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Reg. No.

Question Paper Code

11605

M.E. - DEGREE EXAMINATIONS, NOV/DEC 2022

Third Semester

M.E. - Embedded System Technologies

20PESEL311 - DIGITAL IMAGE PROCESSING

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

- | | <i>Marks,
K-Level, CO</i> |
|-----------------------------------------------------------------|-------------------------------|
| 1. Define Brightness and Contrast. | 2,K1,CO1 |
| 2. What are image pyramids? | 2,K1,CO1 |
| 3. Define Histogram Equalization. | 2,K1,CO2 |
| 4. Compare DFT with FFT frequency domain filters. | 2,K1,CO2 |
| 5. Give the formula for negative and log transformation. | 2,K1,CO3 |
| 6. Give the transfer function of a Butterworth low pass filter. | 2,K1,CO3 |
| 7. State Shannon second theorem. | 2,K1,CO5 |
| 8. What are variable length codes? | 2,K1,CO5 |
| 9. Draw the basic architecture of FPGA. | 2,K1,CO6 |
| 10. What is Parallelism? What are its types? | 2,K1,CO6 |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) Describe with a neat diagram how the image is digitized by sampling and quantization? Explain the representation of an Image. 13,K2,CO1
- OR**
- b) Explain the Morphological operations of an Image in detail with suitable diagrams. 13,K2,CO1
12. a) Explain Gray level transformation with suitable diagrams. 13,K2,CO2
- OR**
- b) Perform Histogram equalization of the image. 13,K3,CO2

20	20	20	18	16
15	15	16	18	15
15	15	19	15	17
16	17	19	18	16
20	18	17	20	15

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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13. a) (i) Find the DCT Transform and its Inverse for the 2x2 Image [3 6; 6 4]. 9,K3,CO3
(ii) List the properties of FFT. 4,K2,CO3

OR

- b) Explain the process of Image sharpening using 13,K2,CO3
(i) Ideal High pass Filters.
(ii) Butterworth Highpass Filters.
(iii) Gaussian Highpass Filters.

14. a) Determine the Huffman code assignment for the following data. 13,K2,CO5

Symbol	Probability
a1	0.1
a2	0.4
a3	0.06
a4	0.1
a5	0.04
a6	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.

OR

- b) Write notes on 7,K3,CO5
(i) Arithmetic Coding. 6,K2,CO5
(ii) JPEG 2000 Standard.

15. a) What are the steps to design an FPGA Image processing system? 13,K2,CO6
Explain with neat block diagram.

OR

- b) (i) Enumerate the design Issues in VLSI Implementation of Image Processing Algorithms. 10,K3,CO6
(ii) What is block RAM in an FPGA? 3,K2,CO6

PART - C (1 × 15 = 15 Marks)

16. a) (i) Describe the edge linking and boundary detection process through Hough transform. 10,K3,CO4
(ii) Explain Region based segmentation and region splitting. 5,K2,CO4

OR

- b) Explain with suitable segmentation algorithm for detection of number plate. 15,K3,CO4