

(2 ½ Hours)

[Total Marks: 60]

- N.B:**
- (1) **All questions are compulsory.**
 - (2) Figures to the **right** indicate full marks.
 - (3) **Assume additional data if necessary** but state the same clearly.
 - (4) Symbols have their usual meanings and tables have their usual standard design unless stated otherwise.
 - (5) Use of **calculators** and statistical tables are **allowed**. / If required keep it.

- Q.1 Attempt **any two** of the following (12)
- a) What is signal? Types of signal and Explain term periodic and aperiodic signal? 6
 - b) What is noise and types of noise? Explain Gaussian noise? 6
 - c) Write note on discrete Fourier transform and inverse discrete Fourier transform? Write any five properties of DFT with formula? 6
 - d) Explain term- (1) High Pass Filter (2) Low Pass Filter 6
- Q.2 Attempt **any two** of the following (12)
- a) What is image processing? Explain briefly application of image processing? 6
 - b) What is Log Transform and Power – Law transform? 6
 - c) Explain Histogram Equalization technique? 6
 - d) Explain smoothing of Images using linear filter with mean filter? 6
- Q.3 Attempt **any two** of the following (12)
- a) Explain Robert edge detection techniques with example. 6
 - b) Explain Hit-or-Miss Transformation with

$$A \circledast B = (A \ominus B_1) \cap (A^c \ominus B_2)$$
 6
 - c) Explain Basic Morphological Operations and write note on convex hull morphological algorithm. 6
 - d) Explain boundary extracting technique. 6

Q.4 Attempt **any two** of the following (12)

- a) The following six symbol and their probabilities are given in tabular form. Generate Huffman code for them. 6

Symbol	A1	A2	A3	A4	A5	A6
Probability	0.1	0.4	0.06	0.1	0.04	0.3
Find average word length?						

- b) What is Histogram of Oriented Gradients and Explain steps to calculate HOG features. 6

- c) Write short note on following: 6

(1) Region-Based Segmentation (2) Edges based segmentation

- d) Explain Grabcut algorithm with use of GrabCut uses Gaussian Mixture Models (GMM)? 6

Q.5 Attempt **any two** of the following (12)

- a) Find the circular convolution of the two finite duration sequences $x_1(n) = \{1, -1, -2, 3, -1\}$ $x_2(n) = \{1, 2, 3\}$ 6

- b) Explain the any six tools and libraries for image processing? 6

- c) Explain Edge Detection technique? 6

- d) Write note on properties of Fourier transform? 6