**SRM Institute of Science and Technology**
**College of Engineering and Technology**
**School of Computing**

SET - B

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu

**Academic Year: 2023-24 (Odd)**

Test: CLA-T1                                         Date: 09-08-2023
Course Code & Title: 18AIE332T - Image and Video Processing          Duration: 1 Hour
Year & Sem: III Year / V Sem                         Max. Marks: 25

| Part - A (5 x 1 = 5 Marks) | | | | | | |
|---|---|---|---|---|---|---|
| Q. No | Question | Marks | BL | CO | PO | PI Code |
| 1 | An image processing system captures an image with dimensions of 640 pixels width and 480 pixels height. Predict the total number of pixels in this image? <br> a) 240 <br> b) 1040 <br> c) 640 <br> **d) 307200** | 1 | L2 | 1 | 1 | 2.6.3 |
| 2 | A digital image is being processed using a logarithmic transformation to enhance its contrast. If the input intensity is 150, State the transformed intensity value (rounded to the nearest integer)? <br> a) 75 <br> **b) 100** <br> c) 150 <br> d) 200 | 1 | L1 | 1 | 1 | 1.4.1 |
| 3 | An RGB image is represented using 8 bits per channel. Select the total number of possible colors in this image? <br> a) 16 million <br> **b) 256 million** <br> c) 16 billion <br> d) 256 billion | 1 | L2 | 1 | 1 | 1.4.1 |
| 4 | A grayscale image is represented using 8 bits per pixel. Name the total number of possible intensity levels in this image? <br> a) 16 <br> b) 32 <br> c) 64 <br> **d) 256** | 1 | L1 | 1 | 2 | 1.4.3 |
| 5 | An image processing system is applying a piecewise linear transformation to enhance the contrast of a grayscale image. The transformation has two segments: [0, 50] is mapped to [0, 100], and [51, 255] is mapped to [101, 255]. Predict the intensity value after the transformation for an input pixel with intensity 80? <br> a) 30 <br> b) 80 <br> **c) 130** <br> d) 180 | 1 | L2 | 1 | 1 | 1.6.1 |

**SRM Institute of Science and Technology**

**College of Engineering and Technology**

**School of Computing**

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu

**Academic Year: 2023-24 (Odd)**

SET - B

Test: CLA-T1                                                      Date: 09-08-2023
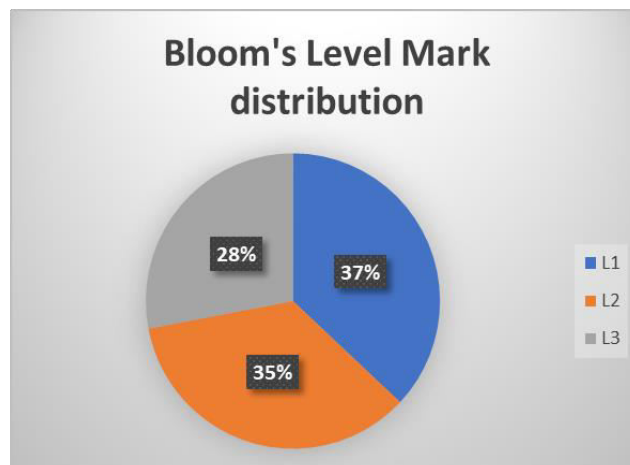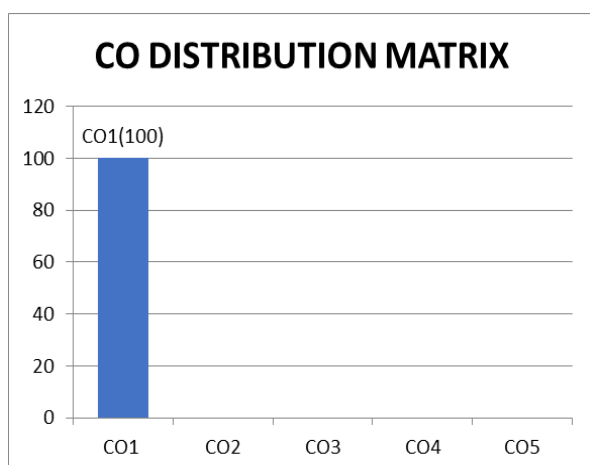Course Code & Title: 18AIE332T - Image and Video Processing        Duration: 1 Hour
Year & Sem: III Year / V Sem                                       Max. Marks: 25

