Total No. of printed pages = 3

ECE 1817 OE 21   05/01/2023

Roll No. of candidate [　　　　　　　　　　]

2022

B.Tech. 7th Semester End-Term Examination

ECE + ETE

IMAGE PROCESSING

New Regulation (w.e.f. 2017-18) &

New Syllabus (w.e.f. 2018-19)

Full Marks – 70   Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No. 1 and any *four* from the rest.

1. Answer the following :   (10 × 1 = 10)

   (i)   The tool that helps in zooming shrinking, rotating etc is called ————.

   (a) Filters   (b) Interpolation

   (c) Sampling   (d) None of the above

   (ii) ———— is an effect of using an inadequate amount of intensity levels in a digital Image's smooth areas.

   (a) Contouring   (b) Interpolation

   (c) Gaussian smooth   (d) False contouring

   (iii) The procedure in which individual pixel values of the digital image gets altered is known as ————.

   (a) Neighbourhood operation

   (b) Image registration

   (c) Geometric spatial transformation

   (d) Single pixel operation

   (iv) Blurring an image with the help of a smoothing filter may lead to noise reduction.

   (a) True   (b) False

[Turn over

(v) Median filters belong to which category of filter?

    (a) Frequency domain filter   (b) Order statistics filter

    (c) Linear spatial filter   (d) Sharpening filter

(vi) Howls radiance measured?

    (a) Lumens   (b) Watts

    (c) Armstrong   (d) Hertz

(vii) How does picture formation in the eye vary from image formation in a camera?

    (a) Fixed focal length

    (b) Varying distance between lens and imaging plane

    (c) No difference

    (d) Variable focal length

(viii) What does image differentiation enhance?

    (a) Edges   (b) Pixel density

    (c) Contours   (d) None of the above

(ix) Histograms are the basics for numerous spatial domain processing techniques.

    (a) True   (b) False

(x) What are the characteristics that are taken together in chromaticity?

    (a) Saturation and brightness

    (b) Hue and saturation

    (c) Hue and brightness

    (d) Saturation, hue and brightness

2. (a) Discuss five application areas of digital image processing. (6)

  (b) Justify the statement "Median filter is an effective tool to minimize salt and pepper noise" through simple illustration. (5)

  (c) Explain about image sampling and quantization. (4)

3. (a) Obtain the Haar transformation matrix for N = 2. (6)

  (b) What is high boost filter? (3)

  (c) Perform histogram equalization for an 8-level image shown below. (6)

$f(x, y) =$	4	6	0	3	7
	2	1	5	0	3
	4	2	7	0	7
	1	5	4	6	0
	4	7	5	4	1

4. (a) State three differences between image enhancement and image restoration. (3)

(b) Draw the degraded model diagram and explain. (5)

(c) State the advantages and disadvantages of Inverse filter and Wiener filter. (2 + 2 = 4)

(d) What are the main goals of bit plane slicing? (3)

5. (a) State the characteristics of the segmentation process. (4)

(b) List the second order edge detection operators. (2)

(c) Explain the region growing algorithm. (6)

(d) Describe simultaneous contrast. (3)

6. (a) Define the following :

(i) Hue

(ii) Saturation

(iii) Intensity

(iv) Radiance

(v) Luminance

(vi) Brightness (6)

(b) Discuss the tristimulus theory. (6)

(c) Define Run-length coding. State its advantages and disadvantages. (3)

7. (a) Calculate the efficiency of Huffman code for the following symbols whose probability of occurrence is given below. (8)

Symbol	Probability
A1	0.40
A2	0.15
A3	0.16
A4	015
A5	0.19

(b) Explain the JPEG image compression standard. (7)

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