O.P.Code: 20EC0441	R20	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. IV Year I Semester Regular & Supplementary Examinations December-2024

DIGITAL IMAGE PROCESSING

(Electronics & Communication Engineering)

Time: 3 Hours **Max. Marks: 60**

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	a	Discuss the method of image sensing and acquisition along with suitable diagrams.	CO1	L3	6M
	b	Calculate the number of bits required to store a digitized image if image sizes are 8×8, 32×32 for 8-bit pixel depth.	CO1	L2	6M

OR

2	a	Illustrate about the adjacency, connectivity, regions and boundaries.	CO1	L2	6M
	b	Let V = {1}, Compute the 4-adjacency, 8-adjacency and different paths between two pixels (1,1) and (3,3) for the center pixel in the given image.	CO1	L3	6M

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 1 & 1 \\ 7 & 1 & 9 \end{bmatrix}$$

UNIT-II

3	a	Define 2D – Discrete Cosine Transform with equations.	CO2	L1	6M
	b	Deduce the Discrete Cosine Transform basis matrix for N = 4	CO2	L4	6M

OR

4	a	Compute the Haar basis for N=2.	CO2	L3	6M
	b	Compare different Image Transforms.	CO2	L2	6M

UNIT-III

5	a	Define negative image transformation and illustrate with suitable example.	CO3	L2	6M
	b	Explain the Intensity level slicing operation and bit extraction operation in image enhancement with suitable example.	CO3	L1	6M

OR

6	a	Write brief notes on CMY and CMYK color models.	CO3	L1	6M
	b	Explain the method of converting colors from RGB to HIS.	CO3	L2	6M

UNIT-IV

7	a	Explain the Gaussian and Rayleigh noises with their PDF expressions.	CO4	L2	6M
	b	Explain the Erlang and Exponential noises with their PDF expressions.	CO4	L2	6M

OR

8	a	Illustrate the Clustering techniques for image segmentation with example.	CO5	L2	6M
	b	Discuss the basics of the intensity thresholding.	CO5	L2	6M

270

UNIT-V

9	a	Explain the Spatial and Temporal Redundancy with suitable example.	CO6	L2	6M
	b	Compute the average length, compression and coding redundancy if the computer-generated image has the intensity distribution shown in table. If a natural 8-bit code is used to represent its 4 possible intensities.	CO6	L4	6M

Intensities r_k	Probabilities p_k
r_{87}=87	0.25
r_{128}=128	0.47
r_{186}=186	0.25
r_{256}=87	0.03
r_k for k ≠ 87, 128, 186, 256	0

OR

10	a	For the image shown below, compute the degree of compression that can be achieved using Huffman coding of pixel values. Assume 2 bits to represent the pixel value.	CO6	L3	6M

$$\begin{pmatrix} 3 & 3 & 3 & 2 \\ 2 & 3 & 3 & 3 \\ 3 & 2 & 2 & 2 \\ 2 & 1 & 1 & 0 \end{pmatrix}$$

	b	Explain the functional block diagram of a transform coding technique.	CO6	L4	6M

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