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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

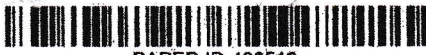
2. Attempt any three of the following:**10*3 = 30**

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. <table border="1" style="margin: 10px auto;"> <tr><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td>5</td><td>5</td><td>6</td><td>6</td></tr> <tr><td>6</td><td>7</td><td>6</td><td>6</td></tr> <tr><td>6</td><td>7</td><td>2</td><td>3</td></tr> </table>	1	2	3	4	5	5	6	6	6	7	6	6	6	7	2	3	2
1	2	3	4															
5	5	6	6															
6	7	6	6															
6	7	2	3															
(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																

SECTION C

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

Qno	Questions	CO																		
(a)	<table border="1" style="margin: 10px auto;"> <tr> <td>Gray level</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> </tr> <tr> <td>Frequency</td> <td>400</td> <td>700</td> <td>1350</td> <td>2500</td> <td>3000</td> <td>1500</td> <td>550</td> <td>0</td> </tr> </table> Discuss histogram specification. Calculate the histogram of the output image obtained by enhancing the input by histogram equalization technique.	Gray level	0	1	2	3	4	5	6	7	Frequency	400	700	1350	2500	3000	1500	550	0	1
Gray level	0	1	2	3	4	5	6	7												
Frequency	400	700	1350	2500	3000	1500	550	0												
(b)	Illustrate colour models. Explain in detail how colour models are converted to each other.	1																		



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

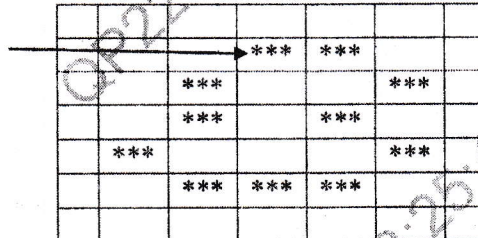
Qno	Questions	CO
(a)	Derive the expression of second order derivative of image sharpening i.e. Laplacian filter.	2
(b)	Analyze the impact if the arithmetic mean filter is applied to an image again and again? What will happen if we use the median filter instead?	2

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