CBCS SCHEME

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21EC753

Seventh Semester B.E./B.Tech. Degree Examination, June/July 2025
Basic Digital Image Processing

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain with block diagram, the fundamental steps used in digital image processing. **(10 Marks)**

b. Explain with relevant diagrams any two sensors arrangements. **(10 Marks)**

OR

2 a. Discuss the various fields of digital image processing based on EM wavelength. **(10 Marks)**

b. Consider the image segment shown below :

i) Let V = {0, 1} and compute the length of shortest 4, 8 and m – path between p and q. If particular path does not exist between these two points explain why?

ii) Repeat for V = {1, 2}. **(10 Marks)**

Module-2

3 a. With necessary graphs, explain the basic gray level transformation used for image enhancement. **(10 Marks)**

b. Describe image sharpening in spatial domain using second order Laplacian derivative. **(10 Marks)**

OR

4 a. For a given 4 × 4 image having gray scales between [0, 9], perform histogram equalization and draw the histogram of image before and after equalization.

$$\begin{bmatrix} 2 & 3 & 3 & 2 \\ 4 & 2 & 4 & 3 \\ 3 & 2 & 3 & 5 \\ 2 & 4 & 2 & 4 \end{bmatrix}.$$

(10 Marks)

b. Discuss image subtraction and image averaging operations, with one example each. **(10 Marks)**

Module-3

5 a. Discuss with relevant diagrams, the image smoothing using the frequency domain. **(10 Marks)**

b. Explain the following filters in frequency domain :

i) High-boost filtering

ii) High frequency-emphasis filtering. **(10 Marks)**

OR

6 a. Describe the basic steps used for filtering in frequency domain. **(10 Marks)**

b. With a neat block diagram and relevant filter response, explain homomorphic filtering approach for image enhancement. **(10 Marks)**

Module-4

7 a. Describe the CIE chromaticity diagram for color specification. **(10 Marks)**

b. Discuss with neat diagrams RGB color model. **(10 Marks)**

OR

8 a. What is pseudo color image processing? Explain any one method with neat diagram. **(10 Marks)**

b. Describe the conversion process of colors from HSI to RGB. **(10 Marks)**

Module-5

9 a. With necessary equations and graph, explain noise probability density functions. **(10 Marks)**

b. Explain the process of restoration of images using inverse filtering technique. **(10 Marks)**

OR

10 a. Explain the following methods for estimating degradation function :

i) Estimation by image observation

ii) Estimation by experimentation. **(10 Marks)**

b. Explain with relevant equations minimum mean square error (wiener) filtering. **(10 Marks)**

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