Part – B
(2 x 10 = 20 Marks)
Instructions: Answer All questions

| Q. No | Question | Marks | BL | CO | PO | PI Code |
|---|---|---|---|---|---|---|
| 6 | An image processing system is being developed for autonomous vehicles to analyze real-time road conditions. Explain the components of the image processing system and how they work together to aid in safe driving. | 10 | L2 | 1 | 1 | 1.4.3 |
| 7 | A computer vision researcher is working on an image processing algorithm for facial recognition. The algorithm uses the Discrete Cosine Transform (DCT) to convert image data into a frequency representation. Illustrate how the DCT works and why it is commonly used in image compression and facial recognition applications. | 10 | L3 | 1 | 1 | 1.6.2 |

**Course Outcome (CO) and Bloom's level (BL) Coverage in Questions**





[NOTE:    THE ABOVE **SAMPLE** CO AND BL FOR YOUR REFERENCE] PLEASE PREPARE LIKE THIS

**SRM Institute of Science and Technology**
**College of Engineering and Technology**
**School of Computing**

SET - A

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu

**Academic Year: 2023-24 (Odd)**

Test: CLA-T1                                                    Date: 09-08-2023
Course Code & Title: 18AIE332T - Image and Video Processing    Duration: 1 Hour
Year & Sem: III Year / V Sem                                   Max. Marks: 25

| | Part - A<br>(5 x 1 = 5 Marks) | | | | | |
|---|---|---|---|---|---|---|
| Q.<br>No | Question | Marks | BL | CO | PO | PI<br>Code |
| 1 | In a digital image processing system, Select the component for converting an analog signal from a camera into a digital form?<br>**a) Analog-to-Digital Converter (ADC)**<br>b) Digital-to-Analog Converter (DAC)<br>c) Central Processing Unit (CPU)<br>d) Graphics Processing Unit (GPU) | 1 | L1 | 1 | 1 | 2.6.3 |
| 2 | A digital image with 8-bit intensity values (ranging from 0 to 255) is being processed. Name the formula to compute the total number of intensity levels in this image?<br>a) Number of Intensity Levels = 2^8<br>b) Number of Intensity Levels = 8 + 1<br>c) Number of Intensity Levels = 256<br>**d) Number of Intensity Levels = 2^256** | 1 | L1 | 1 | 1 | 1.4.1 |
| 3 | An image processing system is capturing an image using a camera. Choose the formula to compute the aspect ratio of the image?<br>**a) Aspect Ratio = Image Width / Image Height**<br>b) Aspect Ratio = Image Height / Image Width<br>c) Aspect Ratio = Image Width * Image Height<br>d) Aspect Ratio = Image Height * Image Width | 1 | L3 | 1 | 1 | 1.4.1 |
| 4 | A digital image undergoes image negation to invert its intensities. Select the formula for image negation, where r is the input intensity and s is the output intensity?<br>**a) s = 255 - r**<br>b) s = log(255 / r)<br>c) s = r^2<br>d) s = sqrt(r) | 1 | L2 | 1 | 2 | 1.4.3 |
| 5 | A medical imaging system captures X-ray images of the human body. Identify the formula to calculate the distance between two points (x1, y1) and (x2, y2) in a 2D image?<br>**a) Distance = sqrt((x2 - x1)^2 + (y2 - y1)^2)**<br>b) Distance = abs(x2 - x1) + abs(y2 - y1)<br>c) Distance = max(abs(x2 - x1), abs(y2 - y1))<br>d) Distance = (x2 - x1) * (y2 - y1) | 1 | L2 | 1 | 1 | 1.6.1 |

| Register Number | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**SRM Institute of Science and Technology**

**College of Engineering and Technology**

**School of Computing**

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu

SET - A

**Academic Year: 2023-24 (Odd)**

Test: CLA-T1                                                     Date: 09-08-2023
Course Code & Title: 18AIE332T - Image and Video Processing       Duration: 1 Hour
Year & Sem: III Year / V Sem                                      Max. Marks: 25

| Part – B (2 x 10 = 20 Marks) Instructions: Answer All questions | | | | | | |
|---|---|---|---|---|---|---|
| Q. No | Question | Marks | BL | CO | PO | PI Code |
| 6 | An image processing engineer is working on a project to digitize old photographs. Explain the basic concepts of sampling and quantization, and how they are applied in converting continuous image data into digital form for storage and processing. | 10 | L2 | 1 | 1 | 1.4.3 |
| 7 | A computer graphics designer is creating a 2D animation with rotating objects. To optimize the animation, the designer decides to use the Fast Fourier Transform (FFT) algorithm. Illustrate how the FFT works and why it is advantageous over the regular DFT for computing the Fourier transform of sampled data. | 10 | L3 | 1 | 1 | 1.6.2 |

