SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

QUESTION BANK

II- SEMESTER – M.E –COMPUTER SCIENCE

AND ENGINEERING

DS3264 -DEEP LEARNING

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SRM Nagar, Kattankulathur-603203

DEPARTMENT OF INFORMATION TECHNOLOGY

QUESTION BANK

SUBJECT : DS3264-DEEP LEARNING

SEM / YEAR : II SEMESTER / I YEAR

UNIT-1 INTRODUCTION

Basic Concepts, Introduction to Machine Learning, Applications of ML, Design Perspective and Issues in ML, Supervised, Unsupervised, Semi-supervised learning with applications and issues.

PART-A

Q. No.	Questions	Competence	Level
1.	Define Machine Learning.	Remember	BTL1
2.	List two common applications of Machine Learning in the healthcare industry.	Remember	BTL1
3.	Choose one issue in Machine Learning model deployment and briefly describe it.	Remember	BTL1
4.	Name two techniques you can use to address imbalanced dataset issue in classification tasks.	Remember	BTL1
5.	When would you apply a decision tree algorithm in machine learning?	Remember	BTL1
6.	Classify the following terms as either related to "Supervised Learning" or "Unsupervised Learning": Regression, Clustering, Classification, Dimensionality Reduction.	Understand	BTL2
7.	What are the two main components you need to build a neural network?	Remember	BTL1
8.	Outline of the steps involved in constructing a neural network for image classification.	Understand	BTL2
9.	Compare a traditional printed book with an e-book in terms of cost, convenience, and environmental impact, using simple language.	Understand	BTL2
10.	Illustrate a user interface for a mobile application that makes it easy for users to input text using no more than 2 sentences.	Understand	BTL2
11.	How would you construct a training dataset for a spam email classifier?	Remember	BTL1
12.	When should you choose a k-nearest neighbors (KNN) algorithm for a machine learning task?	Remember	BTL1
13.	Compare Supervised Learning with Unsupervised Learning.	Understand	BTL2
14.	When is Semi-supervised Learning used, and provide a brief example of its application.	Remember	BTL1
15.	Outline the steps involved in creating a website, starting from domain registration and hosting setup.	Understand	BTL2
16.	Interpret the impact of feature scaling on the performance of machine learning algorithms in two sentences.	Understand	BTL2

17.	Classify K-means clustering, DBSCAN, and hierarchical clustering as density-based or partition-based clustering algorithms.	Understand	BTL2
18.	Compare Logistic Regression and Random Forest classifiers in terms of their interpretability for a business setting.	Understand	BTL2
19.	What is one key step to develop a machine learning model that can handle imbalanced datasets effectively?	Remember	BTL1
20.	Explain the concept of cloud computing in simple words and provide one real-life example of how it's used.	Understand	BTL2
21.	Define the concept of overfitting in Machine Learning and list one technique to mitigate it.	Remember	BTL1
22.	Illustrate a plan for feature selection in a Machine Learning project and name one technique commonly used for this purpose.	Understand	BTL2
23.	What is a critical consideration when developing a machine learning model for a real-time fraud detection system?	Remember	BTL1
24.	Infer a confusion matrix for a binary classification problem and define the term "True Positives."	Understand	BTL2

