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PRN No.	

PAPER CODE	U314-251 (ESE)

(AY:2024-25) December 2024 (ENDSEM) EXAM

TY (SEMESTER - I)

COURSE NAME: DEEP LEARNING FOR COMPUTER VISION **BRANCH: COMPUTER SCIENCE & ENGG (AIML)** **COURSE CODE: CMUA3120**

(T.Y PATTERN 2020)

Time: [1Hr 30 Min] **[Max. Marks: 40]**

Instructions to candidates:

1) **Figures to the right indicate full marks. Use of scientific calculator is allowed**
2) **Use suitable data wherever required**
3) **All questions are compulsory. Solve any two sub question each from Questions 1 and 2**
4) **Solve any one sub question (2 marks) from Questions 3 ,4 ,5 and 6 and sub question of 4 marks is compulsory from questions 3,4,5,and 6**

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) Suppose your model is overfitting the training data during the gradient descent process. How would you address this overfitting issue?".	[4]	1	3
	b) Demonstrate the role of dataset augmentation in improving the generalization ability of a neural network by applying it to a deep learning model for image classification	[4]	1	3
	c) Demonstrate the forward and backpropagation processes in a simple neural network by calculating weight updates for a single layer perceptron using the sigmoid activation function.	[4]	1	3
Q2	a) In CNNs, how would you apply max pooling to reduce the spatial dimensions of feature maps? Explain the benefits of pooling layers and how they affect the overall performance of the CNN.	[4]	2	3
	b) How would you apply a CNN to perform multi-class image classification? Explain the role of the softmax activation function in the final layer and how it transforms network outputs into class probabilities."	[4]	2	3
	c) An input image has been converted into a matrix of size 12 X 12 along with a filter of size 3 X 3 with a Stride of 1. Determine the size of the convoluted matrix and elaborate architecture of the CNN	[4]	2	3

Q3	a) "GRU is faster as compared to LSTM", justify this statement.	[2]	3	2
	OR			
	b) "RNNs work better with text data". Give justification	[2]	3	2
	c) When training an RNN on long sequences, how would you apply techniques like LSTM or GRU to address the vanishing gradient problem? Provide a step-by-step process for implementation	[4]	3	3
Q4	a) How do transformers differ from recurrent neural networks (RNNs) in processing sequential data?	[2]	4	2
	OR			
	b) What are some common applications of transformer models?	[2]	4	2
	c) How would you use a denoising autoencoder to remove noise from corrupted images. Explain the process of training the autoencoder with noisy data and how it reconstructs clean images	[4]	4	3
Q.5	a) What is the purpose of the generator and discriminator in a GAN? How do these two networks work together during training	[2]	5	2
	OR			
	b) What are some real-world applications of GANs?	[2]	5	2
	c) How would you apply a GAN to generate images from textual descriptions (e.g., generating a picture of a "red apple on a table")? Explain the architecture of the GAN and how the generator and discriminator work with both text and image data.	[4]	5	3
Q.6	a) What is the basic framework of reinforcement learning? Describe the interaction between the agent, environment, actions, and rewards.	[2]	6	2
	OR			
	b) What are Deep Q-Recurrent Networks (DQRNs), and why are they used in environments where the agent has partial observability?	[2]	6	2
	c) How would you apply reinforcement learning to control a robotic arm in a pick-and-place task? Describe how the reward function would be structured and how the robot learns through trial and error.	[4]	6	3

Note: [BT Level – 1. Remember 2. Understand 3. Apply 4. Analyze 5. Evaluate 6. Create]