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DEPARTMENT OF

ARTIFICIAL INTELLEGEENCE & DATA SCIENCE

QUESTION BANK

PROGRAMME	:	B.E. - AI & DS
ACADEMIC YEAR	:	2024-2025
SEMESTER	:	V (ODD)
REGULATION	:	2021
COURSE CODE	:	AD3501
COURSE NAME	:	DEEP LEARNING
COURSE COMPONENT	:	CORE
NAME OF THE COURSE IN-CHARGE	:	Dr. K.G.S. Venkatesan

UNIT I DEEP NETWORKS BASICS

Syllabus:

LINEAR ALGEBRA – Scalars – vectors – Metrics and tensors; probability distribution-Gradient-based optimization- MACHINE LEARNING BASICS : Capacity-over fitting and under fitting-Hyperparameters and validation sets-Estimators-Bias and variance-Stochastic gradient descent- challenges motivating deep learning ,
DEEP NETWORKS : Deep feed forward networks, Regularization - optimization

Assessment Questions for UNIT – I

Bloom's Taxonomy Levels: L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6- Create

Thinking Skills: LOTS–L1&L2, IOTS–L3&L4, HOTS–L5&L6

Sl. No.	Questions	Marks	CO	BL	PI Code
PART - A					
1	Define data augmentation ?	2	CO1	L1	1.4.1
2	What is activation function ?	2	CO1	L1	1.4.1
3	What is scalar ?	2	CO1	L1	1.4.1

4	Define Learning .	2	CO1	L1	1.4.1
5	Define Machine Learning ?	2	CO1	L1	1.4.1
6	Define supervised learning ?	2	CO1	L1	1.4.1
7	What is regression ?	2	CO1	L1	1.4.1
8	What is the curse of dimensionality ?	2	CO1	L1	1.4.1
9	What is multi-task learning ?	2	CO1	L1	1.4.1
10	What is deep learning ?	2	CO1	L1	1.4.1
11	Define ensemble model ?	2	CO1	L1	1.4.1
12	What is back propagation	2	CO1	L1	1.4.1
13	What is use of softmax unit ?	2	CO1	L1	1.4.1
14	Define propagation constant.	2	CO1	L1	1.4.1
15	What is regularization	2	CO1	L1	1.4.1
16	What are dropouts	2	CO1	L1	1.4.1
17	How is convolution different from pooling	2	CO1	L1	2.1.2
18	What is regression analysis used for ?	2	CO1	L1	2.1.2
19	What is semi-supervised learning ?	2	CO1	L1	1.4.1
20	What is active function ?	2	CO1	L1	1.4.1
PART – B					
1	a) What is regularization ? Explain L1 regularization b) Explain different between supervised, unsupervised and reinforcement learning ?	7 6	CO1	L1	1.4.1
2	a) Discuss in detail about Discrete variables and probability Mass functions b) Explain Scalars, vectors , matrices and Tensors	7 6	CO1	L1	1.4.1
3	Explain the continuous variables and probability density functions	13	CO1	L2	1.4.1
4	Discuss Jacobian and Hessian Matrices	13	CO1	L2	1.4.1
5	Difference between supervised , unsupervised and Reinforcement Learning	13	CO1	L2	1.4.1
6	a) Explain in detail about Gradient based optimization	13	CO1	L2	1.4.1
7	Derive Linear Regression Models .	13	CO1	L2	1.4.1

8	Explain Hyperparameters and validation sets	13	CO1	L2	3.4.1
9	Explain semi supervised learning ?				
10	Discuss in detail Boosting ?	13	CO1	L3	1.4.1
PART – C					
1	Explain Deep feed forward networks ?	15	CO1	L3	2.1.2
2	Discuss in detail about XOR Function ?	15	CO1	L3	2.1.2
3	Explain Gradient based learning ?	15	CO1	L3	2.1.2
4	Discuss in detail about cost function ?	15	CO1	L3	2.1.2

UNIT – II CONVOLUTIONAL NEURAL NETWORKS

Syllabus :

Convolution operation-sparse interactions- parameter, sharing – Equivariance -pooling-convolution variants
 strided-triled-Transposed and dilated convolutions : CNN Learning : nonlinearity functions-Loss functions –
 Regularization- optimizers – Gradient computation

Assessment Questions for UNIT – II

Bloom's Taxonomy Levels: L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6- Create

