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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 learning 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

Module – 3					
Q.5	a.	Explain the training process of Convolution Neural Networks (CNN) using gradient descent.	10	L2	CO2
	b.	Discuss 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, filter 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