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PES UNIVERSITY

PES University, Bangalore

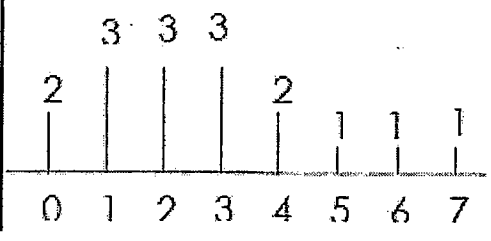
(Established under Karnataka Act No. 16 of 2013)

UE14CS348

MAY 2017: END SEMESTER ASSESSMENT (ESA) B.TECH. VI SEMESTER

UE14CS348 DIGITAL IMAGE PROCESSING QP (Dr SN)

Time: 3 Hrs | Answer All Questions | Max Marks: 100

1.	a)	How eye is able to adjust the range of light intensity levels as well as able to discriminate the changes in brightness levels? Explain this using the necessary concepts	6
	b)	We know that the color of a light/object we see depends on the selective transmission or reflections of some wavelengths more than others. Based on this fact, explain why the sky on earth looks blue, but the same sky on moon looks black. Why?	3
	c)	Consider the two image subsets, S_1 and S_2, shown in the following figure. For V = {1}, determine whether these two subsets are (i) 4-adjacent, (iii) 8-adjacent, or (iii) *m*-adjacent S_1 / S_2 0 0 0 0 0 | 0 0 1 1 0 1 0 0 1 0 | 0 1 0 0 1 1 0 0 1 0 | 1(q) 1 0 0 0 0 0 1 1 1(p) | 0 0 0 0 0 0 0 0 1 1 1 | 0 0 1 1 1	6
	d)	Describe the image acquisition system in terms of either (i) single imaging sensor or (ii) line sensor	5
2.	a)	Critically comment about the quality of the images with respect to following: i) Histogram clustered at the low end. ii) Histogram clustered at the high end. iii) Histogram with a small spread. iv) Histogram with a wide spread	4
	b)	Why the Laplacian is not used in original form for edge detection? Explain the way it is used for edge detection in an image.	5
	c)	Consider the following 4x4 matrix of a 3-bit image, find histogram matching of this image using the following desired histogram. 2 3 3 2 4 2 4 3 3 2 3 5 2 4 2 4 	7

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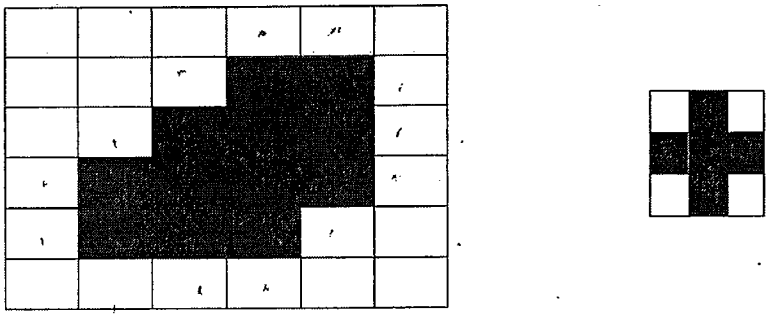
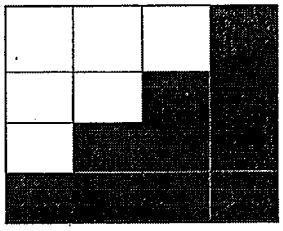
	d)	Compute the mean value and median value of the pixels of underlined numbers using 3 X 3 mask 18 22 33 25 32 24 34 <u>128</u> 24 <u>172</u> 26 23 22 19 32 31 28 26	4
3	a)	Explain why it is common to work with the transform of an image instead of the image itself.	6
	b)	What are the steps for image filtering in frequency domain? Explain with a block diagram?	7
	c)	In the image formation model how do you separate the low frequency and high frequency components? How is it applied in homomorphic filtering?	7
4.	a)	How can you detect boundary using morphological operations?	3
	b)	For the image given below and the 3 X 3 structuring element centered in the mid pixel find the dilated and eroded image. 	3+3
	c)	Explain by means of an example, the parameter space. Based on this describe basic principle of Hough Transform? How do you apply it to detect lines in an image?	1+2+3
	d)	What are the advantages/disadvantages if we use more than one seed in a region growing technique? Apply split and merge technique to 	2+3
5.	a)	Differentiate between True Colour, False Colour and Pseudo Colour and explain where each of these are useful	3+1
	b)	RGB is often not the most convenient colour space. (i) Name and explain the main drawback, which is common in practical image processing (ii) Give an alternative colour model and briefly explain the model	2 4
	c)	What is the principle of Huffman coding? Encode the text AADHAR using Huffman coding	1+4
	d)	Encode the first 3 characters of BREED using Arithmetic coding.(ie. BRE)	5