

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.

x-x-x

Q-1	Define the following (i) Colour Image enhancement. (ii) JPEG compression method (iii) Contrast stretching (iv) Boundary descriptors (v) Wavelets Transform	2x5																		
SECTION-A																				
Q-2 (i)	Gray level histogram of an image is given below: <table border="1"><tr><td>Gray Levels</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td># of pixels</td><td>8</td><td>10</td><td>10</td><td>2</td><td>12</td><td>16</td><td>4</td><td>2</td></tr></table> Write a complete procedure for histogram equalization and perform it for the 8*8 image distribution.	Gray Levels	0	1	2	3	4	5	6	7	# of pixels	8	10	10	2	12	16	4	2	6
Gray Levels	0	1	2	3	4	5	6	7												
# of pixels	8	10	10	2	12	16	4	2												
(ii)	Write down the mathematical expressions for the 2D Fourier Transform in both the continuous $f(x,y)$ and discrete $f(m,n)$ domains.	4																		
Q-3 (i)	What is the purpose of image restoration? Explain the model of image degradation and restoration process using suitable block diagram.																			
(ii)	Draw the functional block diagram of image compression system and explain the purpose of each block. Also explain lossy compression techniques.	(5,5)																		
Q-4(i)	Explain the following operations: i) Contrast stretching ii) Bit-plane slicing																			
(ii)	Describe the region growing technique for image segmentation and mention the problems associated with it.	(5,5)																		
SECTION-B																				
Q-5(i)	Explain image sharpening using Butterworth highpass and Gaussian highpass filters.																			
(ii)	Apply 2D – Discrete Fourier Transform for the following image $f(m, n) = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 \\ & 1 & 1 & 1 & 1 \\ & & 1 & 1 & 1 & 1 \\ & & & 1 & 1 & 1 & 1 \end{bmatrix}$	(5,5)																		
Q-6 (i)	Predict the Code word, Average Length (L), Entropy (H(s)), Efficiency of the word “COMMITTEE” using binary Huffman coding.																			
(ii)	Derive Wiener filter for image restoration using minimum mean-square approach.	(5,5)																		
Q-7(i)	Determine the median value of the marked pixels of the given matrix using 3 x 3 mask. $F = \begin{bmatrix} 18 & 22 & 33 & 25 & 32 & 24 \\ 34 & 128 & 24 & 172 & 26 & 23 \\ 22 & 19 & 32 & 31 & 28 & 26 \end{bmatrix}$	4																		
(ii)	Differentiate between optimal and Global thresholding.	2																		
(iii)	Gray levels of a 4x4 block (order lexicographically) are as follows: 74 78 75 123 77 79 115 128 76 82 118 125 75 116 124 130 Suggest a code to represent the gray levels in the block using block-truncation coding scheme. What is the amount of error incurred?	4																		

x-x-x