



Roll No:

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**BTECH**  
**(SEM VII) THEORY EXAMINATION 2025-26**  
**DEEP LEARNING**

TIME: 3 HRS

M.MARKS: 70

**Note:** Attempt all Sections. In case of any missing data; choose suitably.

**SECTION A**

**1. Attempt all questions in brief.**

**02 x 7 = 14**

Q no.	Question	CO	Level
a.	Define model in machine learning.	1	K1
b.	What is the difference between linear regression and logistic regression?	1	K1
c.	Discuss convolutional neural network (CNN)?	2	K2
d.	Name any two activation functions used in deep networks.	2	K1
e.	Describe the role of regularization during optimization.	3	K2
f.	Discuss the generalization in machine learning.	4	K2
g.	Name two applications of Word2Vec.	2	K1

**SECTION B**

**2. Attempt any three of the following:**

**07 x 3 = 21**

a.	Derive the mathematical expression for the output of a single hidden-layer neural network. Explain the role of activation functions.	1	K2
b.	Describe how probabilistic models help reduce overfitting. Explain with examples.	2	K2
c.	Compare PCA and LDA. Explain how LDA maximizes class separability using scatter matrices.	3	K3
d.	Explain the optimization problem in deep learning. Why are deep learning loss surfaces highly non-convex? Discuss with suitable diagrams.	4	K4
e.	Describe the ImageNet dataset in detail. Explain its scale, structure, challenges, and importance in the evolution of deep learning.		K3

**SECTION C**

**3. Attempt any one part of the following:**

**07 x 1 = 07**

a.	Explain the backpropagation algorithm in detail. Derive the weight update rule for a multilayer perceptron.	1	K3
b.	Discuss the significance of activation functions in the Universal Approximation Theorem.	1	K1

**4. Attempt any one part of the following:**

**07 x 1 = 07**

a.	Compare batch normalization with layer normalization and instance normalization.	2	K2
b.	Explain the concept of semi-supervised learning with examples. Compare it with supervised and unsupervised learning.	2	K3

**5. Attempt any one part of the following:**

**07 x 1 = 07**

a.	Explain convolution operation mathematically, including stride, padding, and feature maps.	3	K2
b.	Compare AlexNet, VGG, Inception, and ResNet in terms of depth, performance, and computation.	3	



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**6. Attempt any *one* part of the following:**

**07 x 1 = 07**

a.	Compare RNN, LSTM, and GRU networks. Highlight their advantages and use-cases.	4	K2
b.	What is deep reinforcement learning? Explain its architecture involving policy networks, value networks, and environment interaction.	4	K3

**7. Attempt any *one* part of the following:**

**07 x 1 = 07**

a.	Explain how WaveNet differs from RNNs for sequential audio generation.	5	K4
b.	Explain the Word2Vec model. Discuss CBOW and Skip-Gram architectures with diagrams.	5	K3

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