

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 how 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)
