

Reg. No. :

Question Paper Code : 10189

M.E./M.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Second Semester

Applied Electronics

AP 5292 — DIGITAL IMAGE PROCESSING

(Common to M.E. VLSI Design)

(Regulation 2017)

Time : Three hours

Maximum : 100 marks

(Code/Tables/Charts to be Permitted, if any may be indicated)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is medical axis of an object?
2. Mention the use of thinning operation in binary images.
3. Specify the two dimensional Haar transformation matrix.
4. What is one-dimensional discrete Fourier transform?
5. What is Bayesian classification?
6. Mention the applications of Hough transform.
7. Specify any one spatial filter used for image enhancement.
8. What is chromaticity? Mention the use of chromaticity diagram.
9. Mention the difference between lossless and lossy compression schemes.
10. What is quantization in image compression?

PART B — (5 × 13 = 65 marks)

11. (a) What are the three principal sensor arrangements? Explain the method of generating images using these sensors. (13)

Or

- (b) Explain the four major morphological operations and its use in image processing with necessary equations. (13)

12. (a) Explain discrete cosine transform with necessary equation and its application. (13)

Or

- (b) Explain discrete wavelet transform with respect to one dimensional and two dimensional signals. (13)
13. (a) Explain the method of performing histogram equalization. (13)

Or

- (b) Explain the first order and second order edge detection methods with its masks. (13)
14. (a) Explain the steps for filtering in the frequency domain with respect to ideal low pass filter. (13)

Or

- (b) Explain the conversion of RGB to HSI color space and segmentation of red components in HSI color space. (13)
15. (a) Explain lossless and lossy prediction based compression schemes with examples. (13)

Or

- (b) Discuss the JPEG baseline coding and decoding system. (13)

PART C — (1 × 15 = 15 marks)

16. (a) (i) Construct Huffman code for the symbols $Z = \{a, b, c, d\}$ the probabilities of the symbols are $P(z) = (0.5, 0.3, 0.1, 0.1)$. Obtain the code for the string "dbca". (8)
- (ii) Derive the equation for color image edge detection using vector method. (7)

Or

- (b) (i) A 24-bit RGB color image of resolution 2048×2048 needs 3MB of memory after compression. Calculate the compression ratio and percentage of memory savings with necessary equations. (7)
- (ii) Explain in detail any four major applications of digital image processing. (8)