Seat No: _____

GANPAT UNIVERSITY
B. TECH SEM VII COMPUTER ENGINEERING/INFORMATION TECHNOLOGY
REGULAR EXAMINATION NOV/DEC- 2011
CE/IT 703: IMAGE PROCESSING

TIME: 3 HOURS **MARKS: 70**

Instructions: 1. Figures to the right indicate full marks of the question.
2. All questions are compulsory.

SECTION: I

Q:1 (a) Perform histogram specification on 8x8 image segment. [6]

Gray Level	0	1	2	3	4	5	6	7
No of pixels	8	10	10	2	12	16	4	2

Target histogram is given as follows.

Gray Level	0	1	2	3	4	5	6	7
No of pixels	0	0	0	0	20	20	16	8

(b) Explain log and power low transformation. And also show their application. [6]

OR

Q:1 (a) What is the purpose Histogram equalization? Achieve the Histogram equalization on following 3 bit image segment. [6]

1 3 5
4 4 3
5 2 2

(b) Write brief short note on [6]
(i) Bit plane Slicing (ii) Order statistics filter

Q:2 (a) Explain why the discrete histogram equalization technique does not yield a flat histogram. [4]

(b) Prove that second pass of the histogram equalization produce the same result as the first pass. [4]

(c) Explain average filter with an example. Also discuss the effect of filter size on smoothing. [3]

OR

Q:2 (a) Explain Ideal, Butterworth and Gaussian low pass filters in reference of frequency domain. Also explain Blurring and ringing effect of each filter. [7]

(b) Define the following terms [4]
(i) Histogram (ii) Normalized Histogram (iii) Convolution (iv) correlation

Q:3 (a) Explain the following key terms [6]
(i) Sampling (ii) Spatial frequency (iii) Fourier spectrum (iv) Gray level resolution (v) Frequency aliasing (vi) Digital image

(b) Describe the Unsharp masking and High boost filtering [3]

(c) Define "Contrast stretching" and give its purpose. [3]

SECTION: II

Q:4 (a) Consider the following binary image segment A and structuring element B [5]

$$A=\begin{matrix}0&0&0&0&0\\0&1&1&1&0\\0&1&1&1&0\\0&1&1&1&0\\0&0&0&0&0\end{matrix} \qquad B=\begin{matrix}0&1&0\\1&1&1\\0&1&0\end{matrix}$$

Perform following operations

$(i) A \ominus B \; (ii) A \oplus B \; (iii) A \circ B \; (iv) A \cdot B \; (v) A - A \ominus B$

(b) Apply DFT on following sequence and also obtain original data by applying inverse DFT. [4]

X= {1 4 6 8}

(c) Define Segmentation and its importance. [3]

OR

Q:4 (a) Discuss canny edge detection procedure in detail and show its use. [6]

(b) Derive Laplacian of Gaussian (LoG) operator. Show its usage and also discuss its limitations. [6]

Q:5 (a) Discuss Otsu's method for optimum global thresholding. [6]

(b) Describe Region growing method for segmentation. [5]

OR

Q:5 (a) Discuss "Chain codes" to represent a boundary with an example. Highlight its limitations. [6]

(b) Briefly explain following morphological algorithms. [5]
(i) Convex Hull (ii) Skeleton

Q:6 (a) Describe Point and Line detection. [4]

(b) Discuss the role of noise, illumination and reflectance in thresholding [4]

(c) Prove the following [4]

$(i) (A \ominus B)^c = (A^c \oplus B)$

$(ii) (A \circ B)^c = (A^c \cdot B)$

END OF PAPER