GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2020-2021
DIGITAL IMAGE PROCESSING
EC703A

TIME ALLOTTED: 3 HOURS **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)	How many different frames are required for analyzing a 3D image? a) 5 b) 4 c) 6 d) 7	1	CO1
1(ii)	Which is a colour attribute that describes a pure colour? a) Saturation b) Hue c) Brightness d) Intensity	1	CO1
1(iii)	Histogram equalization is used for a) compression b) edge detection c) filtering d) contrast adjustment	1	CO2
1(iv)	What is the expanded form of JPEG? a) Joint Photographic Expansion Group b) Joint Photographic Experts Group c) joint Photographs Expansion Group d) Joint Photographic Expanded Group	1	CO1
1(v)	Canny is a_____technique. a) Edge detection b) restoration c) compression d) segmentation	1	CO4
1(vi)	An image function f(x, y) is characterized by f(x, y) = i(x, y)r(x, y) where a) $0 < i(x, y) < 1$ & $0 < r(x, y) < \infty$ b) $0 < i(x, y) < 1$ & $0 < r(x, y) < 1$ c) $0 < i(x, y) < \infty$ & $0 < r(x, y) < \infty$ d) $0 < i(x, y) < \infty$ & $0 < r(x, y) < 1$	1	CO1

1(vii)	For sharpening of an image,_____is used. a) LPF b) HPF c) BPF d) none of the above	1	CO2
1(viii)	Image compression is similar to a) making image look better b) sharpening the intensity-transition regions c) minimizing degradation over image d) reducing the redundancy of the image data	1	CO3
1(ix)	In which technique which is used to determine changes between two images ? a) Image differencing b) segmentation c) skin texture analysis d) image averaging	1	CO2
1(x)	The D8 distance (chessboard distance) between p and q with coordinates (x, y), (s, t) is defined as a) | x – s | + | y – t | b) max(| x – s |, | y – t |) c) [(x – s)2 + (y – t)2] ½ d) min(| x – s |, | y – t |)	1	CO2
1(xi)	Intensity range of 8 bit pixel image is a) 0 to 7 b) 0 to 15 c) 0 to 31 d) 0 to 255	1	CO1
1(xii)	Watermarking is used for image a) Enhancement b) Authentication c) Compression d) restoration	1	CO5

GROUP – B
(Short Answer Type Questions)

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

		Marks	**CO No**
2.	Mention different edge detection operators and compare them.	5	CO3
3.	Define how the effect of Sampling & Quantization plays a major role for Digital Image Representation	5	CO2
4.	"Dimension and the Size of a Digital Image are not same": Explain this with a proper example for Binary, Gray Scale and RGB image.	5	CO3
5.	Size of a grayscale image is 1200 x 800. It is downsampled by 4. Calculate compression ratio.	5	CO2
6.	Explain with merits and demerits of the BMP and JPEG image file format.	5	CO1

GROUP – C
(Long Answer Type Questions)

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

		Marks	CO No
7.a)	Describe all the fundamental steps in Digital Image Processing with block diagram.	5	CO1
7.b)	Explain Brightness and Contrast with respect to a digital image.	4	CO1
7.c)	Explain how different types of pixel neighborhoods are very important to find the relation between them and to measure different distance measure with the help of an example.	6	CO1
8.a)	What is an "edge" in an image? What is the difference between an "edge" and a "line" in an image?	3	CO5
8.b)	Describe edge detection algorithm using gradient operator.	5	CO5
8.c)	What is image segmentation? What are the applications of image segmentation?Explain region splitting and merging technique for image segmentation.	7	CO4
9.a)	Define the basic morphological operation "Erosion" and "dilation" for a binary image.	5	CO4
9.b)	Justify the necessity of image enhancement. Mention the different image enhancement process in spatial domain and frequency domain.	5	CO2
9.c)	What is histogram processing? Explain histogram equalization technique.	5	CO1
10.a)	What do you mean by Image Compression? Why image compression is required? Compare between lossless image compression and lossy image compression.	6	CO3
10.b)	Why wavelet transform plays a very important role in digital image processing.	3	CO5
10.c)	What is image security and why it is needed? Describe the basics of image steganography and cryptography with proper block diagrams	6	CO4
11.	Write short notes on any three of the following:		
11.a)	Bit Plane Slicing	5	CO3
11.b)	Colour models for digital image	5	CO3
11.c)	Region growing algorithm for segmentation	5	CO2
11.d)	Comparison between binary image and Grey scale image	5	CO2
11.e)	Function of Inverse filtering	5	CO2