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

Question Paper Code : 80409

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Seventh Semester

Electronics and Communication Engineering

EC 2029/EC 708/10144ECE41 – DIGITAL IMAGE PROCESSING

(Regulations 2008/2010)

(Common to PTEC 2029 for B.E. (Part-Time) Seventh Semester - Regulations 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention the difference between a monochrome and a grayscale image.
2. State two important properties of unitary transforms.
3. Why noise is always considered to be additive, in images?
4. What do you infer from multimodal histogram?
5. Define image degradation model and sketch it.
6. Define rubber sheet transformation.
7. State the conditions for Region Splitting and Merging Processes.
8. What are factors affecting the accuracy of Region Growing?
9. Define Sobel operator.
10. Write the Hadamard transform matrix H_n for n = 3.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the basic concepts of sampling and quantization with neat sketch. (8)

(ii) Find DCT Transform and its inverse for the given 2 × 2 image [3 6; 6 4]. (8)

Or

(b) Obtain forward KL transform for the given vectors.

X1 = [1 0 0]; X2 = [1 0 1]; X3 = [1 1 0] (Tranpose these vectors) and analyze how the principal components are used for remote sensing applications? (16)

12. (a) Illustrate the steps in histogram equalization of the image. (16)

$$\begin{bmatrix} 4 & 4 & 4 & 4 & 4 \\ 3 & 4 & 5 & 4 & 3 \\ 3 & 5 & 5 & 5 & 3 \\ 3 & 4 & 5 & 4 & 3 \\ 4 & 4 & 4 & 4 & 4 \end{bmatrix}$$

Or

(b) With the help of a block diagram, discuss the principle of homomorphic filtering. (16)

13. (a) Explain the image restoration technique to remove the blur caused by uniform linear motion. (16)

Or

(b) Discuss about the Inverse Filtering and Wiener Filtering. (16)

14. (a) How do you perform edge defection? Give suitable algorithm and discuss how the edge points are linked? (16)

Or

(b) Discuss how

(i) Region growing

(ii) Region splitting and merging approaches are used for image segmentation. (16)

15. (a) Determine the Huffmaa code assignment procedure for the following data. (16)

SYMBOL	PROBABILITY
a_1	0.1
a_2	0.4
a_3	0.06
a_4	0.1
a_5	0.04
a_6	0.3

Compute the average length of the code and the entropy of the source. Is Huffman code uniquely decodable? If so, justify your answer. (16)

Or

(b) (i) Discuss the methods of constructing the masking function based on maximum variance and maximum magnitude. (8)

(ii) Draw and explain the block diagram of MPEG encoder. (8)

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