CBCS SCHEME

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BEC613C/BVL613C/BTE613C

ACHARYA INSTITUTE OF TECHNOLOGY MCA Library Date

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026

Digital Image Processing

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	With a block diagram, explain the fundamental steps in digital image processing.	10	L2	CO1
	b.	Briefly explain the following : i) Neighbors of pixel ii) Adjacency iii) Distance Measures	10	L2	CO1
		OR			
Q.2	a.	With the help of a neat diagram, explain the components of a general purpose image processing system.	10	L2	CO1
	b.	Consider the image segment shown in Fig Q2(b). Let V = {1, 2} compute the length of shortest 4-, 8-, m-path between p and q 3 1 2 1 (q) 2 2 0 2 1 2 1 1 (p) 1 0 1 1 Fig Q2(b)	5	L3	CO1
	c.	Explain image acquisition using Line sensor.	5	L2	CO1
		Module – 2			
Q.3	a.	Explain any four properties of 2D-DFT.	10	L2	CO2
	b.	For the given orthogonal matrix A and image 'u' obtain transformed image, original image and basis images. $A = \frac{1}{\sqrt{2}}\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} \quad u = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$	10	L3	CO2
		OR			
Q.4	a.	Give an expression for 2D – forward and inverse discrete co-sine transform and compute DCT for N = 4.	10	L3	CO2
	b.	Develop Haar transform for N = 4. Discuss the properties of Haar transform.	10	L2	CO2
		Module – 3			
Q.5	a.	Explain the following image enhancement technique. i) Identity ii) Negative iii) log and inverse log iv) Power law transformation.	10	L2	CO3
	b.	Explain the sharpening spatial filters and hence obtain Laplacian filter coefficients.	10	L2	CO3

		OR			
Q.6	a.	Explain Contrast stretching and Bit plane slicing.	10	L2	CO3
	b.	Perform Histogram equalization of the image shown in Fig Q6(b), where levels are in the range [0, 7]. 4 4 4 4 4 3 4 5 4 3 3 5 5 5 3 3 4 5 4 3 4 4 4 4 4 Fig Q6(b) Plot histogram of original image and equalized image.	10	L3	CO3
		Module – 4			
Q.7	a.	Explain the basics of filtering in frequency domain.	10	L2	CO4
	b.	Explain smoothing of image in frequency domain using i) Ideal ii) Butterworth iii) Gaussian low pass filter.	10	L2	CO4
		OR			
Q.8	a.	Explain the following color models i) RGB ii) CMY color model.	10	L2	CO4
	b.	Explain the procedure for converting colors from RGB to HIS and Vice versa.	10	L2	CO4
		Module – 5			
Q.9	a.	Explain the model of the image degradation/restoration process.	10	L2	CO5
	b.	Explain the following mean filters i) Arithmetic ii) Geometric iii) Harmonic iv) Contra harmonic.	10	L2	CO5
		OR			
Q.10	a.	Explain any five Noise Models with the probability density functions.	10	L2	CO5
	b.	Explain how filtering is done using Inverse filter.	10	L2	CO5

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