

Total number of printed pages – 4 **B. Tech**
PECS 3408

Eighth Semester Examination – 2008

IMAGE PROCESSING

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory
and any **five** from the rest.*

*The figures in the right-hand margin
indicate marks.*

1. Answer the following questions : 2 × 10
- (i) Give the mathematical model of a digital image.
 - (ii) What is variable length coding ?
 - (iii) What is Weber Ratio ?



- (iv) What is neighbor of a pixel ? Explain.
- (v) What are additive and subtractive colors?
- (vi) Differentiate between binary image, grayscale image and color image.
- (vii) How do you measure information ?
- (viii) What is quantization error in the context of image processing ?
- (ix) Differentiate between histogram equalization and modification.
- (x) Explain the terms hue, saturation and intensity.

2. Gray level histogram of an image is given below :

Gray Level	0	1	2	3	4	5	6	7
Frequency	400	700	1350	2500	3000	1500	550	0

Compute the gray level histogram of the output image obtained by enhancing the input by the histogram equalization technique. 10

P.T.O.

PECS 3408

2

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3. Write in brief about RGB, CMY, YIQ and HSI color models. 10
4. What do you mean by edge in an image ? Explain how sharpening filter may be used to enhance edges. Also discuss how first and second derivative may be used for detecting edges in an image. 10
5. What are gray level transformations ? Explain gray level slicing and contrast stretching. 10
6. In image compression, following mechanisms are used to compress pixel data :
- (i) mapping the pixel values to some other set of values
 - (ii) quantizing those values
 - (iii) symbol encoding the resulting values
- Explain each mechanism. Describe how it helps in compressing images. Also describe how it affects the visual quality of the decom-

pressed image when compared with original image. What are the different quality measures of compression ? 10

7. Develop a procedure for computing the median of an $n \times n$ neighborhood and replace it with the center pixel of the image. Repeat it for the entire image of size $M \times N$. Also give a procedure to compute weighted median, i.e. certain pixels are given more weights than others.
8. Write short notes on : 10
- (i) Inverse problem
 - (ii) Image enhancement
 - (iii) Image restoration
 - (iv) Image recognition.