**Course Outcome (CO) and Bloom's level (BL) Coverage in Questions**





[NOTE:    THE ABOVE **SAMPLE** CO AND BL FOR YOUR REFERENCE] PLEASE PREPARE LIKE THIS

**SRM Institute of Science and Technology**
**College of Engineering and Technology**
**School of Computing**

SET - C

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu

**Academic Year: 2023-24 (Odd)**

Test: CLA-T1
Course Code & Title: 18AIE332T - Image and Video Processing
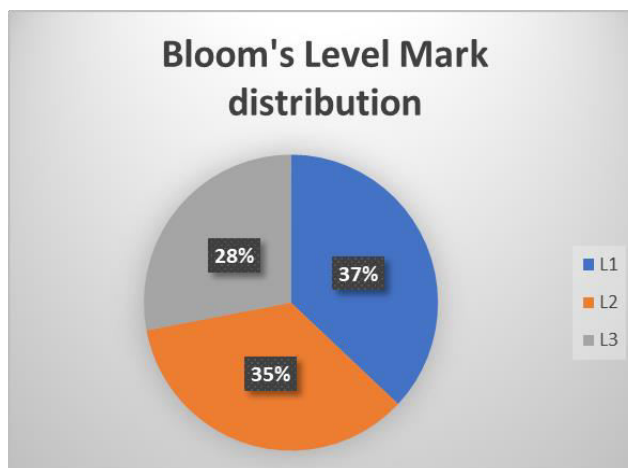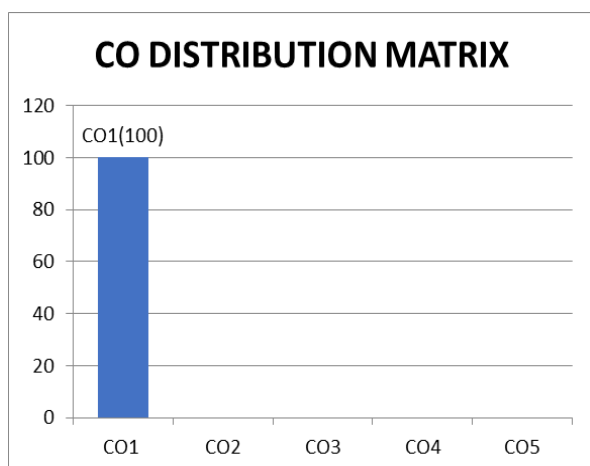Year & Sem: III Year / V Sem

Date: 09-08-2023
Duration: 1 Hour
Max. Marks: 25

| Part - A |
|---|
| (5 x 1 = 5 Marks) |

| Q. No | Question | Marks | BL | CO | PO | PI Code |
|---|---|---|---|---|---|---|
| 1 | A digital image is represented in 24-bit color depth. State how many different colors can be represented in this image.<br>a) 8 colors<br>b) 24 colors<br>c) 256 colors<br>**d) Over 16 million colors** | 1 | L1 | 1 | 1 | 2.6.3 |
| 2 | A digital image processing algorithm uses a 3x3 kernel for convolution on a grayscale image. Identify how many neighboring pixels are considered in this process.<br>a) 3 pixels<br>b) 6 pixels<br>c) 8 pixels<br>**d) 9 pixels** | 1 | L1 | 1 | 1 | 1.4.1 |
| 3 | A digital image is being processed by an image editing software that uses 12-bit intensity values, ranging from 0 to 4095. Choose the total intensity levels are available in each pixel of this digital image.<br>**a) Number of Intensity Levels = $2^{12}$**<br>b) Number of Intensity Levels = 12 + 1<br>c) Number of Intensity Levels = 4096<br>d) Number of Intensity Levels = $2^{4096}$ | 1 | L3 | 1 | 1 | 1.4.1 |
| 4 | A digital image processing system aims to analyze the frequency components of an image. Predict the transform(s) used to analyze both the amplitude and phase information of the image's frequency domain representation?<br>**a) DFT and FFT**<br>b) FFT and DCT<br>c) DFT and DCT<br>d) DFT, FFT, and DCT | 1 | L2 | 1 | 2 | 1.4.3 |
| 5 | A 512x512 image is compressed using the FFT, and the resulting complex-valued coefficients are quantized to 6 bits. Calculate the compression ratio achieved in this case.<br>a) 1:16<br>b) 1:32<br>**c) 1:45**<br>d) 1:64 | 1 | L3 | 1 | 1 | 1.6.1 |