Thinking Skills: LOTS–L1&L2, IOTS–L3&L4, HOTS–L5&L6

Sl. No.	Questions	Marks	CO	BL	PI Code
PartA					
1	Define convolution networks ?	2	CO2	L1	1.4.1
2	Why sparse interactions is beneficial ?	2	CO2	L1	1.4.1
3	What is equivariance representation ?	2	CO2	L1	1.4.1

4	List the types of pooling ?	2	CO2	L1	1.4.1
5	What is a convolution ?	2	CO2	L1	1.4.1
6	What are the main operations in CNN ?	2	CO2	L1	1.4.1
7	Define full convolution	2	CO2	L3	1.4.1
8	What is gradient descent ?	2	CO2	L2	1.4.1
9	What is difference between linear unit and rectified linear unit ?	2	CO2	L3	1.4.1
10	Define sparse interaction ?	2	CO2	L3	1.4.1
11	What is loss functions ?	2	CO2	L3	1.4.1
12	List the component of convolution layers	2	CO2	L3	1.4.1
13	What is the use of parameter sharing in CNN ?	2	CO2	L3	1.4.1
14	Explain padding in CNN ?	2	CO2	L3	1.4.1
15	How many filters must a CNN have ?	2	CO2	L1	1.4.1
16	What is tiled convolution ?	2	CO2	L1	1.4.1
17	Define sparse interaction ?	2	CO2	L2	1.4.1
Part - B					
1	Briefly explain the convolutional Neural Networks	13	CO2	L1	1.4.1
2	Explain the basic architecture of CNN	13	CO2	L2	1.4.1
3	Explain the convolution operation	13	CO2	L2	1.4.1
4	Discuss the parameter sharing in CNN	13	CO2	L2	1.4.1
5	Explain the convolution variants : Tiled	13	C2	L2	1.4.1

6	Describe the Gradient computation	13	CO2	L2	1.4.1
PART - C					
1	Discuss the CNN Learning : Nonlinearity functions	15	CO2	L3	1.4.1
2	Explain loss functions for Regression	15	CO2	L1	1.4.1
3	Explain loss functions for classification	15	CO2	L1	2.1.2
4	Explain for finding the optimal hyper-parameters through Grid search	15	CO2	L1	3.4.1

UNIT – III RUCURRENT NEURAL NETWORKS

Syllabus:

Unfolding Graphs-RNN design patterns : Acceptor – encoder – Transducer : Gradient computation – sequence modeling conditioned on contexts - bidirectional RNN – Sequence to sequence RNN – Deep Recurrent networks – Recursive neural networks – Long term dependences : Leaky units : Skip connection and dropouts : Gated Architecture - LSTM

Assessment Questions for UNIT – III

Bloom's Taxonomy Levels: L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6- Create

Thinking Skills: LOTS–L1&L2, IOTS–L3&L4, HOTS–L5&L6

Sl. No.	Questions	Marks	CO	BL	PICode
PART – A					
1	What is recurrent neural networks ?	2	CO3	L1	1.4.1
2	Why RNN is called as recurrent ?	2	CO3	L1	1.4.1

3	List the advantages of unfolding process	2	CO3	L1	1.4.1
4	How can you overcome the challenges of vanishing and exploding gradient ?	2	CO3	L1	1.4.1
5	What is long short term memory ?	2	CO3	L1	1.4.1
6	List the components of LSTM network ?	2	CO3	L2	1.4.1
PART – B					
1	Explain the basics of Recurrent Neural Networks	13	CO3	L1	1.4.1
2	Briefly explain the types of RNN	13	CO3	L1	1.4.1
3	Discuss the Acceptor – Encoder - Transducer ?	13	CO3	L1	1.4.1
4	Explain the Gradient Computation	13	CO3	L2	1.4.1
5	Explain with neat diagram sequence modeling conditioned on contexts	13	CO3	L2	1.4.1
6	Discuss adding skip connections through time in RNN ?	13	CO3	L2	1.4.1
7	Explain leaky units and a spectrum of different time scales	13	CO3	L2	1.4.1
8	Discuss the removing connections in RNN ?	13	CO3	L2	1.4.1
PART – C					
1	Explain briefly the bidirectional RNN ?	15	CO3	L3	2.1.2
2	Discuss the sequence to sequence RNN	15	CO3	L3	2.1.2
3	Explain deep recurrent networks	15	CO3	L3	1.4.1
4	Discuss Long term dependencies in recursive neural networks	15	CO3	L3	1.4.1