PART-B

Q. No.	Questions	Competence	Level
1.	Classify three different real-world applications of machine learning and explain how they are used in simple terms. (16)	Analyze	BTL4
2.	(i) Explain the practical applications, advantages,and disadvantages of both supervised and unsupervised machine learning in everyday language. (12) (ii) Explain the importance of data quality in machine learning. (4)	Evaluate	BTL5
3.	Compare supervised and unsupervised learning by outlining their main differences and provide an example for each to illustrate the contrast. (16)	Analyze	BTL4
4.	Experiment how data quality issues impact the performance of a machine learning model. (16)	Apply	BTL3
5.	Build the step by step process of supervised learning mechanism using everyday language and examples to make it easy to understand. (16)	Apply	BTL3
6.	Choose one real-world application where machine learning is commonly used and briefly explain its significance in that context. (16)	Create	BTL6
7.	(i) Analyze on the "what" and "how" of supervised learning. Provide a brief, straightforward explanation of both. (9) (ii) Inspect how data quality affect machine learning outcomes, and why should we care about it? Use simple language to describe its impact. (7)	Analyze	BTL4
8.	Explain the "what" and "how" of machine learning, providing clear definitions and practical applications for each concept. (16)	Evaluate	BTL5
9.	Explain, in simple words, the importance of data quality in machine learning, and outline three common issues that can arise when dealing with poor-quality data. (16)	Evaluate	BTL5
10.	(i) Choose one common application of machine learning and explain why it's important in simple terms. (9)	Create	BTL6

	(ii) Develop one real-life application of machine learning and explain its significance. (7)		
11.	Solve a real-world problem by choosing an application, explaining what type of machine learning is suitable, and describing how it can be applied, all in clear and straightforward terms. (16)	Create	BTL6
12.	Identify the basic steps involved in the design of a machine learning model, and explain why each step is crucial for the model's success in a way that is easy to understand. (16)	Apply	BTL3
13.	Compare the performance for supervised, unsupervised with semi-supervised learning. (16)	Analyze	BTL4
14.	Develop a step-by-step plan for applying machine learning to solve a real-world problem, and explain each step in the process. (16)	Apply	BTL3
15.	Compare and contrast the "what" and "how" of reinforcement learning in simple terms, and provide an example to help clarify the differences. (16)	Analyze	BTL4
16.	Examine the primary differences exists between supervised and unsupervised learning and provide a concise explanation of each. (16)	Analyze	BTL4
17.	Evaluate why having good, clean data is crucial in machine learning. Explain how messy or inaccurate data can cause problems, and give clear examples to illustrate your points. (16)	Evaluate	BTL5

UNIT -II DEEP NETWORKS

Deep Networks – Introduction to Neural Networks, Feed-forward Networks, Deep Feed forward Networks-Learning XOR, Gradient Based learning, Hidden Units, Back propagation and other Differential Algorithms, Regularization for Deep Learning, Optimization for training Deep Models.

PART-A

Q. No.	Questions	Competence	Level
1.	Define neural networks.	Remember	BTL1
2.	List the applications of neural networks.	Remember	BTL1
3.	What is feedforward neural networks?	Remember	BTL1
4.	How can we solve the learning XOR problem?	Remember	BTL1
5.	Infer gradient based learning.	Understand	BTL2
6.	Where hidden units used in deep learning?	Remember	BTL1
7.	List some names of activation function.	Remember	BTL1
8.	What is perceptron?	Remember	BTL1
9.	Define the activation function.	Remember	BTL1
10.	Build the equation of sigmoid function.	Understand	BTL2
11.	Infer Relu Function.	Understand	BTL2
12.	List the applications of Gradient Descent Optimization algorithm.	Remember	BTL1
13.	What is XOR in deep learning?	Remember	BTL1
14.	What is XOR problem in perceptron?	Remember	BTL1
15.	Name the applications of CNN.	Remember	BTL1
16.	Illustrate the concept of gradient descent to explain how deep feed-forward networks learn complex tasks.	Understand	BTL2
17.	Select one key advantage of using hidden units in deep neural networks and briefly describe it.	Understand	BTL2
18.	Summarize the concept of gradient-based learning in the context of neural networks in just a few sentences.	Understand	BTL2

19.	Compare the role of regularization with optimization techniques in training deep neural networks.	Understand	BTL2
20.	Compare and contrast feed-forward neural networks with recurrent neural networks in terms of their architecture and typical use cases.	Understand	BTL2
21.	"In feed-forward neural networks, information flows in one direction, from input to output". Interpret your reasoning.	Understand	BTL2
22.	Choose the regularization technique that helps prevent overfitting in deep learning models and explain its purpose in training.	Understand	BTL2
23.	Demonstrate a design for a neural network for a futuristic space exploration mission, explain how the network architecture to adapt and learn from new environments it encounters during the mission.	Understand	BTL2
24.	List two fundamental components of a neural network.	Remember	BTL1

