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6/11/16 FN

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**Question Paper Code : 60414**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh/Eighth Semester

Electronics and Communication Engineering

EC 2029/EC 708/10144 ECE 41 — DIGITAL IMAGE PROCESSING

(Common to Electronics and Instrumentation Engineering)

(Regulations 2008/2010)

(Also Common to PTEC2029 – Digital Image Processing 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. Define Hue and Saturation.
2. What do you mean by mach band effect?
3. Why noise is always considered to be additive, in images?
4. What do you infer from multimodal histogram?
5. List any two properties of a median filter.
6. Mention the drawbacks of inverse filtering.
7. Write Sobel horizontal and vertical edge detection masks.
8. Define region splitting and merging.
9. Define Sobel operator.
10. Write the Hadamard transform matrix  $H_n$  for  $n = 3$ .

PART B — (5 × 16 = 80 marks)

11. (a) (i) Briefly discuss about the elements of a Digital Image Processing System. (8)
- (ii) Explain about the Sampling. (4)
- (iii) Write the Kernel matrix for SVD transform. (4)

Or

- (b) Explain in detail about the vidicon and Digital camera working principles. (16)

12. (a) (i) How do you enhance a monochrome image by histogram? (8)
- (1) Equalization
- (2) Specification technique how do you assess the qualities of enhancement?
- (ii) Give an algorithm for obtaining the average of four images of same size and explain. (8)

Or

- (b) (i) What is directional smoothing? Explain how this is done. Where it is required? (8)
- (ii) Discuss the procedure for color image enhancement. (8)

13. (a) Describe the constrained least square filtering for image restoration and derive its transfer function. (16)

Or

- (b) (i) Explain the concept of geometric transformation for image restoration. (8)
- (ii) How wiener filtering is helpful to reduce the mean square error? (8)

14. (a) Discuss the principle of image segmentation by watershed transformation and explain its drawbacks. (16)

Or

- (b) Discuss image segmentation based on various thresholding techniques. (16)

15. (a) Determine the Huffman code assignment procedure for the following data :

Symbol	Probability
a <sub>1</sub>	0.1
a <sub>2</sub>	0.4
a <sub>3</sub>	0.06
a <sub>4</sub>	0.1
a <sub>5</sub>	0.04
a <sub>6</sub>	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)