Roll No ....

MCIT-302(B)
M.E./M.Tech., III Semester Examination, June 2020
Digital Image Processing
(Elective-II)
Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.
      ii) All questions carry equal marks.

1. a) What is an Image? How an image is represented? Comment on types of images based on their representations.   5
   b) What type of sensors are used for capturing images? Also explain the principle image capture. Explain this in relation with the image creation in our eyes.   5
   c) Explain the terms "Intensity Resolution" and "Spatial Resolution".   4

2. a) Explain the Quantization process used for digitizing the images.   4
   b) Show by block diagram, the fundamental steps of Digital Image Processing. Write explanatory note about each step.   10

3. a) What is the need of image transformation? Explain.   4
   b) Give examples of some point operation based transformations. Draw functions in each cases.   6
   c) Explain Piecewise Linear Transformation function.   4

4. a) What are the benefits of Bit Plane Slicing? Explain the reason.   4
   b) Define histogram of an image with proper mathematical notations. Draw histogram of the sample image with the intensity values as given below. Comment on the significance of histogram processing in DIP.   6

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

   c) What is histogram equalization done for? Discuss about variants of histogram equalization. 4

5. a) What is image filtering? How image filtering is used for image enhancement? Explain the spatial domain filtering process.   5
   b) Short detailed note on Smoothening filters and sharpening filters. Discuss about their applicability. List name of some popular filters in two cases.   9

6. a) Write a differentiating notes on Low Pass, Band pass and High Pass filters.   5
   b) Comment of the significance of edge detection operation in image processing. Also explain any two techniques used for edge detection.   6
   c) Write short note on Hough Transform.   3

7. a) What is thresholding used for? Write about different types of thresholding.   5
   b) What is segmentation? Which primary characteristics of an image are used for segmenting the image.   4
   c) Define "Feature". Discuss in detail about the features used for texture analysis in an image. 5

8. a) How color image is represented? What do we understand by the term "Color Space"? List some of the popular color spaces used for color image representations.   5
   b) Discuss about the segmentation techniques used for color image segmentation.   4
   c) Explain the Erosion and Dilation processes. What is the effect of these two processes on the histogram of resultant image?   5

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