Reg. No. :

Question Paper Code: 99215

B.E./B.Tech. DEGREE EXAMINATION, APRIL 2024

Professional Elective

Computer Science and Engineering

19UCS915 - IMAGE PROCESSING

(Régulations 2019)

Duration: Three hours   Maximum: 100 Marks

Answer All Questions

PART A - (10 x 2 = 20 Marks)

1. What do you meant by Color model and give the primary and secondary colors   CO1 U

2. Explain the categories of digital storage?   CO1 U

3. Consider the following two images. The addition and subtraction of images are given by f1+f2. Assume both the images are of the 8-bit integer type.   CO2 AP

   f1= 100 100 100   and   f2 = 50 50 25

        50   50   50   40 40 50

        200 150 150   50 50 75

4. List various gray level transformation techniques.   CO1 U

5. Give the mask used for high boost filtering.   CO1 U

6 Define high pass filter in frequency domain   CO1 U

7 Calculate values of a standard 8.5" by 11" sheet of paper scanned at 100 samples per inch (dpi) and quantized to two gray levels (binary image) would require more than 100k bytes to represent   CO2 AP

8 Give the different types of data redundancy   CO1 U

9 Which morphological operation is used for smoothing an object in grayscale?   CO1 U

10 Write a matlab code to perform morphological erosion.   CO2 AP

<div align="center">PART – B (5 x 16= 80 Marks)</div>

11. (a) (i) Enlist various fundamental steps in Digital Image Processing   CO1U   (10)
        with neat block diagram.
        (ii) Explain various components of Digital Image processing   CO1U   (6)

    (b) (i) Explain the concept of color models and conversion between   CO1U
        one color model to another color model   (10)
        (ii) Explain in detail about sampling and quantization.   CO1U   (6)

12. (a) Consider the following image and perform Smoothing spatial filter CO2 AP   (16)
        to apply Correlation method using 3X3 neighborhood –Weighted
        average filter

4	4	4
3	4	5
3	5	5

    (b) Obtain Histogram matching for a given image (4 x 4) – 4 bit per   CO2 AP   (16)
        pixel is given by (i) and (ii)
            (i)

4	3	5	2
3	6	4	6
2	2	6	5
7	6	4	1

        (ii)

$$\begin{bmatrix} 4 & 4 & 4 & 4 & 4 \\ 3 & 4 & 5 & 4 & 3 \\ 3 & 5 & 5 & 5 & 3 \\ 3 & 4 & 5 & 4 & 3 \\ 4 & 4 & 4 & 4 & 4 \end{bmatrix}$$

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13. (a) Convert the given spatial domain image using Fourier transform and perform Ideal low pass filter to smoothen the image choose D0 as 0.5. Show the step by step procedure for doing the same.

CO2 AP (16)

1	0	1	0
1	0	1	0
1	0	1	0
1	0	1	0

(b) Convert the given spatial domain image using Fourier transform and perform Gaussian low pass filter to smoothen the image choose D0 as 0.5. Show the step by step procedure for doing the same.

CO2 AP (16)

1	0	1	0
1	0	1	0
1	0	1	0
1	0	1	0

14. (a) An Let the transition probabilities for run-length encoding of a binary image (0:black and 1:white) be $p0 = P(0/1)$ and $p1 = P(1/0)$. Assuming all runs are independent, find (a) average run lengths, (b) entropies of white and black runs, and (c) compression ratio.

CO2 AP (16)

Or

(b) For a given image F=

CO2 AP (16)

6	5	7
2	8	4
6	3	7

W1=

0	-1	0
0	2	0
0	-1	0

Apply the following filter mask W1 on the input image F and obtain the output image

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15. (a) Discuss basic morpho analytical algorithms for region filling with   CO1 U   (16)
    suitable example

    (b) How can hit-or-miss transformation be used for extracting specific   CO1 U   (16)
    pixel configuration in an image? Give suitable example

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