# GURU NANAK INSTITUTE OF TECHNOLOGY

## An Autonomous Institute under MAKAUT

## 2022

## DIGITAL IMAGE & VIDEO PROCESSING

## EC701B

**TIME ALLOTTED: 3Hours** **FULL MARKS:70**

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable*

**GROUP – A**

**(Multiple Choice Type Questions)**

Answer any *ten* from the following, choosing the correct alternative of each question: **10×1=10**

| | | Marks | CO No |
|---|---|---|---|
| 1. (i) | Which of the following is the fundamental step in image processing?<br>a) filtration<br>b) image restoration<br>c) image enhancement<br>d) image acquisition | 1 | CO1 |
| (ii) | Which is used to determine changes between two images?<br>a) Image differencing<br>b) segmentation<br>c) skin texture analysis<br>d) image averaging | 1 | CO2 |
| (iii) | Image enhancement is similar to<br>a) making image look better<br>b) sharpening the intensity-transition regions<br>c) minimizing degradation over image<br>d) reducing the redundancy of the image data | 1 | CO2 |
| (iv) | An image is considered to be a function of a(x, y) where a represents<br>a) Height of image<br>b) width of image<br>c) amplitude of image<br>d) resolution of image | 1 | CO1 |
| (v) | _______ represents the transition between image function's continuous values and its digital equivalent.<br>a) Rasterization<br>b) Quantization<br>c) Sampling<br>d) None of the above | 1 | CO1 |
| (vi) | An image function f(x, y) is characterized by $f(x, y) = i(x, y)r(x, y)$ where<br>a) $0 < i(x, y) < 1$ & $0 < r(x, y) < \infty$<br>b) $0 < i(x, y) < 1$ & $0 < r(x, y) < 1$<br>c) $0 < i(x, y) < \infty$ & $0 < r(x, y) < \infty$<br>d) $0 < i(x, y) < \infty$ & $0 < r(x, y) < 1$ | 1 | CO2 |

| | | | |
|---|---|---|---|
| (vii) | For blurring of an image,_______is used.<br>a) LPF<br>b) HPF<br>c) BPF<br>d) none of the above | 1 | CO3 |
| (viii) | The D4 distance between p and q with coordinates (x, y), (s, t) is defined as<br>a) $\mid x - s \mid + \mid y - t \mid$<br>b) max( $\mid x - s \mid$, $\mid y - t \mid$ )<br>c) [( x – s )2 + ( y – t )2] ½<br>d) min( $\mid x - s \mid$, $\mid y - t \mid$ ) | 1 | CO3 |
| (ix) | In 4-neighbors of a pixel p, how far are each of the neighbors located from p?<br>a) one pixel apart<br>b) four pixels apart<br>c) alternating pixels<br>d) none of the Mentioned | 1 | CO3 |
| (x) | Histogram equalization is used for<br>a) compression<br>b) edge detection<br>c) filtering<br>d) contrast adjustment | 1 | CO3 |
| (xi) | For which purpose image subtraction is used<br>a) color enhancement<br>b) spatial enhancement<br>c) detection<br>d) frequency enhancement | 1 | CO4 |
| (xii) | Steganography and cryptography are used for image<br>a) Enhancement<br>b) Security<br>c) Compression<br>d) restoration | 1 | CO5 |

## GROUP – B

**(Short Answer Type Questions)**

(Answer any *three* of the following) **3 x 5 = 15**

| | | Marks | CO No. |
|---|---|---|---|
| 2. | Describe the fundamental steps in Digital Image Processing using block diagram. | 5 | CO1 |
| 3. | Define Resolutions? What is meant by pixel? | 5 | CO1 |
| 4. | "Dimension and the Size of a Digital Image are not same": Explain with a proper example. | 5 | CO2 |
| 5. | Explain the purpose of the following MATLAB functions: imread(), imshow(), imwrite(), rgb2gray() and size() | 5 | CO3 |
| 6 | What is image compression? What is the need for Compression? | 5 | CO4 |

## GROUP – C

**(Long Answer Type Questions)**

(Answer any *three* of the following) **3 x 15 = 45**

| | | | Marks | CO No. |
|---|---|---|---|---|
| 7. | a) | What do you mean by Digital Image? Explain that digital image is an approximation of a real scene or object. | 5 | CO1 |
| | b) | Mention 3 image file format. Explain Brightness and Contrast of a digital image. | 4 | CO1 |
| | c) | Explain how we can measure the distance between pixels using different distance measure technique. | 6 | CO1 |
| 8. | a) | What is the need of image segmentation? Explain region splitting and merging technique for image segmentation. | 5 | CO4 |
| | b) | What is an "edge" in an image? What is the difference between an "edge" and a "line"in an image? | 5 | CO4 |
| | c) | Describe edge detection algorithm using gradient operator. | 5 | CO4 |
| 9. | a) | What is histogram processing? Explain histogram equalization technique. | 5 | CO2 |
| | b) | Explain filtering operation in video processing. | 5 | CO3 |
| | c) | Justify the necessity of image enhancement. Mention the different image enhancement process in spatial domain and frequency domain. | 5 | CO4 |
| 10. | a) | Explain the different Colour models for digital image. | 4 | CO3 |
| | b) | What is image security and why it is needed? Explain image cryptography and watermarking related to image security. | 4 | CO5 |
| | c) | Describe basic Steps of Video Processing. | 2 | CO5 |
| | d) | Explain Motion Estimation. | 5 | |
| 11. | | Write short notes on any three of the following: | 3x5=15 | |
| | a) | Comparison between binary image and Grey scale image | 5 | CO1 |
| | b) | Time varying image formation | 5 | CO4 |
| | c) | Bit Plane Slicing | 5 | CO2 |
| | d) | Sampling of video signal | 5 | CO3 |
| | e) | Region based motion estimation | 5 | CO5 |