTL-1	Remember
5	Give major advantage of slow feature analysis.	BTL-2	Understand
6	Name the various tasks than can be done by probabilistic models.	BTL-1	Remember

7	What is Denoising Auto encoders?	BTL-1	Remember
8	Predict the primary disadvantage of the non-parametric encoder.	BTL-2	Understand
9	Define the trade-off faced in representation learning problems.	BTL-1	Remember

10	Distinguish between one-shot learning and zero-shot learning.	BTL-2	Understand
11	Classify the different Graphical models.	BTL-2	Understand
12	Define distribution equation for energy based model.	BTL-1	Remember
13	Define undirected models?	BTL-1	Remember
14	Discuss about Distributed representations.	BTL-2	Understand
15	Identify the reason for why Greedy layer-wise pre-training called Greedy.	BTL-2	Understand
16	Classify directed models and undirected models.	BTL-2	Understand
17	Slow Feature Analysis is an efficient application of slowness principle? Explain	BTL-2	Understand
18	Identify the task that does the learner to perform in transfer learning?	BTL-2	Understand
19	List the two different ideas combined by Unsupervised pre-training.	BTL-1	Remember
20	Explain an example for distribution equation that represent a Boltzman distribution.	BTL-2	Understand
21	Give an example of learning algorithm based on non-distributed representations.	BTL-2	Understand
22	Classify distributed representation and a symbolic one.	BTL-2	Understand
23	Define the reasons for which Modeling a rich distribution is not feasible in unstructured modeling.	BTL-1	Remember
24	State Undirected models.	BTL-1	Remember
	PART – B		
1	Evaluate the Sparse Coding. (13)	BTL-5	Evaluate
2	Execute the following i. Probabilistic PCA and. (6) ii. Factor Analysis. (7)	BTL-3	Apply
3	Execute the following. i, Independent Component Analysis (5) ii, Slow Feature Analysis. (8)	BTL-3	Apply
4	Demonstrate the Manifold interpretation of PCA. (13)	BTL-3	Apply
5	Organize the Auto encoders. (13)	BTL-4	Analyze
6	Write in detail about Under complete Auto encoders. (13)	BTL-3	Apply
7	Explain Regularized Auto encoders. (13)	BTL-4	Analyze
8	Compare Structured Probabilistic Model and Unstructured Modeling (13)	BTL-4	Analyze
9	Summarize usage of various Graphs to describe Model Structure.(13)	BTL-5	Evaluate
10	Develop an example distribution equation for energy-based model and explain in detail. (13)	BTL-6	Create

11	**i.** Write short notes Sparse Autoencoders.(7) **ii.** Illustrate Denoising Autoencoders. (6)	BTL-4	Analyze
12	Examine the following. i. Representation learning.(6) ii. Greedy Layer-Wise Unsupervised Pretraining.(7)	BTL-4	Analyze

13	Discuss in detail about transfer learning and Domain Adaptation. (13)	BTL-3	Apply
14	Execute the Distributed Representation.(13)	BTL-3	Apply
15	Develop about Slow Feature Analysis. (13)	BTL-6	Create
16	Write about representation learning. (13)	BTL-3	Analyze
17	Explain Markov random fields. (13)	BTL-5	Evaluate
	PART – C		
1	Develop a short notes on Separation and D-Separation.(15)	BTL-6	Create
2	Explain Monte Carlo methods.(15)	BTL-5	Evaluate
3	Explain Auto encoders.(15)	BTL-5	Evaluate
4	Develop a various graphs to describe Model Structure. (15)	BTL-6	Create
5	Assess Independent Component Analysis. (15)	BTL-5	Evaluate