PART-B

Q. No.	Questions	Competence	Level
1.	Examine the details of the neural networks in deep learning. (16)	Analyze	BTL4
2.	Assess the function of feed forward network with an example. (16)	Evaluate	BTL5
3.	Explain in detail, the back propagation learning method. (16)	Evaluate	BTL5
4.	Identify the role of hidden units in neural networks. (16)	Apply	BTL3
5.	With neat description explain about back propagation algorithms. (16)	Apply	BTL3
6.	Elaborate on the differential evaluation algorithm. (16)	Create	BTL6
7.	Discuss the architecture and training process of deep feed-forward networks, emphasizing their role in capturing complex patterns. (16)	Create	BTL6
8.	Estimate the significance of optimization in neural network. (16)	Evaluate	BTL5
9.	Compare the various types of neural networks with necessary illustration. (16)	Analyze	BTL4
10.	Explain about deep networks. (16)	Evaluate	BTL5
11.	(i) Examine the architecture of neural networks. (9) (ii) Compare the effectiveness of batch normalization and dropout regularization techniques in improving deep neural network performance. (7)	Analyze	BTL4
12.	Evaluate the back-propagation algorithm's significance in training deep feed-forward neural networks and compare it with other differential algorithms. (16)	Evaluate	BTL5
13.	(i) Apply the back-propagation algorithm to train a deep feed-forward network with one hidden layer for the XOR problem and describe thekey steps in the learning process. (9) (ii) Identify the core concept of neural networks for capturing complex patterns, and explain how does it relate to hidden units in deep networks. (7)	Apply	BTL3
14.	Develop a comprehensive explanation of how the back-propagation algorithm is employed to train deep feed-forward networks, emphasizing its key components and its crucial role in optimizing model parameters and enabling deep learning. (16)	Apply	BTL3
15.	Compare the impact of L1 and L2 regularization techniques on deep neural network performance in preventing overfitting. (16)	Analyze	BTL4
16.	Choose and explain a key feature of deep feed-forward networks that distinguishes them from shallow networks. (16)	Apply	BTL3

17.	Determine the significance of regularization and optimization techniques in deep learning, highlighting their impact on model training and generalization. (16)	Evaluate	BTL5

UNIT - III: CONVOLUTIONAL NETWORKS

Convolution operation, Motivation, Pooling, Convolution and Pooling as strong prior, Efficient convolution algorithms, Unsupervised features, Sequence Modeling: Recurrent and Recursive Nets, LSTM Networks, Applications - Computer Vision, Speech Recognition, Natural Language Processing.

PART-A

Q. No.	Questions	Competence	Level
1.	What is convolutional networks?	Remember	BTL1
2.	Difference between traditional and convolutional networks.	Remember	BTL1
3.	Define edge detection in convolution networks.	Remember	BTL1
4.	Define the term pooling.	Remember	BTL1
5.	Illustrate the three stages of Cnn.	Understand	BTL2
6.	Why we using motivation for convolution networks	Remember	BTL1
7.	What are the layers present in convolution networks.	Remember	BTL1
8.	Summarize the unsupervised features.	Remember	BTL1
9.	List out the two convolutional layer in Keras.	Remember	BTL1
10.	Write the definition of Equivariance.	Understand	BTL2
11.	Compare weak and strong priors with example.	Understand	BTL2
12.	Define the term Effect of Zero-padding on network size'.	Remember	BTL1
13.	Why we perform pooling?	Remember	BTL1
14.	What are the features of convolutional neural network?	Remember	BTL1
15.	Summarize the uses of natural language processing.	Remember	BTL1
16.	Which pooling is most preferred in CNN?	Understand	BTL2
17.	List the applications of convolution.	Understand	BTL2

