Reg No.:_____ Name:_____

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Sixth Semester B.Tech Degree Regular and Supplementary Examination July 2021

Course Code: EC370
Course Name: DIGITAL IMAGE PROCESSING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks Marks

1 a) Explain different types of connectivity. Illustrate with examples. (6)

b) 'Perceived brightness is not a simple function of the intensity of the region' – Explain the phenomena behind this. (4)

c) Perform linear convolution of the following two matrices using matrix multiplication method. $x[m,n] = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ and $h[m,n] = [3 \quad 4 \quad 5]$ (5)

2 a) State and explain 2D sampling theorem. Show that the spectrum of a sampled image is a scaled and shifted repetition of spectrum of original image with constant spacing along x axis and y axis. (7)

b) State and prove the spatial shift property and convolution property of 2D-DFT. (8)

3 a) Give the draw backs and applications of KL transform. (4)

b) With the help of a diagram, explain HSI colour model. (5)

c) Define 2-D Discrete Cosine Transform (2-D DCT). Why we use 2D-DCT exxtensively in Image processing? (6)

PART B

Answer any two full questions, each carries 15 marks

4 a) Can two different images have the same histogram? Justify your answer. (4)

b) Using equations, explain how low pass and high pass filtering is done in the frequency domain. (8)

c) Distinguish between constrained and un-constrained image restoration techniques. (3)

5	a)	Explain any four local neighbourhood operations used in image enhancement.	(8)
	b)	Explain the principle of inverse filtering. Give the drawbacks of inverse filtering.	(7)
6	a)	Derive a Wiener filter for image restoration using minimum mean square approach. Mention the situation in which the behaviour of Wiener filter resembles that of inverse filter.	(10)
	b)	With diagram, explain the principle of different slicing techniques used in image enhancement.	(5)

PART C

Answer any two full questions, each carries 20 marks

7	a)	Explain the need for image compression.	(4)
	b)	What is image segmentation? Explain the different thresholding techniques used for image segmentation.	(8)
	c)	With diagram, explain vector quantization.	(8)
8	a)	What are the different types of edges present in an image? Explain the two approaches for detection of edges in an image.	(10)
	b)	Explain the different types of redundancy present in images.	(6)
	c)	Explain an image analysis tool for refinement of an object boundary.	(4)
9	a)	Explain the role of Hough transform in edge linking.	(7)
	b)	A source emits 4 symbols {m, n, o, p} with probabilities {0.1, 0.2, 0.3, 0.4} respectively. Perform arithmetic coding to encode the word “pop”.	(8)
	c)	Explain K-means clustering.	(5)

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