

# CBCS SCHEME



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17EC72

Seventh Semester B.E. Degree Examination, June/July 2023

## Digital Image Processing

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- Define sampling and quantization of digital images. Give reasons for blocking artifacts and false contouring in an image. (08 Marks)
  - Find the item required to transmit a monochrome image of size  $2.5'' \times 2.5''$ , seamed at 150 DPI and to be sent at 28 KBPS speed with 256 intensity levels. (04 Marks)
  - Explain with neat diagram, how image is acquired using sensor strips. (08 Marks)

OR

- With a neat diagram, explain the fundamental steps in digital image processing (08 Marks)
  - Explain the following terms as applicable to image processing with necessary graphs.
    - Brightness adaptation
    - Brightness discrimination. (06 Marks)
  - Find the Euclidean, chess board and Manhattan distances between two pixels  $P(100, 120)$  and  $q(130, 160)$ . (06 Marks)

### Module-2

- With necessary transformation graphs, explain the following with an example :
    - Image negative
    - Bit plane slicing. (06 Marks)
  - The following table gives the number of pixels at each of the grey levels from 0 to 7 in an image.

Gray level $r_k$	0	1	2	3	4	5	6	7
Number of pixels $P_k$	30	50	100	1500	2300	4000	200	20

Draw histogram corresponding to these grey levels. Perform histogram equalization and draw resulting histogram. (08 Marks)

- Explain with the block diagram, the basic steps for image filtering in frequency domain. (06 Marks)

OR

- Develop a procedure to perform histogram matching. (06 Marks)
  - Explain homomorphism filters for image enhancement with necessary equations and block diagram. (08 Marks)
  - Explain the sharpening of images in frequency domain using Butterworth high pass and Gaussian high pass filter. (06 Marks)

### Module-3

- Explain the basic model of image restoration process, and also explain any four noise probability density functions. (12 Marks)
  - Explain adaptive median filter algorithm in detail. (08 Marks)

OR

- 6 a. Explain the order statistics filter used for restoring images in the presence of noise. (08 Marks)  
 b. Explain all the three methods of estimation of degradation function. (12 Marks)

**Module-4**

- 7 a. Explain RGB colour model in detail. What are web-safe colours? (08 Marks)  
 b. With the help of block diagram, explain two band sub-band coding and decoding system. (07 Marks)  
 c. Explain Hit and Miss transformation technique in morphological image processing. (05 Marks)

OR

- 8 a. What are image pyramids? With the help of block diagram explain the generation of approximation and prediction residual pyramids. (09 Marks)  
 b. Explain Erosion and dilation with examples. (06 Marks)  
 c. Write a note on pseudocolour image processing. (05 Marks)

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**Module-5**

- 9 a. Explain carry edge detector algorithm with suitable equation and figures. (10 Marks)  
 b. Find chain code in 4-connectivity and first difference for the given Fig.Q9(b).

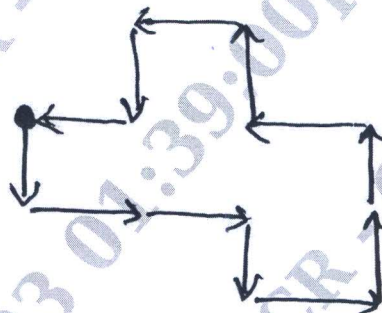


Fig.Q9(b)

- c. What is Fourier descriptor? How is it used for boundary description? (06 Marks)

OR

- 10 a. Explain global processing in detail using Hough transform. (10 Marks)  
 b. Write a notes on :  
 i) Skeletons  
 ii) Statistical moments. (10 Marks)

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