

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: CS463

Course Name: DIGITAL IMAGE PROCESSING

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 4 marks.

		Marks
1	What is meant by Moire patterns and aliasing in imaging.	(4)
2	Find the 4 order Hadamard Transform for the following image segment:	(4)
	$\begin{matrix} 2 & 1 & 2 & 1 \\ 1 & 2 & 3 & 2 \\ 2 & 3 & 4 & 3 \\ 1 & 2 & 3 & 2 \end{matrix}$	
3	Define Energy compaction? Explain how energy compaction of unitary transform useful in image processing	(4)
4	Explain the following gray level transformations	(4)
	<ul style="list-style-type: none"> a) Logarithmic b) Power Law 	
5	Differentiate between ideal low pass and high pass filter in frequency domain.	(4)
6	How can order statistic filter be used for image enhancement?	(4)
7	Write short note on 1) Line edge 2) Ramp edge	(4)
8	Explain the significance of adaptive thresholding compared to global thresholding	(4)
9	Explain the following morphological operations with suitable examples	(4)
	<ul style="list-style-type: none"> i) Closing ii) Opening 	
10	Briefly explain Fourier Descriptor.	(4)

PART B

Answer any two full questions, each carries 9 marks.

11	a) Find the 4 order forward and inverse DFT for the following image segment:	(5)
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1 1 1 1

1 1 1 1

1 1 1 1

1 1 1 1

- b) Explain any four properties of 2D Fourier transform. (4)
- 12 a) Illustrate and briefly explain the image formation model. Explain the significance of sampling and quantization. (6)
- b) List out any one application each where image processing is used in Gamma Ray imaging and Microwave Imaging. (3)
- 13 a) What are the major components of an image processing system? (4)
- b) Verify whether the DFT matrix is unitary or not for $N=4$. (5)

PART C

Answer any two full questions, each carries 9 marks.

- 14 a) Illustrate and explain the steps in homomorphic filtering. (5)
- b) Explain butterworth low pass and high pass filter for enhancement in frequency domain. (4)
- 15 a) Perform histogram equalization of the following 3 bit gray scale image whose gray level distribution is given as follows: (5)

Gray level	0	1	2	3	4	5	6	7
No. of Pixels	8	10	10	2	12	16	4	2

- b) In a given application an averaging mask is applied to input images to reduce noise, and then a laplacian mask is applied to enhance small details. Would the result be the same if the order of these operations were reversed? (4)
- 16 a) Explain the various sharpening filters used in spatial domain. (5)
- b) What is meant by high boost filtering? Derive the mask used for the filter. (4)

PART D

Answer any two full questions, each carries 12 marks.

- 17 a) Apply opening and closing operation on the image sample A given below with structuring element B (6)

$$A = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix} \quad \text{and} \quad B = \begin{bmatrix} 1 & 1 & 1 \end{bmatrix}$$

- b) Describe how boundary in image can be represented with chain code with an example. (6)
- 18 a) Explain Region splitting and merging algorithm with example (7)
- b) Write short note on Prewitt, Robert's and Sobel edge detectors. (5)
- 19 a) Describe various thresholding based image segmentation methods. Explain any one global threshold detection method. (8)
- b) Explain hit or miss transformation with an example. (4)