18.	Define computer vision.	Understand	BTL2
19.	What are the LSTM networks used in convolution?	Understand	BTL2
20.	List out the types in sequential modeling.	Understand	BTL2
21.	Difference between speech recognition and NLP.	Understand	BTL2
22.	What are the examples of NLP?	Understand	BTL2
23.	How Neural Net Convolution is Different from CNN?	Understand	BTL2
24.	Is NLP and speech recognition same?	Remember	BTL1

PART-B

Q. No.	Questions	Competence	Level
1.	Draw a diagram for convolution network with explanation.	Analyze	BTL4
2.	Explain the concept of parameter sharing.	Evaluate	BTL5
3.	Write a short notes about overview of convolution networks.	Evaluate	BTL5
4.	Illustrate the types of pooling in details	Apply	BTL3
5.	Briefly explain the classification of convolution networks.	Apply	BTL3
6.	Definition and explanation of convolution with stride in detail.	Create	BTL6
7.	Describe the types linear transforms with diagram.	Create	BTL6
8.	Compare the architecture of convolution and Recurrent architectures.	Evaluate	BTL5
9.	(i) How work with computing similarity for coupling. (ii) Elaborate the four steps of convolution?	Analyze	BTL4
10.	Explain the concept and equation for tiled Convolution Algebraically.	Evaluate	BTL5
11.	Write a short notes about visual fixation in detail.	Analyze	BTL4
12.	(i) Discuss the limitations of convolutional networks with example. (ii) Illustrate the Processing Steps and Training for ConvNets.	Evaluate	BTL5
13.	Write a short note about efficient convolution algorithms.	Apply	BTL3

14.	Discus about the operations in convolution.	Apply	BTL3
15.	(i) Discuss about LSTM Networks with performance steps. (ii) Explain the types of kernel in convolution networks.	Analyze	BTL4
16.	Explain the concept of NLP with examples.	Apply	BTL3
17.	Compare the features of speech recognition and natural language in detail.	Evaluate	BTL5

UNIT -IV OPTIMIZATION AND GENERALIZATION

Optimization in deep learning– Non-convex optimization for deep networks- Stochastic Optimization. Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM -Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning -Computational & Artificial Neuroscience.

PART-A

Q. No.	Questions	Competence	Level
1.	Define optimizer in deep learning	Remember	BTL1
2.	List the name of optimizers used in deep learning.	Remember	BTL1
3.	What is the use of momentum optimizer?	Remember	BTL1
4.	Examine how gradient descent optimizer works?	Remember	BTL1
5.	List the uses nonconvex optimizer?	Remember	BTL1
6.	Describe deep reinforcement learning	Understand	BTL2
7.	List the components that are used in spatial transformer?	Remember	BTL1
8.	Give the uses of grid generator in spatial transformer?	Understand	BTL2
9.	Discuss localization net.	Understand	BTL2
10.	Give the advantages of RNN and draw the architecture of RNN	Understand	BTL2
11.	Describe about reverse mapping in spatial transformer.	Remember	BTL1
12.	List the key elements of deep reinforcement learning.	Remember	BTL1

13.	Predict the uses of sampler in spatial transformer?	Understand	BTL2
14.	What is recurrent neural network?	Remember	BTL1
15.	Describe the application of neuroscience's	Understand	BTL2
16.	Discuss the language models in RNN.	Understand	BTL2
17.	Give the name of filed involved in neuroscience.	Understand	BTL2
18.	Define is RNNLM?	Remember	BTL1
19.	What is word based LSTM?	Understand	BTL2
20.	Draw and label the reinforcement learning cycle.	Remember	BTL1
21.	Give the two core components of deep reinforcement learning	Understand	BTL2
22.	What is character based LSTM?	Remember	BTL1
23.	Differentiate the action and transition function	Understand	BTL2
24.	Give the definition of LSTM?	Understand	BTL2
Q. No.	Questions	**Competence**	**Level**
1.	Analyze the functions of computational neuroscience. (16)	Analyze	BTL4
2.	Explain in detail about deep learning optimizers . (16)	Evaluate	BTL5
3.	Explain in detail about localization net with diagram and calculation. (16)	Evaluate	BTL5
4.	Explain any three stochastic descent optimization techniques. (16)	Apply	BTL3
5.	Show how a high-level overview of how a Spatial Transformer Network (STN) operates within a convolutional neural network (CNN). Describe the potential applications and benefits of using STNs in computer vision tasks. (16)	Apply	BTL3
6.	Choose two stochastic optimization algorithms commonly used in deep learning. Explain how they work and discuss their advantages and disadvantages in optimizing deep neural networks. (16)	Create	BTL6
7.	Analyze about no convex optimizing in deep learning.(16)	Create	BTL6

