Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Sixth Semester B.Tech Degree (R,S) Examination May 2024 (2019 Scheme)

Course Code: ECT352

Course Name: DIGITAL IMAGE PROCESSING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks. Marks

1	How do you define a digital image?	(3)
2	Discuss how the Weber ratio helps in brightness discrimination.	(3)
3	Define a block matrix with a suitable example.	(3)
4	List out the need (any three) for doing image transformations in digital image processing.	(3)
5	Illustrate bit plane slicing with a neat diagram.	(3)
6	Draw the block diagram of homomorphic filtering.	(3)
7	What are the factors affecting image degradation?	(3)
8	What is the geometric transformation of an image? List the geometric transformations which can be applied to an image.	(3)
9	Explain how adaptive thresholding is done.	(3)
10	Mention any three drawbacks of region growing technique, in image segmentation	(3)

PART B

Answer one full question from each module, each carries 14 marks.

Module I

11	a)	Define the terms brightness, contrast, hue, and saturation with respect to a digital image	(8)
	b)	Derive the expression for 2D image sampling.	(6)

OR

12	a)	Explain HSI colour model in detail. Include necessary figures.	(8)
	b)	Explain the three types of adjacency in a digital image.	(6)

Module II

13	a)	State and prove any three properties of the 2 D Fourier Transform.	(9)

b) Determine if the following matrix is orthogonal or not. $A=\frac{1}{\sqrt{2}}\begin{bmatrix}1 & 1\\ -1 & 1\end{bmatrix}$ (5)

OR

14 a) Explain the process of JPEG compression in an image with help of neat block diagram. (9)

b) Perform 2D Haar transform on $f(m,n)=\begin{bmatrix}4 & -1\\ 2 & 3\end{bmatrix}$ (5)

Module III

15 a) Perform histogram equalization of the image $I=\begin{bmatrix}0 & 0 & 1 & 1\\ 2 & 2 & 1 & 0\\ 1 & 3 & 3 & 2\\ 2 & 4 & 5 & 6\end{bmatrix}$ (7)

b) Compare Ideal, Butterworth, and Gaussian Low Pass Filters. (7)

OR

16 a) Differentiate between mean and median filters. Give a suitable example for each. (7)

b) Explain contrast stretching with the help of graph. (7)

Module IV

17 a) Explain the three ways to estimate the degradation function in detail. (7)

b) Explain image restoration using inverse filtering. (7)

OR

18 a) Explain the image degradation model with a neat diagram. (7)

b) Explain how the Weiner filter helps to restore degraded images with suitable equations. (7)

Module V

19 a) Explain the Region splitting and merging approach in image segmentation. (7)

b) Explain the active contouring process used in image segmentation (7)

OR

20 a) List out the steps to perform Haugh Transform to link edges in an image. (7)

b) List out the steps to perform K-mean clustering in image segmentation. (7)

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