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**SUBJECT CODE NO:- H-554**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**T.E. (CSE/IT)**  
**Elective –I: Digital Image Processing**  
**(REVISED)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- 1) Que. No. 1 and Que.No.6 are compulsory.
  - 2) Attempt any two questions from the remaining question from each section.
  - 3) Assume suitable data if necessary.

**Section A**

- Q.1 Solve any five:- 10
- a) What is digital image?
  - b) Define neighbors of pixel.
  - c) What is Image Negative?
  - d) What is need of image transform? Define DFT.
  - e) What is unsharp masking? Give its expression.
  - f) What is mean filter? Why it is known as a linear spatial filter.
  - g) Define source encoder.
  - h) What is fidelity criterion?
- Q.2 a) A  $4 \times 4$ , 4 bits per pixel original image is given by [10,12,8,9; 10,12,12,14; 12,13,10,9; 14,12,10,12] 08
- i) Apply histogram equalization to the given image by rounding the resulting image pixels to integers.
  - ii) Sketch the histogram of the original image and histogram equalized image.
- b) What is image filtering? Explain basic steps for filtering in frequency domain. 07
- Q.3 a) Elaborate the components of digital image processing along with its block diagram. 08
- b) What is connectivity in digital image processing? Explain different types of connectivity. 07
- Q.4 a) Explain with neat diagram image compression model. 08
- b) Explain the LZW encoding technique with suitable example. 07
- Q.5 Write short note on:- (Any three) 15
- a) Data Redundancy
  - b) Sampling and quantization
  - c) Log and power-law transformation
  - d) Binary image compression standards.

Section B

- Q.6 Solve any five:- 10
- What is mean by discontinuity?
  - Write applications of segmentation.
  - Define gradient operator.
  - Define multilevel thresholding.
  - What is color complement?
  - Define image opening and closing.
  - Define signature.
  - Define image description.
- Q.7
- Explain three types of discontinuities in digital images. 07
  - Define thresholding and explain the various methods of thresholding with suitable example. 08
- Q.8
- Explain RGB color model. 07
  - The input picture and structuring element as shown below. Perform the erosion and dilation 08  
of the input image/picture.
- |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |   |   |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 |   |   |   |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |   |   |   |
- Input picture
- Structuring element
- Q.9
- Explain the different types of region descriptors required in image description step. 07
  - What is representation? What is role of chain code & polygonal approximation in representation process? 08
- Q.10 Write short note on:- (Any three) 15
- Pattern and pattern classes.
  - Applications of gray scale morphology.
  - Region split and merge technique.
  - Skeletonization.