**SRM Institute of Science and Technology**
**College of Engineering and Technology**
**School of Computing**

SET - C

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu

**Academic Year: 2023-24 (Odd)**

Test: CLA-T1                                                    Date: 09-08-2023
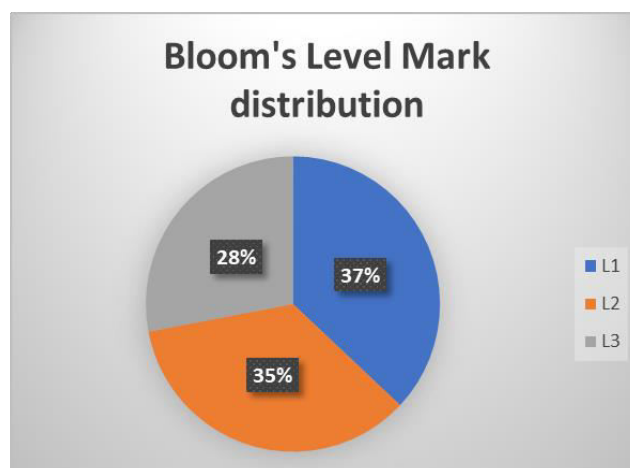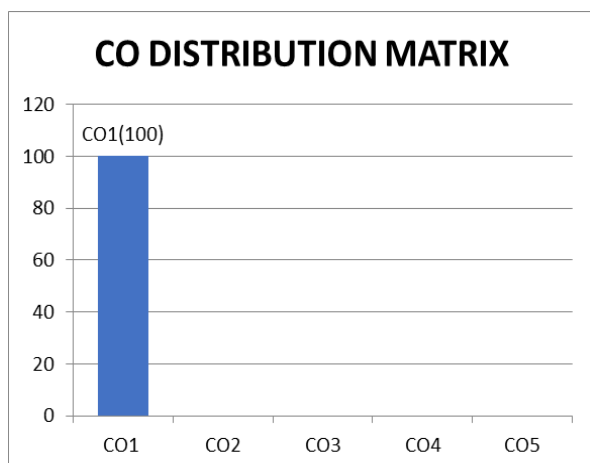Course Code & Title: 18AIE332T - Image and Video Processing    Duration: 1 Hour
Year & Sem: III Year / V Sem                                   Max. Marks: 25

| | Part – B<br>(2 x 10 = 20 Marks)<br>Instructions: Answer All questions | | | | | |
|---|---|---|---|---|---|---|
| Q. No | Question | Marks | BL | CO | PO | PI Code |
| 6 | Consider a 2D binary image with black and white pixels. A pixel P in the image has eight neighboring pixels around it. Define adjacency in the context of digital image processing and explain how it is determined for pixel P. Give examples of adjacency relationships in the binary image. | 10 | L2 | 1 | 1 | 1.4.3 |
| 7 | You are designing a 3D model for a game, and you want to add a rotating object to one of the scenes. Compare and contrast the relationship between the spatial rotation angle and the frequency of rotation in the object. Discover an experiment to investigate how discrete spatial rotations can create a continuous rotation effect. | 10 | L3 | 1 | 1 | 1.6.2 |

**Course Outcome (CO) and Bloom's level (BL) Coverage in Questions**



[NOTE:    THE ABOVE **SAMPLE** CO AND BL FOR YOUR REFERENCE] PLEASE PREPARE LIKE THIS

**SRM Institute of Science and Technology**
**College of Engineering and Technology**
**School of Computing**

SET - D

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu

**Academic Year: 2023-24 (Odd)**

Test: CLA-T1                                              Date: 09-08-2023
Course Code & Title: 18AIE332T - Image and Video Processing        Duration: 1 Hour
Year & Sem: III Year / V Sem                              Max. Marks: 25

