Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 53226

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

Sixth/Seventh Semester

Information Technology

IT 6005 — DIGITAL IMAGE PROCESSING

(Common to Biomedical Engineering/Computer Science and Engineering/
Electronics and Communication Engineering/Electronics and Instrumentation
Engineering/Instrumentation and Control Engineering/
Mechatronics Engineering/Medical Electronics)

(Regulation 2013)

(Also common to PTIT 6005 – Digital Image Processing for B.E. (Part-Time)
Sixth Semester – Electronics and Communication Engineering – Regulation 2014)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   Define spatial resolution. How it is represented quantitatively?

2.   What is the memory required to store a 512*512 RGB image of 8 bit resolution?

3.   What is histogram? How is it generated for an image

4.   How negative of an image is obtained?

5.   Give the 3 × 3 mask to detect horizontal line in an image.

6.   How an image is segmented using thresholding?

7.   State the advantages of Wavelets.

8.   Define the objective fidelity criterias used for assessment in image compression.

9.   What is Euler number?

10. Distinguish between pattern and pattern class.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Derive 2D sampling theorem and describe proper reconstruction of an image. (8)

    (ii) Discuss the fundamental steps in digital image processing. (5)

Or

(b) (i) How an image is quantized? Explain. What is the effect on the image quantization levels if it is reduced? (7)

    (ii) What is HSI color model? How an RGB image is converted into HSI? Explain. (6)

12. (a) (i) Perform histogram equalization of the image (8)

    Gray levels r_k 0   1   2   3   4   5   6   7

    No.of pixels p_k 6   8   11   12   3   5   15   6

    (ii) How contrast stretching and intensity level slicing is performed on an image? Explain. (5)

Or

(b) (i) How low-pass and high-pass filtering is performed in frequency domain given an image? Explain. (8)

    (ii) Apply spatial high-pass filter for the marked pixels in the image. (5)

$$\begin{pmatrix} 1 & 2 & 3 \\ 4 & \boxed{3} & 2 \\ 1 & \boxed{5} & 6 \end{pmatrix}$$

13. (a) (i) How image restoration is performed using Wiener filter? Explain. (8)

    (ii) Apply a suitable filter for the marked pixels in the image, which is corrupted by salt and pepper noise. (5)

$$\begin{pmatrix} 2 & 4 & 6 \\ 4 & 255 & \boxed{0} \\ 3 & \boxed{255} & 6 \end{pmatrix}$$

Or

(b) (i) Discuss the behavior of first and second order derivatives for a step and ramp edge. (8)

    (ii) How an image is segmented using region growing technique? Explain. (5)

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14. (a) (i) Explain Wavelet coding system. (5)

    (ii) Construct the Huffman code for the word "ILLUSION" (8)

Or

    (b) (i) What is Lossless predictive coding? Explain. (6)

    (ii) Explain JPEG based image compression technique. (7)

15. (a) (i) How to represent boundaries using chain code? Explain. (7)

    (ii) What is texture? How texture features are extracted in an image? (6)

Or

    (b) (i) What regional descriptors are used to represent an image? Explain. (6)

    (ii) How patterns are recognized based on matching? Explain. (7)

PART C — (1 × 15 = 15 marks)

16. (a) Design a system for recognition of number plates in vehicles using image processing techniques. Suggest a suitable algorithm for each step.

Or

    (b) Design a system for detecting driver drowsiness using image processing techniques. Suggest a suitable algorithm for each step.