Q. Code:780001

Reg. No. | | | | | | | | | | | | | |

B.E / B.TECH.

DEGREE EXAMINATIONS, MAY 2024

Sixth Semester

EC18008 - DIGITAL IMAGE PROCESSING

(Electronics and Communication Engineering)

(Regulation 2018 / 2018A)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Examine the different image enhancement techniques.	**2**
CO 2	Identify and interrelate the various image compression techniques.	**3**
CO 3	Assess various image transformation techniques and Image analysis.	**3**
CO 4	Determine the image segmentation and classification techniques for various applications.	**3**
CO 5	Infer the various image processing techniques employed for real time applications.	**4**

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Define weber ratio.	**1**	**1**
2.	Compute the Hadamard transform matrix of order 4.	**3**	**3**
3.	For the given image, change the intensity levels between 100 and 180 to 220, while retaining the remaining intensity levels. Specify the technique involved. 130 145 245 20 100 160 230 176 26 57 3 112 158 0 77 200	**1**	**3**
4.	Illustrate the process of filtering in the frequency domain.	**1**	**2**
5.	Draw the image degradation/restoration model.	**3**	**2**
6.	Which filter will be effective in minimizing the impact of “salt and pepper” noise in an image?Justify.	**3**	**3**
7.	Compare supervised and unsupervised learning.	**4**	**2**
8.	What is the purpose of the convolution layer in CNN?	**4**	**2**
9.	List the types of redundancies in image compression..	**2**	**1**

			Marks	CO	RBT LEVEL
10.		How are Image Processing techniques applied in fingerprint recognition systems?	**5**		**3**

PART- B (5 x 14 = 70 Marks)

			Marks	CO	RBT LEVEL
11. (a)	**(i)**	What are the different steps involved in converting an analog image to a digital image? Illustrate with a neat sketch.	**(7)**	**1**	**3**
	(ii)	Apply DCT to the following input image F and obtain its coefficients. $F=\begin{pmatrix}1&2\\2&1\end{pmatrix}$	**(7)**	**1**	**3**
		(OR)			
(b)	**(i)**	Explain in detail about the fundamental steps in the digital image processing system.	**(7)**	**1**	**3**
	(ii)	Derive the basis vectors using Slant Transform for N=4 and list its properties.	**(7)**	**1**	**3**
12. (a)	**(i)**	Perform Histogram equalization of the image 10 10 12 10 10 14 15 10 13 12 15 14 8 12 8 10 15 14 12 8 14 14 10 12 14 Justify your inference of the image before and after Histogram Equalization.	**(7)**	**1**	**3**
	(ii)	Illustrate and explain with suitable diagrams the HSI color model and the application of the same.	**(7)**	**3**	**2**
		(OR)			
(b)	**(i)**	Illustrate and explain the technique with necessary diagrams to enhance the illumination-reflectance parameter to produce an enhanced image.	**(7)**	**1**	**3**
	(ii)	Elucidate the role of Gradient operator for image enhancement.	**(7)**	**3**	**2**
13. (a)		Design a minimum mean square error restoration model which can remove the degradation as well as noise with relevant mathematical equations.	**(14)**	**4**	**3**

(OR)

(b)	**(i)**	Elucidate the principle of erosion with an example.	**(7)**	**4**	**3**
	(ii)	How can the contours of an image be segmented using the Greedy Snake algorithm?	**(7)**	**4**	**3**
14. (a)		Explain the different layers of Multilayer Feedforward Neural Network with a neat diagram.	**(14)**	**4**	**3**

(OR)

(b)		Sketch the building blocks of convolutional neural network architecture and examine the application of the same for an image classification task.	**(14)**	**4**	**3**
15. (a)	**(i)**	Elucidate the JPEG encoder for image compression with a neat block diagram.	**(7)**	**2**	**3**
	(ii)	Elucidate the various image processing techniques being applied in the vehicle in vision systems.	**(7)**	**5**	**4**

(OR)

(b)	**(i)**	Explain arithmetic coding with an example.	**(7)**	**2**	**3**
	(ii)	Demonstrate the application of face recognition in the field of biometrics.	**(7)**	**5**	**4**

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

			Marks	CO	RBT LEVEL
16.		Construct the Huffman code for the word "MISSISSIPPI" and compute the efficiency and compression ratio for the same.	**(10)**	**2**	**3**

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