| Part - A (5 x 1 = 5 Marks) | | | | | | |
|---|---|---|---|---|---|---|
| Q. No | Question | Marks | BL | CO | PO | PI Code |
| 1 | In an image processing system, state the function of the cornea in the human eye during image formation is to:<br>a) **Focus light onto the retina**<br>b) Detect colors in the incoming light<br>c) Adjust the size of the pupil<br>d) Process visual information in the brain | 1 | L1 | 1 | 1 | 2.6.3 |
| 2 | In a 4-connected neighborhood system, select the number of adjacent pixels to a central pixel is:<br>**a) 4**<br>b) 6<br>c) 8<br>d) 10 | 1 | L1 | 1 | 1 | 1.4.1 |
| 3 | Choose the symmetry property of 2D Discrete Fourier Transform (DFT) by providing the mathematical relationship between F(u, v) and F(-u, -v).<br>**a) F(u, v) = F(-u, -v)**<br>b) F(u, v) = F(v, u)<br>c) F(u, v) = e^(j2πuv)<br>d) F(u, v) = 0 | 1 | L3 | 1 | 1 | 1.4.1 |
| 4 | Indicate the RGB color model and show how it represents the color "purple" with specific intensity values for red, green, and blue components.<br>**a) RGB color model: (R=255, G=0, B=255)**<br>b) RGB color model: (R=128, G=128, B=128)<br>c) RGB color model: (R=0, G=0, B=255)<br>d) RGB color model: (R=255, G=255, B=0) | 1 | L2 | 1 | 2 | 1.4.3 |
| 5 | Calculate the number of levels in a 1D discrete wavelet decomposition of an image with an initial size of 256 pixels, assuming each level reduces the size by half.<br>a) 7<br>**b) 8**<br>c) 9<br>d) 10 | 1 | L3 | 1 | 1 | 1.6.1 |

**SRM Institute of Science and Technology**
**College of Engineering and Technology**
**School of Computing**

SET - D

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu

**Academic Year: 2023-24 (Odd)**

Test: CLA-T1                 Date: 09-08-2023
Course Code & Title: 18AIE332T - Image and Video Processing     Duration: 1 Hour
Year & Sem: III Year / V Sem                Max. Marks: 25

<table>
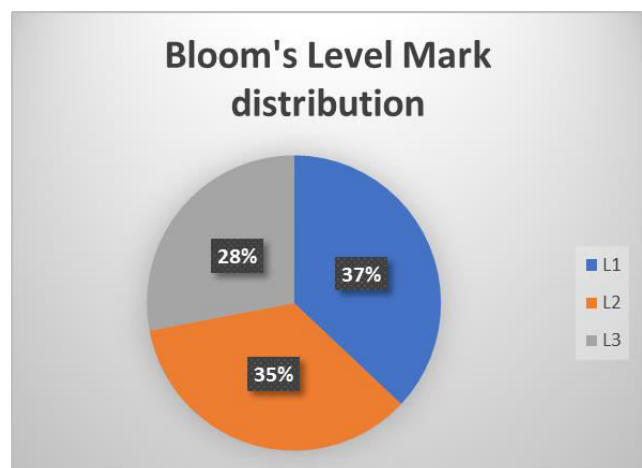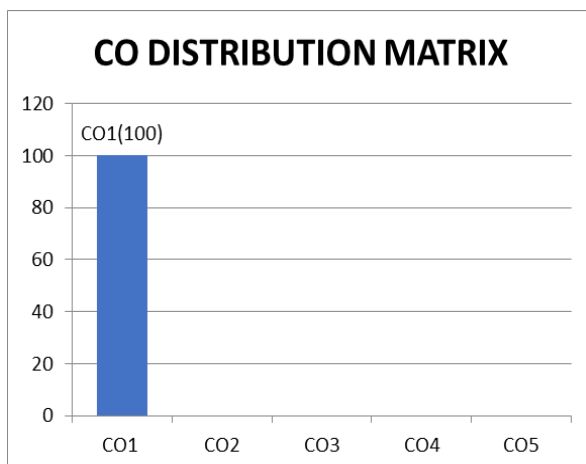<tr><td colspan="7" align="center">Part – B<br>(2 x 10 = 20 Marks)<br>Instructions: Answer All questions</td></tr>
<tr><td>Q. No</td><td>Question</td><td>Marks</td><td>BL</td><td>CO</td><td>PO</td><td>PI Code</td></tr>
<tr><td>6</td><td>You are capturing a high-frequency audio signal using a digital recorder. The signal ranges from 0 to 10 kHz. The recorder has a maximum sampling frequency of 8 kHz. Explain the Sampling Theorem and determine whether aliasing will occur during the recording process.</td><td>10</td><td>L2</td><td>1</td><td>1</td><td>1.4.3</td></tr>
<tr><td>7</td><td>You have an image with a 4x4 pixel grid, and you perform the 2D Discrete Fourier Transform (DFT) on it. Show the frequency domain representation of the image after the transformation. Illustrate and list the properties exhibited by the frequency domain representation.</td><td>10</td><td>L3</td><td>1</td><td>1</td><td>1.6.2</td></tr>
</table>

**Course Outcome (CO) and Bloom's level (BL) Coverage in Questions**





[NOTE:    THE ABOVE **SAMPLE** CO AND BL FOR YOUR REFERENCE] PLEASE PREPARE LIKE THIS