

**321206**

May, 2019

M.Tech. (ECE-2nd Semester)

Digital Image Processing (MECE-204)

Time : 3 Hours]

[Max. Marks : 75

*Instructions :*

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

**PART-A**

1. (a) A set is defined as having elements {1, 2, 3} and relation  $R = \{(1, 2), (2, 3), (1, 3)\}$ . Prove that the relation is transitive. (1.5)
- (b) When are two pixels p and q called as m connected? (1.5)
- (c) Give two difference between DCT and FFT transforms. (1.5)
- (d) Give the value of 3X3 mask to detect a point in an image. (1.5)
- (e) How image is transformed from RGB to CMYK color model. (1.5)

- (f) What is the role of quantization matrix in JPEG compression. (1.5)
- (g) Explain run length compression technique with the help of an example. (1.5)
- (h) Define Aliasing. (1.5)
- (i) Define Erosion. (1.5)
- (j) Explain run length compression technique with the help of an example. (1.5)

**PART-B**

- 2. (a) Give proof of linearity, time shifting and frequency shifting property of fast Fourier Transform. (7.5)
  - (b) How contrast of an image is improved using histogram equalization. Explain the whole process in detail. (7.5)
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- 3. (a) Explain least square restoration model in detail. (7.5)
  - (b) Explain weiner filter in detail. (7.5)
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- 4. (a) Explain the concept of edge detection using laplacian and gradient operator. Also plot its first and second order derivative while moving towards dark to bright and vice versa regions. (7.5)
  - (b) Explain Adaptive Thresholding Method.

- 5. (a) For a given text sequence :  
a b b c d b c c c d c c a e c f e c c c  
Compute (i) Huffman code (ii) Entropy (iii) Efficiency (iv) Compression ratio. (7.5)
  - (b) With the help of block diagram, explain the homomorphic filtering approach for image enhancement. (7.5)
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- 6. (a) How images are compressed using JPEG compression technique. (7.5)
  - (b) What are the fundamental steps in image processing? Explain it with the help of block diagram. (5)
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- 7. Write Short notes on the following :  
(a) Golomb Coding.  
(b) Arithmetic coding. (7.5+7.5)