8.	Explain about spatial transformer network in detail. (16)	Evaluate	BTL5
9.	Explain about stochastic gradient descent. (16)	Analyze	BTL4
10.	Summarize how the RNN is structured (8) What are all the advantages and disadvantages of RNN.(8)	Evaluate	BTL5
11.	Explain RNN language models. (16)	Analyze	BTL4
12.	Explain the operations of Grid and Sampler in spatial Transformer Networks. (16)	Evaluate	BTL5
13.	(i)Illustrate with example the word based LSTM?(8) (ii)Explain about character based LSTM?(8)	Apply	BTL3
14.	Demonstrate in detail about deep reinforcement learning algorithm. (16)	Apply	BTL3
15.	Compare and contrast recurrent neural networks (RNNs) and Long Short-Term Memory (LSTM) networks. (16)	Analyze	BTL4
16.	Examine in detail about agent and environment in reinforcement learning. (16)	Apply	BTL3
17.	Explain the concept of generalization in neural networks. Provide Examples of techniques used to improve generalization, and discuss their impact on model performance. (16)	Evaluate	BTL5

UNIT-V [PART-B]

Introduction to Keras and Tensorflow, Deep Learning for computer vision - convnets, Deep Learning for Text and Sequences, Generative Deep Learning - Text Generation with LSTM, Deep Dream, Neural Style Transfer, Generating images with variational auto encoders, Generative Adversarial Networks(GAN).

Q. No.	Questions	**Competence**	**Level**
1.	Define the primary goal of LSTM in text generation?	Remember	BTL1
2.	List three applications where CNNs outperform traditional methods in computer vision.	Remember	BTL1
3.	What is the primary benefit of using Convolutional Neural Networks (CNNs) in computer vision tasks?	Remember	BTL1
4.	Examine the role of pooling layers in Convolutional Neural Networks (CNNs) for computer vision.	Remember	BTL1
5.	List the types of GAN	Remember	BTL1
6.	Distinguish Keras and TensorFlow based on their primary use cases and mention one advantage of each	Understand	BTL2

