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CBCS SCHEME

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17MT754

Seventh Semester B.E. Degree Examination, Jan./Feb.2021
Digital Image Processing

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. With a neat block diagram, explain the fundamental steps involved in "Digital Image Processing". **(10 Marks)**

b. Explain brightness adaptation with the help of suitable diagram. **(10 Marks)**

OR

2 a. With block diagram, explain the components of a general purpose image processing system. **(10 Marks)**

b. With a neat sketch, explain the structure of human eye. **(10 Marks)**

Module-2

3 a. Consider the image segment given in Fig. Q3 (a). Let V = {0, 1}. Compute the lengths of the shortest 4, 8 and m path between p and q. **(06 Marks)**

	3	1	2	1	(q)
	2	2	0	2	
	1	2	1	1	
(p)	1	0	1	2	

Fig. Q3 (a)

b. Let p and q are the two pixels at coordinates (100, 120) and (130, 160) respectively. Compute (i) Euclidian distance (ii) Chess board distance. **(04 Marks)**

c. Explain the sampling and quantization and representation of digital image. **(10 Marks)**

OR

4 a. Explain the following terms between pixels :
(i) Neighbors of a pixel.
(ii) Adjacency
(iii) Connectivity.
(iv) Region. **(10 Marks)**

b. With a neat diagram, explain image acquisition using single sensor, linear sensor strip and circular sensor strip. **(10 Marks)**

Module-3

5 a. For a 2×2 transform A and the image u $A = \frac{1}{\sqrt{2}}\begin{bmatrix}1 & 1\\ 1 & 1\end{bmatrix}$, $u = \begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}$,

Calculate the transformed image V and the bias images. Also reconstruct the original image u by inverse transform. **(10 Marks)**

b. Discuss any three properties of 2D Discrete Fourier transform. **(10 Marks)**

OR

6 a. Compute the Haar Basis for N = 2. **(10 Marks)**

b. Write the expression for 2D discrete cosine transformation pair. Also compute DCT matrix for N = 4. **(10 Marks)**

Module-4

7 a. Explain the following image enhancement techniques,

(i) Contrast stretching.

(ii) Intensity level slicing.

(iii) Bit-plane slicing. **(10 Marks)**

b. A 3 bit image of size 64×64 has intensity distribution as shown in table. Implement histogram equalization and plot the same.

Gray level	0	1	2	3	4	5	6	7
Number of pixels	790	1023	850	656	329	245	122	81

(10 Marks)

OR

8 a. Briefly explain homomorphic filtering and its implementation. **(10 Marks)**

b. Write the functions for the below smoothing frequency domain filters:

(i) Ideal low pass filter.

(ii) Butterworth low pass filter.

(iii) Gaussian low pass filter. **(10 Marks)**

Module-5

9 a. Write the functions and characteristics for different noise models. **(10 Marks)**

b. Derive the equation for Wiener filtering. **(10 Marks)**

OR

10 a. Write a note on RGB colour model with neat diagram. **(10 Marks)**

b. What is pseudo colour image processing? Explain intensity slicing with neat sketches. **(10 Marks)**

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