



- Notes :
1. All questions carry marks as indicated.
  2. Solve Question 1 OR Questions No. 2.
  3. Solve Question 3 OR Questions No. 4.
  4. Solve Question 5 OR Questions No. 6.
  5. Solve Question 7 OR Questions No. 8.
  6. Solve Question 9 OR Questions No. 10.
  7. Solve Question 11 OR Questions No. 12.
  8. Due credit will be given to neatness and adequate dimensions.
  9. Assume suitable data whenever necessary.
  10. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Draw the block diagram & explain various components of an Image processing system. **9**
- b) Define : **5**
- |                     |                |
|---------------------|----------------|
| i) Hue              | ii) Saturation |
| iii) Contrast       | iv) Brightness |
| v) Mach band effect |                |

**OR**

2. a) Explain with the help of example image sampling & quantization. **7**
- b) What are different transforms used in DIP ? Explain the most advantages one. **7**
3. a) Elaborate Histogram processing. Gray level histogram of an image is given below. **10**

Gray level	1	2	3	4	5	6	7
Frequency	700	1350	2500	3000	1500	550	0

Compute the gray level histogram of the output image obtained by enhancing the input by histogram equalization technique.

- b) Specify the expressions of following filters - **3**
- i) Harmonic mean filter
  - ii) Geometric mean filter
  - iii) Contra harmonic mean filter.

**OR**

4. a) Write short notes on : **8**
- i) Harmonic filters.
  - ii) Median filters.
  - iii) Histogram matching.

- b) How RGB model is represented using HSI format ? Describe the transformation. **5**
5. a) Elaborate the model of Image Degradation / Restoration Process. Also illustrate different causes of image degradation. **7**
- b) How Wiener filtering is useful to reduce the mean square error ? **6**

**OR**

6. a) Differentiate between constraint restoration & unconstraint restoration. **6**
- b) Write short notes on **any two**. **7**
- i) Inverse filtering
- ii) Wiener filtering
- iii) Geometric transformations.
7. a) Describe a point detection method for detection of isolated point in an image. **5**
- b) What is thresholding ? State the algorithm for global thresholding. **6**
- c) State the line masks for detecting lines in - **3**
- i) Horizontal direction
- ii) Vertical direction
- iii) -45 direction

**OR**

8. a) Discuss how region splitting & merging approach is used in image segmentation. **6**
- b) Elaborate the process of Dam construction & watershed in segmentation. **8**
9. a) A source emits letters from an alphabet  $A = \{a_1, a_2, a_3, a_3, a_4, a_5\}$  with probabilities  $P(a_1) = 0.2, P(a_2) = 0.4, P(a_3) = 0.2, P(a_4) = 0.1$  and  $P(a_5) = 0.1$  **8**
- i) Find the Huffman code for this source ?
- ii) Find the average length of this code and its redundancy ?
- b) Briefly explain transform coding with neat sketch. **5**

**OR**

10. a) Explain the need of image compression how run length encoding approach is used for compression ? Is it lossy ? Justify. **8**
- b) How images are compressed using JPEG image compression standard ? **5**
11. a) Explain need of feature extraction in image processing. Also explain boundary based description. **7**

b) Describe following attributes -

- i) Topological attributes.
- ii) Geometric attributes

6

**OR**

12. a) Write short notes on :

13

- i) Object Recognition
- ii) Clustering
- iii) Tree search
- iv) Graph matching.

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