7.	Examine how Style Transfer work?	Remember	BTL1
8.	Give the reason why CNNs is preferred over traditional neural networks in computer vision?	Understand	BTL2
9.	Compare and contrast the objectives of Neural Style Transfer and Deep Dream in generative deep learning, highlighting their unique features.	Understand	BTL2
10.	Distinguish architecture of a Convolutional Neural Network (CNN) with a Recurrent Neural Network (RNN) for different types of data.	Understand	BTL2
11.	Examine why Deep Dream is used for artistic image generation?	Remember	BTL1
12.	List the key steps involved in building a text generation model using LSTM.	Remember	BTL1
13.	Compare and contrast the objectives of Neural Style Transfer and Deep Dream in generative deep learning, highlighting their unique features.	Understand	BTL2
14.	In neural style transfer, Examine how can you envision how applying the style of a famous painting to a cityscape photograph might transform the visual experience?	Remember	BTL1
15.	Compare and contrast then RNNs with CNNs in processing sequential data for text and sequences?	Understand	BTL2
16.	Discuss how to adjust the "temperature" parameter in LSTM-based text generation impact the diversity of generated text?	Understand	BTL2
17.	Summarize Why we use a probabilistic approach in VAEs for image generation?	Understand	BTL2
18.	Define Variational Autoencoders (VAEs)	Remember	BTL1
19.	Discuss the concept of Neural Style Transfer and how it can be used to transform images.	Understand	BTL2
20.	Define Generative Adversarial Networks (GANs)	Remember	BTL1
21.	Discuss how convolutional neural networks (convnets) be applied for image classification in computer vision?	Understand	BTL2
22.	What factors should you select for tuning a neural network to improve text generation using LSTM?	Remember	BTL1
23.	How do you choose between LSTM and CNN models for sequence analysis tasks, When working with text data?	Understand	BTL2
24.	Discuss the primary distinctions between LSTMs and GRUs (Gated Recurrent Units) in deep learning for text and sequences.	Understand	BTL2
Q. No.	**Questions**	**Competence**	**Level**
1.	Analyze a deep learning technique and explain its suitability for artistic style transfer between images. (16)	Analyze	BTL4
2.	Explain the fundamental principles behind Convolutional Neural Networks (CNNs) and provide a brief explanation of how they are applied in computer vision tasks. (16)	Evaluate	BTL5

3.	Classify convolutional neural networks (ConvNets) based on their applications in computer vision and Explaint their key architectural components. (16)	Evaluate	BTL5
4.	Explain the significance of Long Short-Term Memory (LSTM) networks in text generation.(16)	Apply	BTL3
5.	Show the architecture and training process of a Bidirectional LSTM for sentiment analysis of text data.(16)	Apply	BTL3
6.	Explain the key differences between Deep Dream, Neural Style ransfer, and Variational Autoencoders (VAEs) in generative deep learning.(16)	Create	BTL6
7.	Analyze the steps involved in performing Neural Style Transfer using deep learning and provide an example of how this technique can be applied to transform a photograph into an artwork (16)	Create	BTL6
8.	Compare the key differences between Variational Autoencoders (VAEs) and Generative Adversarial Networks(GANs) in the context of generative deep learning. (16)	Evaluate	BTL5
9.	Compare Convolutional Neural Networks (ConvNets) and Variational Autoencoders (VAEs) in deep learning for computer vision. (16)	Analyze	BTL4
10.	(i)Summarize the coreprinciple behind Generative Adversarial Networks (GANs) and one practical application. (8) (ii)What are the key components of a Generative Adversarial Network (GAN) and how are they trained? (8)	Evaluate	BTL5
11.	Analyze the role of Convolutional Neural Networks (CNNs) in Computer vision tasks, discussing their advantages and limitations. (16)	Analyze	BTL4
	The LSTM networks significantly improve the handling of sequential data in Deep Learning for Text and Sequences. Evaluate their effectiveness compared to traditional machine learning algorithms. (16)	Evaluate	BTL5
12.	Illustrate the primary purpose of Convolutional Neural Networks (ConvNets) in computer vision. (16)	Apply	BTL3
13.	Demonstrate how LSTMs differ from traditional RNNs in text generation, and what are their advantages? (16)	Apply	BTL3
14.	Compare and contrast Keras and TensorFlow in terms of their roles and advantages in deep learning development. (16) .	Analyze	BTL4
15.	(i)Evaluate the significance of recurrent neural networks (RNNs) in deep learning for text and sequences. Provide examples of real-world applications where RNNs excel.(8) (ii)Choose between LSTM and GRU (Gated Recurrent Unit) for text generation tasks, and explain the factors that influence your choice(8)	Evaluate	BTL5
16.	Explain the key components and training procedure of a Deep Dream algorithm for enhancing images using neural networks.	Evaluate	BTL5
17.	(i)Discuss in detail about how deep learning is applied in Text and Sequences with example.(8) (ii)Discuss the two fundamental algorithms in sequence processing.(8)	Evaluate	BTL5