UNIT – IV**MODEL EVALUATION****Syllabus:**

Performance metrics – Baseline models – Hyperparameters : Manual Hyperparameters – Automatic Hyperparameter - Grid search – Random search - Debugging strategies

Assessment Questions for UNIT – IV

Bloom’s Taxonomy Levels: L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6- Create

Thinking Skills: LOTS–L1&L2, IOTS–L3&L4, HOTS–L5&L6

Sl. No.	Questions	Marks	CO	BL	PICode
PART - A					
1	What is Grid search ?	2	CO4	L1	1.4.1
2	Define random search	2	CO4	L1	1.4.1
3	What is main reason why random search finds good solutions faster than grid search ?	2	CO4	L1	1.4.1
4	When manual hyperparameter works well ?	2	CO4	L1	1.4.1
5	Define precision ?	2	CO4	L1	1.4.1
6	How capacity is controlled in manual hyperparameters ?	2	CO4	L1	1.4.1
7	What are the reasons for training data can be limited ?				
8	Explain learning rate ?	2	CO4	L1	1.4.1
PART - B					
1	Explain the performance metrics in model evaluation	13	CO4	L4	1.4.1

2	Explain baseline models	13	CO4	L4	1.4.1 1.4.1
3	Explain the hyperparameters tuning process of search methods?	13	CO4	L4	1.4.1
4	Discuss manual hyperparameter & automatic hyperparameters	13	CO4	L4	1.4.1
PART - C					
1	Explain Grid search & random search ?	15	CO4	L3	1.4.1
2	Elaborate the points in Debugging strategies in hyperparameters	15	CO4	L3	1.4.1
3	Explain the reasons for training data can be limited ?	15	CO4	L4	1.4.1

UNIT - V**AUTOENCODERS AND GENERATIVE MODELS****Syllabus:**

Autoencoders : Undercomplete autoencoders – Regularized autoencoders - Stochastic encoders and decoders –
 Learning with autoencoders : Deep generative models : Variational autoencoders – Generative adversarial
 networks

Assessment Questions for UNIT – V

Bloom's Taxonomy Levels: L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6- Create

Thinking Skills: LOTS–L1&L2, IOTS–L3&L4, HOTS–L5&L6

Sl. No.	Questions	Marks	CO	BL	PICode
PART – A					
1	What is an autoencoder ?	2	CO5	L1	1.4.1
2	What is the aim of autoencoder ?	2	CO5	L1	1.4.1
3	What is regularization in autoencoder ?	2	CO5	L1	1.4.1
4	Is autoencoder supervised or unsupervised ?	2	CO5	L1	1.4.1
5	Why do we use autoencoder ?	2	CO5	L1	1.4.1
6	What is a deep belief network used for ?	2	CO5	L1	1.4.1
7	Is the deep belief network supervised or unsupervised ?	2	CO5	L1	1.4.1
8	Explain key characteristics of the boltzman machine	2	CO5	L1	1.4.1
9	What is Boltzman machine	2	CO5	L1	1.4.1
10	Define generative adversarial networks ?	2	CO5	L1	1.4.1
11	What are the properties of autoencoder ?	2	CO5	L1	1.4.1
12	What are the types of autoencoders ?	2	CO5	L1	1.4.1
13	What are the applications of autoencoders ?	2	CO5	L1	1.4.1
14	Define regularized autoencoder ?				
PART – B					
1	Explain with a neat diagram the architecture of autoencoder ?	13	CO5	L2	1.4.1
2	Explain the undercomplete autoencoders ?	13	CO5	L1	1.4.1
3	Explain sparse autoencoders ?	13	CO5	L1	1.4.1
4	Explain deep belief network and its architecture ?	13	CO5	L2	1.4.1
5	With a neat diagram explain the generative adversarial networks ?	13	CO5	L2	1.4.1
6	Discuss the types of generative adversarial networks ?	13	CO5	L2	1.4.1

7	Explain the variational autoencoders ?	13	CO5	L1	1.4.1
PART – C					
1	Explain the architecture of denoising autoencoders ?	15	CO5	L3	1.4.1
2	Discuss the stochastic encoders and decoders ?	15	CO5	L4	1.4.1
3	Discuss the deep generative models in detail ?	15	CO5	L3	1.4.1
4	Explain Boltzman machine	15	CO5	L3	1.4.1
5	Explain the undercomplete autoencoders ?	15	CO5	L3	1.4.1
6	Explain sparse autoencoders ?	15	CO5	L3	1.4.1
7	Explain deep belief network and its architecture ?	15	CO5	L3	1.4.1

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