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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2026

B.Tech-III Semester (ECE/ECS)

COURSE CODE (CREDITS): 25B1WEC432 (3)

MAX. MARKS: 25

COURSE NAME: INTRODUCTION TO NEURAL NETWORKS

COURSE INSTRUCTOR: Dr. Nishant Jain

MAX. TIME: 1.5

Hour

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

| Q.No | Question | CO | Marks |
|------|---|-----|-------|
| Q1 | Modalities such as Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) possess distinct characteristics concerning both intensity and spatial resolution. How does balancing these two aspects influence the reliability and accuracy of medical diagnoses? | CO3 | 3 |
| Q2 | Contrast the representation methods of RGB, grayscale, and binary images by discussing the number of channels involved, and common applications in computer vision. Furthermore, analyze how these differences affect the architecture and complexity of convolutional neural networks designed for image analysis. | CO3 | 3 |
| Q3 | Why are multilayer perceptrons (MLPs) considered unsuitable for processing visual data? How do convolutional neural networks (CNNs) overcome these challenges? | CO3 | 3 |
| Q4 | Explain how Data augmentation methods enhance the CNN model's ability to generalize to unseen data and why they are vital for improving performance. | CO3 | 3 |
| Q5 | Draw and explain the main building blocks of a CNN. Discuss how each component contributes to feature extraction, reduces data dimensionality, and supports the learning process within the network. | CO3 | 3 |

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| Q6 | Consider a convolutional layer with a 3×3 filter, stride of 1, and padding set to 'same' applied to an input image of size 64×64×3 with 32 filters. Calculate the total number of trainable parameters in this layer, including biases, and determine the size of the resulting output feature map. Clarify each step involved in your calculation. | CO3 | 2 |
| Q7 | Compare Max Pooling and Average Pooling. Explain how these pooling reduces the output dimensions. | CO3 | 2 |
| Q8 | Outline the overall structure of the AlexNet architecture, highlighting its key layers and their specific functions within the network. | CO3 | 3 |
| Q9 | What are the main advantages of applying transfer learning, especially in scenarios with limited data? How does transfer learning typically outperform training a model from scratch regarding training duration, data requirements, computational demands, and accuracy? | CO3 | 3 |