15MT754

Seventh Semester B.E. Degree Examination, July/August 2022
Digital Image Processing

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1   a.   Explain the fundamental steps in digital image processing.   (08 Marks)
    b.   Explain the components of an image processing system.   (08 Marks)

OR

2   a.   With the help of cross sectional view of eye explain the different parts of eye.   (08 Marks)
    b.   With suitable examples, explain brightness adaption and discrimination.   (08 Marks)

Module-2

3   a.   Explain the different image acquisition methods.   (08 Marks)
    b.   Explain the concept of image sampling and quantization.   (08 Marks)

OR

4   a.   With an example, explain the different distance measurement in an image segments.   (08 Marks)

    b.   Consider the image segment below. Compute the lengths of shortest 4, 8 and m-path between P and Q. (i) Criteria $V = \{0,1\}$ (ii) $V = \{1, 2\}$ (08 Marks)

3	1	2	1	(Q)
2	2	0	2	
1	2	1	1	
(P) 1	0	1	2	

Module-3

5   a.   State and prove 2 dimensional circular convolution properties.   (08 Marks)

Let $A = \dfrac{1}{\sqrt{2}}\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$, $U = \begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}$

    b.   Determine Transformed image and basis images.   (08 Marks)

OR

6   a.   Explain the Hadmard transform and its properties.   (08 Marks)
    b.   Explain the Haar transform and its properties.   (08 Marks)

Module-4

7   a. Explain the following image enhancement methods. (i) Contrast stretching   (ii) Gray level slicing   (iii) Bit plane slicing.   **(08 Marks)**

   b. Perform image histogram equalization for the image.   **(08 Marks)**

$$\begin{bmatrix} 0 & 0 & 0 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 2 & 2 & 2 & 2 & 3 \\ 3 & 3 & 3 & 3 & 3 \\ 0 & 0 & 0 & 7 & 7 \end{bmatrix}$$

OR

8   a. Explain image enhancement in the frequency domain and smoothing filters.   **(08 Marks)**

   b. Explain the homomorphic filtering and derive the homomorphic filter function expression.   **(08 Marks)**

Module-5

9   a. Explain the different types of estimation of degradation function.   **(08 Marks)**

   b. Explain the different types of noise models with probability density functions.   **(08 Marks)**

OR

10   a. Explain the HSI color model based on triangular and circular color planes and conversion from RGB and HSI.   **(08 Marks)**

   b. Explain pseudo color image processing.   **(08 Marks)**

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