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CBCS SCHEME

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BAI701

Seventh Semester B.E./B.Tech. Degree Examination, June/July 2026
Deep learning and Reinforcement Learning

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define Deep Learning. List the key differences between shallow learning and Deep learning architectures with suitable examples.	10	L1	CO1
	b.	What is Optimization in Neural Network? explain briefly how learning in Neural networks is related to optimization.	10	L2	CO1
		OR			
Q.2	a.	Define a Computational Graph in Deep learning. List the main steps involved in Forward Propagation during model training.	10	L1	CO1
	b.	Discuss the common challenges faced while training Deep leaning models such as Vanishing Gradients, over fitting and large data requirement. Explain one solution for each challenge.	10	L2	CO1
		Module – 2			
Q.3	a.	Define Supervised Deep Learning. Explain the architecture of a Convolution Neural Network (CNN) with a neat diagram.	10	L2	CO1
	b.	Compare CNNs and fully connected neural networks in terms of parameters sharing locality and computational efficiency.	10	L3	CO1
		OR			
Q.4	a.	Discuss the evolution of CNN architecture from LeNet – 5 to AlexNet. And ResNet.	10	L2	CO1
	b.	Explain the mathematical operation of 2D convolution. Discuss its importance in features extraction.	10	L3	CO1

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		Module – 3			
Q.5	**a.**	Explain the training process of Convolution Neural Networks (CNN) using gradient descent.	**10**	**L2**	**CO2**
	b.	Discus optimization algorithm used in deep learning such as SGD, RMS prop Adam and Momentum.	**10**	**L3**	**CO2**
		OR			
Q.6	**a.**	Explain the architecture and working of LeNet - 5, compare it with AlexNet in terms of depth, fillet design and performance.	**10**	**L2**	**CO2**
	b.	Describe challenges in training deep networks and explain methods like batch normalization dropout and learning rate scheduling.	**10**	**L2**	**CO2**
		Module – 4			
Q.7	**a.**	Explain the architecture of Recurrent Neural Network (RNN) and the hidden state update equation.	**10**	**L2**	**CO3**
	b.	Explain the unfolding of a computational graph and its role in learning temporal dependences.	**10**	**L2**	**CO3**
		OR			
Q.8	**a.**	Explain the internal architecture of Long-Short Term Memory (LSTM) network with gating mechanism.	**10**	**L2**	**CO3**
	b.	Compare RNN, LSTM, GRU and Bidirectional RNN's in terms of memory management gradient behaviour and application domains.	**10**	**L2**	**CO3**
		Module – 5			
Q.9	**a.**	Explain the basic frame work of reinforcement learning. Describe the agent environment interaction with neat diagram.	**10**	**L2**	**CO3**
	b.	Explain the action selection problem in reinforcement learning and derive the update rule of E-greedy and UCB algorithms.	**10**	**L2**	**CO3**
		OR			
Q.10	**a.**	Illustrate the architecture of a Deep –Q-Network (DQN). Explain the role of experience replay and target networks.	**10**	**L2**	**CO3**
	b.	Design a Deep Reinforcement Learning System for robotics or autonomous navigation. Justify your choice of network architecture and reward function.	**10**	**L3**	**CO3**

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