Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: EC370
Course Name: DIGITAL IMAGE PROCESSING

Max. Marks: 100   Duration: 3 Hours

PART A
Answer any two full questions, each carries 15 marks.

                                                             Marks

1 a) State and explain the 2D sampling theorem. Explain how aliasing errors can be eliminated?   (7)

   b) Define the terms brightness, contrast, hue and saturation with respect to a digital image.   (4)

   c) Explain the terms False contouring and Mach band effect.   (4)

2 a) Perform KL transform on the following matrix.   (8)

$$x = \begin{bmatrix} 4 & -2 \\ -1 & 3 \end{bmatrix}$$

   b) State and prove the convolution property of 2D DFT.   (7)

3 a) Compute the 2D DFT of matrix $x = \begin{bmatrix} 4 & 6 \\ 3 & 4 \end{bmatrix}$ (7)

   b) Find the DCT of the sequence x(n) = {11,22,33,44}.   (4)

   c) Explain the energy compaction property of DCT.   (4)

PART B
Answer any two full questions, each carries 15 marks.

4 a) What is meant by histogram equalization of an image? Explain how histogram equalization can be performed on a given gray scale image, with necessary mathematical details.   (7)

   b) Distinguish between image enhancement and image restoration. Give an example for each.   (4)

   c) What are the steps involved in homomorphic filtering?   (4)

5 a) Distinguish between smoothing and sharpening filters. Give the appropriate masks for any one smoothing and sharpening filters.   (8)

	b)	Explain the image restoration mechanism using a Weiner filter.	(7)
6	a)	Explain how a degraded image can be restored using an inverse filter. Explain its limitations.	(7)
	b)	Explain any two geometric transformations on an image.	(4)
	c)	Explain how low pass filtering can be performed using frequency domain method.	(4)

PART C
Answer any two full questions, each carries 20 marks.

7	a)	Explain the method of global thresholding for image segmentation.	(6)
	b)	What is Laplacian of an image? Derive an appropriate mask for the Laplacian operator. Explain how Laplacian can be used for detecting edges in an image.	(9)
	c)	What is a LoG filter? Give an appropriate mask for a LoG filter.	(5)
8	a)	Explain the active contour algorithm for image segmentation.	(8)
	b)	Explain hoe lines can be detected using Hough transform.	(7)
	c)	Compare the image compression standards JPEG and MPEG.	(5)
9	a)	Explain the different steps in dictionary based compression algorithm.	(7)
	b)	Explain the use of wavelet transforms in image compression.	(7)
	c)	Illustrate Huffman coding with an example.	(6)

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