

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 ?

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- (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

- 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 IWL

- (i) Inverse problem
- (ii) Image enhancement
- (iii) Image restoration
- (iv) Image recognition.