PAPER ID-420519

Roll No:

BTECH
(SEM VI) THEORY EXAMINATION 2021-22
IMAGE PROCESSING

Time: 3 Hours   *Total Marks: 100*

Note: Attempt all Sections. If you require any missing data, then choose suitably.

SECTION A

1.   Attempt *all* questions in brief.   2*10 = 20

Qno	Questions	CO
(a)	Discuss photopic and scotopic vision.	1
(b)	Explain gamma correction in image processing.	1
(c)	Identify the need of Fourier transform.	2
(d)	Explain the relevance of DFT in image processing.	2
(e)	Describe motion blur in image restoration.	3
(f)	Differentiate between band pass and band reject filter.	3
(g)	Write short note on watershed segmentation.	4
(h)	Discuss dilation & erosion in morphological image processing.	4
(i)	Discuss Huffman encoding and shift codes.	5
(j)	Write a short note on regional descriptors.	5

SECTION B

2.   Attempt any *three* of the following: 10*3 = 30

Qno	Questions	CO
(a)	Explain sampling and quantization and differentiate it. Also explain aliasing in context of image sampling.	1
(b)	Given Image f(x,y), Assuming that grey level is 0-7, Apply the following transformation: inversion, square root, square and logarithm function, given a= 0.5. Analyse the change in output image.	2
(c)	Illustrate homomorphic filter and derive the transfer function of it. Why do we not prefer higher–order derivatives filters?	3
(d)	Illustrate the image segmentation method based on thresholding. Also discuss various types of thresholding.	4
(e)	Explain the need of data compression in image processing. Discuss Run length encoding technique by using an example.	5

Table for question 2(b):

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

SECTION C

3.   Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	(table below) Discuss histogram specification. Calculate the histogram of the output image obtained by enhancing the input by histogram equalization technique.	1
(b)	Illustrate colour models. Explain in detail how colour models are converted to each other.	1

Table for question 3(a):

Gray level	0	1	2	3	4	5	6	7
Frequency	400	700	1350	2500	3000	1500	550	0

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4. **Attempt any *one* part of the following:** 10 *1 = 10

Qno	Questions	CO
(a)	Derive the expression of second order derivative of image sharpening i.e. Laplacian filter.	2
(b)	Analyze the impact if the arithmetic mean filter is applied to an image again and again? What will happen if we use the median filter instead?	2

5. **Attempt any *one* part of the following:** 10*1 = 10

Qno	Questions	CO
(a)	Analyze the concept and expression of restored image using minimum mean square approach.? What are the advantages of a Wiener filter over an inverse filter?	3
(b)	Illustrate different restoration filters in frequency domain. What is the significance of Notch filter in image restoration?	3

6. **Attempt any *one* part of the following:** 10*1 = 10

Qno	Questions	CO
(a)	Discuss the following: (i) Border Tracing (ii) Edge Relaxation.	4
(b)	Discuss robert, sobel, prewitt operator of edge detection. For the given image write down the 8 chain code & find shape number of it.	4

7. **Attempt any *one* part of the following:** 10*1 = 10

Qno	Questions	CO
(a)	Discuss why do we focus on boundary. Which descriptor is used to describe holes and connected components of the region?	5
(b)	The characters a to h have the set of frequencies based on the first 8 Fibonacci numbers as follows: a : 1, b : 1, c : 2, d : 3, e : 5, f : 8, g : 13, h : 21 A Huffman code is used to represent the characters. What is the sequence of characters corresponding to the following code? 110111100111010	5