CBCS SCHEME

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BAI701

ACHARYA INSTITUTE OF TECHNOLOGY BANGALORE MCA Library Date .....

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.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.	What is Deep Learning? Write a program to demonstrate the working of a deep neural network for classification task.	07	L1	CO1
	b.	Explain the prominent challenges involved in optimization during the training deep neural networks.	07	L2	CO1
	c.	Explain with an example how maximum likelihood estimation decomposes into a sum over training examples. List the key factors that influence the choice of mini batch size in deep learning.	06	L2	CO1
		OR			
Q.2	a.	Differentiate between conventional Machine learning and Deep Learning approaches in terms of feature extraction and representation learning. Illustrate your answer with a suitable diagram.? List the challenges associated with deep learning.	10	L2	CO1
	b.	Define surrogate Loss function and early stopping. What are the key factors that influence the choice of minibatch size in deep learning?	10	L1	CO1
		Module – 2			
Q.3	a.	What is convolution layer? Explain the convolution neural network layers in detail.	10	L1	CO1
	b.	Explain the activation function used in Artificial Neural Networks: i) RLU (Rectified Linear Unit) ii) Logistic / Sigmoid Function iii) Tanh Function. iv) Softmax Function	10	L2	CO1
		OR			
Q.4	a.	With the help of an example, explain the convolution Operation. List the applications of Deep Learning.	10	L2	CO2
	b.	List and explain the evolution of Convolution Neural Network.	10	L2	CO2
		Module – 3			
Q.5	a.	Outline the CNN architecture in detail including its mathematical operations.	10	L2	CO2
	b.	Explain the working of Alex Net, Highlighting its key layers and features, with a suitable architecture diagram. Design and implement a Convolutional Neural Network for classification of image data set.	10	L2	CO2

		OR			
Q.6	a.	Illustrate the feature map transformations in LeNet – 5 for an input image of size 32 × 32. Develop and implement a deep learning network for forecasting time series data.	10	L2,3	CO2
	b.	List and explain the Gradient Descent Variants. What are the challenges in Training Deep Networks?	10	L3	CO2
		Module – 4			
Q.7	a.	How does unfolding a Recurrent Neural Network (RNN) represent recurrence as a computational graph? State any two advantages of unfolding.	10	L1	CO3
	b.	Explain Gated Recurrent Neural Networks (RNNs) with reference of LSTM and GRU. Describe their purpose and working.	10	L2	CO3
		OR			
Q.8	a.	List and explain the three parameters transformations in a RNN. What roles do skip connections play in deep RNNs?	10	L1	CO3
	b.	Explain the architecture and working of Bidirectional Recurrent Neural Networks (BRNN). How do they address the limitations of causal RNNs? List the applications in which they are most effective.	10	L2	CO3
		Module – 5			
Q.9	a.	Explain with an example, how Reinforcement Learning uses reward – driven trail and error in two environments, such as video games and self-driving cars.	10	L2	CO3
	b.	Compare traditional table – based Reinforcement Learning and Deep Reinforcement Learning using examples of Tic – Tac – Toe and chess.	10	L2	CO3
		OR			
Q.10	a.	Explain how a Mouse learns to find cheese in maze through interaction with its environment using the Reinforcement Learning framework?	10	L2	CO3
	b.	Explain how Reinforcement Learning was applied in Facebook's negotiation chatbot. How did self – play and reward – based learning improve negotiation behavior?	10	L1	CO3

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