# IV B.Tech I Semester Examinations,MAY 2011 <br> IMAGE PROCESSING <br> Information Technology 

Time: 3 hours

## Answer any FIVE Questions

All Questions carry equal marks

1. Explain about the logic operations involved in binary images?
2. (a) Define and Explain about variable - length coding?
(b) What is $L a v_{g}$ and $R_{D}$ value for coding redundancy?
3. Explain in detail about the following color models:
a) RGB
b) HSI
c) CMY.
4. (a) Write a brief description about training algorithms?
(b) What is the difference between Linearly seperable classes and nonseperable classes?
5. (a) Explain in detail about different types of order statistics filters for Restoration.
(b) Name different types of estimating the degradation function for use in image restoration and explain in detail estimation by modeling.
6. (a) Propose a set of gray level slicing transformations capable of producing all the individual bit planes of an 8-bit monochrome image.
(b) What effect would setting to zero the lower order bit planes have on the histogram of an image in general.
[16]
7. Consider the image segment shown
(a) Let $\mathrm{V}=\{0,1\}$ and compute the lengths of shortest 4- ,8- and m-path between p and q . If a particular path does not exist between these two points, explain why it is so.
(b) Repeat for $\mathrm{V}=\{1,2\}$

3121 (q)
2202
1211
(p) 1012 .
8. (a) Define and Explain about Gaussian noise?
(b) Explain about edge detection?

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Time: 3 hours
Max Marks: 80

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1. (a) Explain the following Arithmetic operations and their application for Image Enhancement i) Image Subtraction ii) Image Averaging.
(b) Explain how Region of Interest processing can be done using logic operations. $[10+6]$
2. Derive the expressions for conversion of HSI to RGB and HIS models.
[16]
3. (a) List the different components of a general purpose image processing system and explain.
(b) For transmission of digital data the common measure is baud rate, defined as number of lists transmitted per second. Using this fact answer the following. i) How many minutes would it take to transmit a $1024 \times 1024$ image with grams levels using a 56 k baud modem.
ii) What would the time be at 150 K baud a representative speed of a DSL phone connection.
4. Explain in detail the constrained least squares filtering with related expressions.
5. (a) Explain about FFT?
(b) Explain about matching by correlation?
6. (a) Explain about image compression models with neat block diagrams?
(b) Define DCT? And explain DCT with near block diagrams and suitable example?

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[8+8]
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7. Explain about Hit-or-Miss Transformation with suitable diagrams?
8. (a) Explain briefly about thresholding?
(b) Define and Explain about goal node?

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1. (a) What is Pattern? Explain briefly about Pattern?
(b) Explain briefly pattern class?
2. Explain in detail with block diagram the fundamental steps in digital Image processing and their importance.
3. (a) Prove that for continuous signal Histogram equalization results in flat histogram.
(b) Explain how Histogram statistics helps in Image Enhancement.
4. Explain the following filters used in Inage restoration.
a) Inverse filter
b) Wiener filter.
5. Explain in detail the following color Transformations
a) Color complements.
b) Color slicing.
c) Tone and color corrections.
6. (a) Give applications for Gray-Scale Morphology?
(b) Explain about Skeletons?
7. (a) Explain about grey-level histogram?
(b) How we can use morphology in coding redundancy?
8. (a) Define and Explain about Gaussian noise?
(b) Explain about line detection?

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1. (a) Explain about matching shape numbers?
(b) Explain about similarity matrix?
2. (a) Define and Explain about star (or) root node?
(b) Define and Explain about goal node?
3. (a) What is data redundancy?
(b) What is relative data redundancy? Compare with data redundancy? [6+10]
4. Explain about the following Geometric Transformations.
a) Spatial Transformation
b) Gray level Interpolation.
5. (a) Consider any three valid colors $C_{1}, C_{2} \& C_{3}$ with coordinates $\left(x_{1} y_{1}\right),\left(x_{2} y_{2}\right) \&$ $\left(x_{3} y_{3}\right)$ in the chromatieity diagram. Derive the necessary general expressions for computing the relative percentages of colors $C_{1}, C_{2} \& C_{3}$ composing a given color that is known to lie with in the triangle whose vertices are at the coordinates $C_{1}, C_{2} \& C_{3}$.
(b) How many đifferent shades of gray are there in a color RGB system in which each RGB image is an 8-bit image.
6. (a) Give the conditions (s) under which the D 4 distance between two points p \& q is equal to the shortest 4 - path between these points. Is this path unique. Explain.
(b) Explain in detail how digital Image is represented.
7. (a) How would you convert an image from a square grid to a hexagonal grid?
(b) Explain and Draw the diagram for $(A \cap B) \cup(A \cup B)^{C}$.
8. (a) In a given application an averaging mask is applied to input images to reduce noise and then a daplacian mask is applied to enhance small details. Would the result be same if the order of operations were reversed. Explain.
(b) Show that isotropic property is lost in general if the gradient is completed using $\nabla f \approx\left|G_{x}\right|+\left|G_{y}\right|$.
