

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

**Course Code: EC370**

**Course Name: Digital Image Processing**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer any two full questions, each carries 15 marks*

Marks

- 1 a) What are the features of HSI model? How can you perform RGB to HSI conversion? (6)
- b) Explain the fundamental steps involved in digital image processing with the help of a block diagram (5)
- c) What do you mean by a) mach band effect b)m-adjacency ? (4)
- 2 a) State and prove the separability property of 2D-DFT. Find the 2D-DFT of (8)

$$f(m, n) = \begin{bmatrix} 0 & 1 & 2 & 1 \\ 1 & 2 & 3 & 2 \\ 2 & 3 & 4 & 3 \\ 1 & 2 & 3 & 2 \end{bmatrix}$$

- b) What are the features of Walsh transform? Find the 1-D Walsh basis for the fourth order system(N=4) (7)
- 3 a) With a neat figure, explain the construction and operation of a Vidicon camera tube (7)
- b) What are the properties of SVD? How is an image compressed using SVD? (8)

**PART B**

*Answer any two full questions, each carries 15 marks*

- 4 a) Justify the following a) if all the pixels in an image are shuffled, the histogram remains unchanged. b)Median filter is an effective tool to minimise salt and pepper noise (6)
- b) Derive the transfer function of Wiener filter and specify its advantages. (9)
- 5 a) Compare image enhancement and image restoration. Explain how an image is restored using inverse filter. What are its drawbacks? (10)
- b) Explain an image degradation model with necessary figure (5)

6 a) Explain the following a)bit plane slicing b)logarithmic transformation c)image subtraction (6)

b) Perform histogram equalization of the following image (9)

$$\begin{bmatrix} 3 & 4 & 5 & 5 \\ 4 & 4 & 4 & 3 \\ 0 & 0 & 2 & 1 \\ 4 & 5 & 6 & 2 \end{bmatrix}$$

### PART C

*Answer any two full questions, each carries 20 marks*

7 a) With the help of a block diagram, explain the need of image compression. (10)

b) Give the classification of edges and explain the various techniques in detecting edges (10)

8 a) Explain region splitting and merging approach of image segmentation. (10)

b) Explain active contour model for refining an object boundary (10)

9 a) With a block diagram, explain transform coding. (10)

b) An image clip is formed using 6 colours ; white(W), red(R),yellow(Y),green(G) ,blue(B) and orange(O).These occur in the clip with following probabilities;  $P(W)=0.5,P(R)=0.1,P(Y)=0.05,P(G)=0.05,P(B)=0.2,P(O)=0.1$ . Construct a Huffman code and find its efficiency (10)

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