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Question Paper Code : X 67523

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
Sixth/Seventh/Eighth Semester
Electronics and Communication Engineering
CS 1002 – DIGITAL IMAGE PROCESSING
(Common to Computer Science and Engineering)
(Regulations 2008)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Write the orthogonality property of a 2D DFT.
2. What is quantization error ? How this can be reduced ?
3. What is meant by spatial filtering ?
4. Define Histogram.
5. What is white noise ?
6. Why is the bipolar impulse noise called salt and pepper noise ?
7. How does psychovisual redundancy differ from other redundancies ?
8. Define compression ratio.
9. Define eccentricity and curvature of boundary.
10. What is meant by object point and background point ?

PART – B **(5×16=80 Marks)**

11. a) i) Discuss in detail about elements of visual perception. **(8)**
    ii) Explain the basic properties of 2D Fourier transform. **(8)**

(OR)

b) Write notes on :
    i) Walsh Hadamard. **(8)**
    ii) Karhunen-Loeve transforms. **(8)**

12. a) i) Explain the different types of piecewise-linear transformation functions. State the advantages and disadvantages of piecewise-linear transformation. **(10)**

ii) Describe the process of image subtraction. **(6)**

(OR)

b) Explain smoothing in frequency domain filters. **(16)**

13. a) i) Describe the image degradation process and its remedy. **(8)**

ii) What is SVD ? How this is computed ? Explain an application. **(8)**

(OR)

b) i) Compare image enhancement and restoration. **(7)**

ii) Describe constrained least mean square filtering approach for image restoration. **(9)**

14. a) i) Construct the Huffman's code for the following set of source symbols and their probabilities. Also calculate the average length of the code. **(6)**

Source symbol	**Probability**
S_1	0.19
S_2	0.18
S_3	0.17
S_4	0.12
S_5	0.11
S_6	0.10
S_7	0.08
S_8	0.05

ii) What is the principle of arithmetic coding ? Perform arithmetic coding for a six symbol message S_1, S_3, S_2, S_4, S_6, S_5 from the source given below. **(10)**

Source symbol	**Probability**
S_1	0.35
S_2	0.25
S_3	0.10
S_4	0.15
S_5	0.05
S_6	0.06
S_7	0.04

(OR)

b) i) Consider the following 4 × 4 8-bit image.

40	40	40	40
40	40	40	40
90	90	90	90
90	90	90	90

Perform LZW coding with a suitable dictionary. **(10)**

ii) Discuss the principle of PCM briefly. What is the need for non-uniform quantisation in PCM ? **(6)**

15. a) i) Explain region based segmentation with suitable diagram. **(8)**

ii) Describe in detail about regional descriptors and compare it with simple descriptor. **(8)**

(OR)

b) i) Explain in detail about polygonal approximation technique. **(8)**

ii) Write short note on texture, boundary segments, chair codes and thresholding. **(8)**

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