

QP CODE : 811901

(3 Hours)

[ Total Marks : 80

- N.B. (1) Question No. 1 is **Compulsory**.  
 (2) Attempt any **THREE** questions out of remaining questions.  
 (3) Assume any suitable data if required with justification.

Q. 1 Answer the followings:

- a) Explain any one color model.  
 b) Discuss unitary matrix with example.  
 c) Explain lowpass spatial filtering.  
 d) Explain basic morphological operations.

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Q.2 a) Explain any five zero memory point operations.

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- b) Perform histogram equalization and draw new equalized histogram of the following image data.

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Gray level	0	1	2	3	4	5	6	7
Number of pixels	550	900	650	150	300	250	110	90

Q. 3 a) Find the DCT of the given image using matrix multiplication method:

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0	3	3	1
3	1	2	1
3	2	4	2
1	1	2	1

- b) What is segmentation? Explain (i) Region Growing (ii) Region Splitting (iii) Thresholding.

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Q. 4 a) Explain: The first difference makes the chain code invariant to rotation.

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- b) Write 8 x 8 HADAMARD transform matrix and its signal flow graph. Using Butterfly diagram, compute HADAMARD transform for  $x(n) = \{1,2,1,2,1,2,3,4\}$

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Q. 5 a) Classify Image Compression methods in detail along with the different redundancies that can be present in digital images.

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b) Given

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$$F = \begin{bmatrix} 10 & 44 & 16 \\ 10 & 14 & 48 \\ 11 & 10 & 22 \end{bmatrix}$$

Find 3-bit IGS coded image and calculate compression factor, BPP and MSE.

Q. 6 Write notes on (Any two)

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- a) Moments with examples.  
 c) Fidelity criteria.

- (b) Edge linking using Hough transform.  
 (d) Homomorphic filter..