

2054  
M.E. Electronics and Communication Engineering  
Second Semester  
ECE-1202: Digital Image Processing

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.

x-x-x

1. (a) Describe different types of relationships between pixels. Discuss adjacency, connectivity, and boundary in an image.
- (b) When we enter from bright outdoors to a dark room, it takes some time to adjust the vision to the dark surroundings. Which process of vision is responsible for this phenomenon?
- (c) What will be the result of applying arithmetic mean filter to an image repeatedly? What will happen if we apply median filter instead?
- (d) Describe color complement operation.
- (e) Describe boundary extraction.

(5×2)

Section-A

2. (a) Describe the Acquisition of Images using different types of energy sources in electromagnetic spectrum. Discuss applications of each. (5)
- (b) Give the linear filter masks for the following operations: region averaging, weighted region averaging, image sharpening (5)
3. (a) Perform histogram equalization of the 3-bit image (5)  
$$\begin{bmatrix} 3 & 3 & 3 & 3 & 2 \\ 2 & 3 & 5 & 4 & 2 \\ 1 & 4 & 4 & 4 & 2 \\ 2 & 2 & 3 & 3 & 3 \\ 1 & 1 & 2 & 7 & 6 \end{bmatrix}$$
- (b) With the help of mathematical expressions, describe models of different types of noise affecting the images. Briefly describe filters to remove these noises. (5)
4. (a) Describe wavelet transform for the images. How does it achieve multi-resolution representation for the images? (5)
- (b) Describe DCT for images. Discuss energy compaction property of transforms. Why this property is useful for image processing? (5)

P.T.O.

(2)

**Section-B**

5. (a) Describe color slicing operation with the help of equation. (5)
- (b) Arithmetically decode the message 0.2455 given a six symbol source {a, e, i, o, u, !} with source probabilities {0.3, 0.15, 0.15, 0.2, 0.1, 0.1}. (5)
6. (a) Explain the three fundamental steps performed in edge detection. Describe some filters for detection of edges in an image. (5)
- (b) Describe redundancies present in the images. What are the ways to remove these redundancies for image compression? (5)
7. (a) Describe region growing. What is the advantage/ disadvantage, if we use more than one seed in region-growing technique? (5)
- (b) Describe Thersholding for image segmentation. (5)

x-x-x