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

Question Paper Code: 1066359

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV / DEC 2024
Sixth Semester
Electronics and Communication Engineering
U20EC603 – IMAGE AND VIDEO PROCESSING
(Regulation 2020)

Time: Three Hours | Maximum: 100 Marks

Answer ALL questions

PART – A (10 x 2 = 20 Marks)

1. List the steps involved in digital image processing.

2. Differentiate Image sampling and Image quantization.

3. Define Point Processing.

4. An image is filtered by an averaging filter of sizes 3×3 and 5×5. Comment on the resulting images.

5. What is meant by coding redundancy?

6. State the difference between lossy and lossless compression.

7. Mention some important parameters of the video signals.

8. Explain the importance of sampling in video signals.

9. State different motion estimation techniques.

10. What are the applications of motion estimation in video coding?

PART – B (5 x 16 = 80 Marks)

11. (a) Apply 2D-DCT to the following matrix: (16)

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

(OR)

(b) Compute the De, D4, D8 distances between two pixels p and q. Let the pixel coordinators of p and q be (3,0) and (2,3) respectively, for the image shown below. Also identify the N_4 , N_D and N_8 neighbors of the pixels p and q. (16)

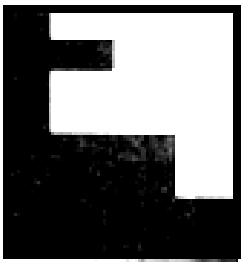
$$\begin{pmatrix} 0 & 1 & 1 & 1\\ 1 & 0 & 0 & 1\\ 1 & 1 & 1 & 1(q)\\ 1(p) & 1 & 1 & 1\end{pmatrix}$$

12. (a) Perform histogram equalization of the image segment. (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) Apply region splitting and merging segmentation technique to segment the given image. (16)



13. (a) Consider the symbols with the following probability distribution. (16)

Symbols	A	B	E	R
Probability	0.2	0.2	0.2	0.4

Code the word **ARBER** using arithmetic coding.

(OR)

(b) Draw the block diagram of Transform coding and explain JPEG Compression in detail. (16)

14. (a) Explain the process of geometric image formation in the context of optics. Include discussions on the role of lenses, image formation by reflection and refraction, ray tracing, and characteristics of images formed by different optical elements. Provide detailed explanations supported by relevant diagrams. (16)

(OR)

(b) Explain the process of photometric image formation. Discuss the key concepts and factors that influence the appearance of objects in images. How does light interaction with surfaces and the camera affect the final image captured? (16)

15. (a) Explain the Block-Based Video Coder with a neat Block Diagram. (16)

(OR)

(b) Explain the methods for Pixel based estimation and Region based estimation in detail. (16)

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