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**Printed Page:-4** **Subject Code:- ACSE0701/ACSEH0701**

**Roll. No:**

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**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA**
**(An Autonomous Institute Affiliated to AKTU, Lucknow)**
**B.Tech**
**SEM: VII - THEORY EXAMINATION (2025 - 2026)**
**Subject: Computer Vision**

**Time: 3 Hours** **Max. Marks: 100**

**General Instructions:**

**IMP:** *Verify that you have received the question paper with the correct course, code, branch etc.*

***1.*** *This Question paper comprises of* ***three Sections -A, B, & C.*** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

***2.*** *Maximum marks for each question are indicated on right -hand side of each question.*

***3.*** *Illustrate your answers with neat sketches wherever necessary.*

***4.*** *Assume suitable data if necessary.*

***5.*** *Preferably, write the answers in sequential order.*

***6.*** *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*



## SECTION-A 20

1. Attempt all parts:-

1-a. A common task in computer vision is_____ (CO1,K1) 1

(a) Speech recognition
(b) Image classification
(c) Sorting algorithms
(d) Database management

1-b. The primary goal of image segmentation in computer vision is _____(CO1, K1) 1

(a) Recognizing objects in an image
(b) Dividing an image into regions with similar properties
(c) Compressing image data
(d) Enhancing image resolution

1-c. In transfer learning, what is the purpose of the "fine-tuning" process. (CO2,K1) 1

(a) Rewriting the entire model architecture
(b) Adapting the pre-trained model to a new task
(c) Eliminating all previous knowledge from the model
(d) Reducing the number of parameters in the model

1-d. Mention technique is commonly used to minimize false positives in moving object detection.(CO2,K1) 1

(a) Background modeling
(b) Adaptive learning
(c) Data association
(d) Model pruning

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1-e. State the purpose of pixel transformations in image processing.(CO3, K1) 1

(a) To change the aspect ratio of an image
(b) To resize the image
(c) To enhance or modify pixel values
(d) To add noise to the image

1-f. Geometric operations in image processing typically involve transformations such as:(CO3,K2) 1

(a) Scaling, rotation, and translation
(b) Histogram equalization
(c) Median filtering
(d) Edge detection

1-g. State type of neural network is commonly used for instance recognition tasks (CO4,K2) 1

(a) Recurrent Neural Network (RNN)
(b) Convolutional Neural Network (CNN)
(c) Long Short-Term Memory (LSTM)
(d) Radial Basis Function (RBF) Network

1-h. State the purpose of data augmentation in training object recognition models (CO4,K2) 1

(a) To reduce the size of the training dataset
(b) To improve model performance by artificially increasing the diversity of training data
(c) To randomly shuffle the training data
(d) To remove noise from the training dataset

1-i. Mention the following filter's responses is based on the pixels ranking (CO5,K2). 1

(a) Sharpening filters
(b) Nonlinear smoothing filters
(c) Geometric mean filter
(d) Linear smoothing filters

1-j. In GANs, what is the role of the latent vector (CO5,K2). 1

(a) To classify data
(b) To encode features of the data
(c) To create patterns
(d) To perform adversarial training

2. Attempt all parts:-

2.a. Describe the distinctions between a single-layer perceptron (SLP) and a multi-layer perceptron (MLP). (CO1,K2) 2

2.b. Show examples of images where max pooling and average pooling have different outcomes.(CO2,K2) 2

2.c. Briefly describe the primary goal of the geometric operation used when a website automatically resizes a large photograph to fit a smaller, fixed-size display window..(CO3, K2) 2

| | | |
|---|---|---|
| 2.d. | Illustrate the primary algorithm behind face recognition systems (CO4,K3) | 2 |
| 2.e. | Brifly write down role of the BigGAN architecture (CO5,K2). | 2 |

**SECTION-B** 30

3. Attempt all parts:-

3.a. Answer any one of the following:-

| | | |
|---|---|---|
| 3.a.(i) | Discuss computer vision algorithms being applied in healthcare.(CO1,K2) | 6 |
| 3.a.(ii) | Can you provide insights into the advancements in real-time image classification systems (CO1,K2) | 6 |

3.b. Answer any one of the following:-

| | | |
|---|---|---|
| 3.b.(i) | Explain the difference in methodology between how neural network weights are learned and how neural network hyperparameters are optimized. (CO2,K2) | 6 |
| 3.b.(ii) | Describe the sequential steps a Convolutional Neural Network (CNN) undertakes to transform an input image into a classification prediction. (CO2,K2) | 6 |

3.c. Answer any one of the following:-

| | | |
|---|---|---|
| 3.c.(i) | How does a Fully Convolutional Network (FCN) architecture work, and what is its role in semantic segmentation.(CO3, K2) | 6 |
| 3.c.(ii) | Explain Convolutional Neural Networks (CNNs) contribute to object detection and image segmentation in computer vision applications(CO3, K2) | 6 |

3.d. Answer any one of the following:-

| | | |
|---|---|---|
| 3.d.(i) | What is the main challenge in the ImageNet dataset that led to development of advanced deep learning models. (CO4,K1) | 6 |
| 3.d.(ii) | Explain digital watermarking, and how is it used to protect digital content (CO4,K2) | 6 |

3.e. Answer any one of the following:-

| | | |
|---|---|---|
| 3.e.(i) | Explain the primary architectural distinctions between ZFNet, AlexNet, and VGGNet. (CO5,K2). | 6 |
| 3.e.(ii) | Which technique can help stabilize GAN training by updating the generator more frequently than the discriminator. (CO5,K2). | 6 |

**SECTION-C** 50

4. Answer any one of the following:-

| | | |
|---|---|---|
| 4-a. | Differentiate between a convolutional layer and an inception module in a Google net network architecture. (CO1, K2) | 10 |
| 4-b. | Explain filtering, stride and padding in Convolutional Neural Network (CO1,K2) | 10 |

5. Answer any one of the following:-

| | | |
|---|---|---|
| 5-a. | In what domains or applications has LeNet-5 demonstrated success, and why is it well-suited for these tasks.(CO2,K3) | 10 |
| 5-b. | Illustrate the comparative advantages and disadvantages of Convolutional Neural Networks (CNNs) over generic Deep Neural Networks (DNNs).(CO2,K3) | 10 |

6. Answer any one of the following:-

| | | |
|---|---|---|
| 6-a. | Describe the concept of Region-based Convolutional Neural Networks (R-CNNs) and their role in object detection.(CO3, K2) | 10 |

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|---|---|---|
| 6-b. | Explain the concept of non-linear filtering in image processing and its role in noise reduction and feature enhancement with example.(CO3,K2) | 10 |
| 7. Answer any one of the following:- | | |
| 7-a. | Illustrate briefly some real-world applications of object detection, and how do they impact our daily lives.(CO4, K2) | 10 |
| 7-b. | Explain the challenges and techniques involved in face recognition (CO4,K2) | 10 |
| 8. Answer any one of the following:- | | |
| 8-a. | Explain mode collapse in a GAN that is being trained to generate images of diverse pets (dogs, cats, birds, fish) to a colleague using a real-life analogy.(CO5, K2) | 10 |
| 8-b. | Describe the architecture and components of a typical GAN, including the generator and discriminator networks. (CO5,K2). | 10 |