

CBCS SCHEME

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17EC72

Seventh Semester B.E. Degree Examination, Jan./Feb. 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

- 1 a. Explain the various components of Image Processing System, with neat block diagram. (08 Marks)
- b. Explain the process of Image Acquisition, using sensor strips to generate 2D - Image. (08 Marks)
- c. Image transmission is done in packets. A packet consists of a start bit, a byte of data and a stop bit. Find
 - i) How many minutes would it take to transmit a 512×512 image with 256 grey levels at 300 baud rate.
 - ii) What would be the time at 9600 baud? (04 Marks)

OR

- 2 a. Explain the importance of brightness adaption and discrimination in Image processing. (08 Marks)
- b. List four major applications of Image processing. (04 Marks)
- c. For $V = \{2, 3, 4\}$, compute the lengths of shortest 4, 8, m paths between p and q in the following image. If a particular path does not exist between these three points, explain why. Repeat for $V = \{0, 1, 2, 4\}$. (08 Marks)

	3	4	1	2	0	
	0	1	0	4	2	(q)
	2	2	3	1	4	
(p)	2	0	4	2	1	
	1	2	0	3	4	

Module-2

- 3 a. Explain the power law transformation and piece – wise linear bit plane slicing with a neat graphical illustration. (10 Marks)
- b. Explain the sharpening of Image in frequency domain using :
 - i) Ideal High pass filter
 - ii) Butterworth High pass filter
 - iii) Gaussian High pass filter. (10 Marks)

OR

- 4 a. Explain with a block diagram, the basic steps for image filtering frequency domain. (06 Marks)
- b. Perform the histogram equalization of 8 level image of size 64×64 whose data is shown in table Q4(b).

Grey level r_k	0	1	2	3	4	5	6	7
Number of Pixels	123	78	281	417	639	1054	816	688

Table Q4(b)

- c. Explain 2D – DFT and mention Translation and Symmetry properties of 2D - DFT. (06 Marks)

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-3

- 5 a. With neat block diagram and relevant mathematical expressions, explain Image Degradation / Restoration model. (06 Marks)
- b. Explain Alpha Trimmed mean filter with necessary equations. (06 Marks)
- c. Show the effect of 3×3 midpoint, min max and median filter on an given Image Segment.

0	1	2	3	4
5	6	7	8	9
5	5	5	9	9
5	5	5	9	9
5	5	5	9	9

(08 Marks)

OR

- 6 a. With necessary diagrams and relevant equations, explain any four noise probability density functions. (10 Marks)
- b. Explain with necessary expression the Periodic Noise reduction by frequency domain filtering. (10 Marks)

Module-4

- 7 a. Explain with necessary diagram, the RGB colour model. (08 Marks)
- b. Explain the conversion of RGB to HSI color model and HSI to RGB colour model. (08 Marks)
- c. Explain Boundary Extraction using Morphological Algorithm. (04 Marks)

OR

- 8 a. Write a note on Pseudo colour Image Processing. Explain Intensity slicing as applied to pseudo colour Image Processing. (10 Marks)
- b. Explain Erosion and Dilation in Image Processing. (10 Marks)

Module-5

- 9 a. Explain Segmentation with respect to an Image. Write note on applications of Image Segmentation. (08 Marks)
- b. Explain Global thresholding using Otsu's method. (08 Marks)
- c. Define Length and diameter of a boundary with respect to image. (04 Marks)

OR

- 10 a. Write short notes on Image Segmentation by region splitting and merging. (06 Marks)
- b. Explain Boundary representation by Chain codes. (08 Marks)
- c. Explain Point detection with respect to Image Segmentation. (06 Marks)
