PRN No.	

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PAPER CODE	U314-242_(ESE)

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

TY (SEMESTER - I)

COURSE NAME: DEEP LEARNING **Branch: CSE-AI** **COURSE CODE: CAUA31202**

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) Illustrate the role of sigmoid and tanh activation functions in a neural network's hidden layers.	[4]	CO1	Understand
	b) Describe the vanishing gradient problem in neural networks.	[4]	CO1	Understand
	c) Compare momentum based gradient descent with stochastic gradient descent with their advantages and disadvantages.	[4]	CO1	Understand
Q2	a) Imagine you are working on an automated retail checkout system that uses cameras to detect items in a shopping cart and automatically calculate the total bill. Apply the YOLO object detection algorithm to this task. Explain the steps involved in detecting multiple items in real-time, including data preparation and model implementation.	[4]	CO2	Apply
	b) Imagine you are developing a system to recognize handwritten mathematical equations for an educational tool. Describe how you would use a CNN architecture for recognizing various handwritten symbols. Discuss the design of the model and how you would assess its performance on this dataset.	[4]	CO2	Apply
	c) A research team has a dataset of chest X-ray images and wants to classify them as normal or indicative of pneumonia. Since training a deep CNN from scratch is not feasible, apply transfer learning using a pretrained model like InceptionV3 or MobileNet. Explain the steps you would take to adapt and fine-tune the model for this specific medical classification task.	[4]	CO2	Apply

Q3	a) Describe how the architecture of an encoder-decoder system can be adapted for tasks such as machine translation or text summarization. OR b) Describe the role of output gate in LSTM networks and how it affects the final output generated from the hidden state. c) A weather forecasting agency wants to predict daily temperatures based on historical weather data and seasonal trends. Design an RNN model to perform this task, detailing the architecture and features to consider for effective predictions.	[2] [2] [4]	CO3 CO3 CO3	Understand Understand Apply
Q4	a) Discuss the benefits of using self-attention in Transformers over traditional sequence models. OR b) Illustrate the application of autoencoders in natural language processing (NLP) for tasks such as text representation or sentiment analysis. c) You are creating a chatbot that generates human-like responses. Explain how multi-head attention can be utilized in the underlying Transformer model to enhance the quality of generated dialogues.	[2] [2] [4]	CO4 CO4 CO4	Understand Understand Apply
Q.5	a) Explain the process of training the generator network in a GAN and how it adapts based on feedback from the discriminator. OR b) Summarize the function of the discriminator network in a GAN and how it affects the training process. c) A video game developer wants to use GANs to create realistic character models based on existing character designs. Discuss how you would implement a GAN-based approach for this task, including the necessary steps for data preparation and training.	[2] [2] [4]	CO5 CO5 CO5	Understand Understand Apply
Q.6	a) Describe the role of rewards in reinforcement learning and how they differ from labels used in supervised learning. OR b) Illustrate the components of a Markov Decision Process and discuss how each component contributes to the decision-making process in reinforcement learning. c) A customer service department wants to improve the conversational abilities of their chatbot using deep learning techniques. Propose a solution for enhancing the chatbot's understanding and response generation. Describe the deep learning models you would use, how you would train them, and the evaluation metrics for measuring success.	[2] [2] [4]	CO6 CO6 CO6	Understand Understand Apply