



**M.E DEGREE EXAMINATIONS: JUNE 2015**

(Regulation 2014)

Second Semester

**P14AETE21: ADVANCED DIGITAL IMAGE PROCESSING**

(Common to AE & CS)

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. Assertion (A): When there are strips of constant intensity, the Mach band effect makes the individual strips appear darker at the right than at the left. [K<sub>4</sub>]

Reason (R): Mach band effect is the result of spatial response of the eye.

- a) Both A and R are individually true and R is the correct explanation of A      b) Both A and R are individually true and R is not the correct explanation of A  
c) A is true but R is false      d) A is false but R is true.
2. The values that can be taken by the RGB components to form safe colors are : [K<sub>2</sub>]
- a) (00, 33, 66, 99, CC, FF)<sub>H</sub>      b) (0, 51, 102, 153, 204, 255)<sub>H</sub>  
c) (A, B, C, D, E, F)<sub>H</sub>      d) (0, 1, 2, 3, 4, 5, 6, 7, 8, 9)<sub>D</sub>
3. The 1D mask that can be used for implementing the operation  $f(x+1, y) - f(x, y)$  is : [K<sub>3</sub>]

a) 

-1
1

b) 

1	-1
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c) 

1
-1

d) 

-1	1
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4. Matching type item with multiple choice code [K<sub>2</sub>]

List I	List II
A. $\rho\theta$ parameter space	i. $S \rightarrow aA$
B. $f(x,y) > T$	ii. boundary
C. watershed lines	iii. accumulator cells
D. texture primitive	iv. object pixel

	A	B	C	D
a)	i	ii	iii	iv
b)	iv	iii	ii	i
c)	iii	iv	ii	i
d)	ii	iii	iv	i

5. Assertion (A): The value of the discriminant function decides the pattern class. [K<sub>4</sub>]

Reason (R): The decision boundary separates the pattern classes.

- |   |   |
|---|---|
| a) Both A and R are individually true and R is the correct explanation of A | b) Both A and R are individually true and R is not the correct explanation of A |
| c) A is true but R is false   | d) A is false but R is true.  |

6. The number of pattern classes is determined by : [K<sub>3</sub>]

- |                                      |                        |
|--------------------------------------|------------------------|
| a) Number of nodes in neural network | b) Activation function |
| c) Number of training vectors        | d) Training algorithm  |

7. Erosion of an image can be done by the following operations : [K<sub>2</sub>]

1. Translation
2. Reflection
3. Complement
4. Opening

- |           |            |
|-----------|------------|
| a) 1, 2   | b) 2, 3    |
| c) 1 only | d) 1, 2, 3 |

8. Assertion (A): Structuring elements can be converted to rectangular arrays by padding. [K<sub>4</sub>]

Reason (R): The origin of the structuring element changes by padding.

- |   |   |
|---|---|
| a) Both A and R are individually true and R is the correct explanation of A | b) Both A and R are individually true and R is not the correct explanation of A |
| c) A is true but R is false   | d) A is false but R is true.  |

9. Technique used to extract shape from intensity images is : [K<sub>2</sub>]

- |                            |                      |
|----------------------------|----------------------|
| a) Shape from optical flow | b) Shape from X      |
| c) Shape from texture      | d) Shape from motion |

10. Steganography can be done by the following steps : [K<sub>2</sub>]

1. Binary values of the pixel intensities
2. Insertion of bits in LSB
3. Forward Transform of the image
4. Inverse Transform

The sequence to be followed is :

- |          |            |
|----------|------------|
| a) 3-2-4 | b) 1-2-3   |
| c) 1-2-4 | d) 1-2-3-4 |

**PART B (10 x 2 = 20 Marks)**

11. Distinguish between scotopic and photopic vision. [K<sub>2</sub>]
12. Illustrate intensity slicing of an image with graphical representation. [K<sub>2</sub>]
13. A binary image is corrupted with salt and pepper noise. What will be the change in the histogram? [K<sub>4</sub>]
14. What is the use of marker in segmentation? [K<sub>2</sub>]
15. In a multilayer neural network, how many nodes will be required in each layer? [K<sub>3</sub>]
16. How is the next generation population created in GA? [K<sub>2</sub>]
17. Examine the limiting effect of repeatedly eroding an image. [K<sub>4</sub>]
18. How can thinning be done using a sequence of structuring elements? [K<sub>2</sub>]
19. An RGB image of size 400 x 300 is compressed to a rate of 8 bpp. Calculate the compression ratio. [K<sub>3</sub>]
20. What is depth map? [K<sub>2</sub>]

**PART C (10 x 5 = 50 Marks)**

21. Derive the CMY intensity mapping from the RGB counterpart. [K<sub>3</sub>]
22. How will you modify the RGB cube to represent HSI model? [K<sub>2</sub>]
23. Explain the thresholding algorithm used to achieve minimum average segmentation error. [K<sub>2</sub>]
24. Summarize the statistical parameters used in describing texture. [K<sub>2</sub>]
25. Explain how string matching is employed in pattern recognition. [K<sub>2</sub>]
26. With an example of your own, explain how fuzzy logic is used in image processing. [K<sub>3</sub>]
27. Let A be the set shown and B be the structuring element. Perform dilation of A using B. [K<sub>3</sub>]



28. Show that erosion and dilation are dual of each other. [K<sub>3</sub>]
29. Analyze the properties of a watermarked image. [K<sub>4</sub>]
30. Explain Marr's theory. [K<sub>2</sub>]

**PART D (2 x 10 = 20 Marks)**

31. Compare Graph-theoretic method, Hough Transform and Watershed algorithm for edge and boundary detection. [K<sub>4</sub>]
32. Justify that JPEG2000 gives more compression and quality than JPEG. [K<sub>4</sub>]

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