

GANPAT UNIVERSITY
B. Tech. Semester: VII(Mechatronics)Engineering
Regular Examination November – December 2014
Digital Image Processing and Machine Vision (2MC705)

Time: 3 Hours

Total Marks: 70

- Instruction:** 1 Start a new question from new page.
 2 Draw the figure with full indication.
 3 Each section must be answered in separate answer sheet.

Section - I

Que. - 1

- (a) Perform the histogram equalization in for the given 8×8 image. [12]
 (04)

r_k	0	1	2	3	4	5	6	7
P_k	8	10	10	2	12	16	4	2

- (b) Give the bit plane slicing of the given image. If the MSB plane is remove then reconstruct the same image. (04)

$$A = \begin{bmatrix} 9 & 2 & 13 \\ 10 & 5 & 11 \\ 8 & 3 & 14 \end{bmatrix}$$

- (c) Find the convolution and correlation of the following stream of data. (04)
 1) $I = \{1 \ 8 \ 7 \ 5\}$ and $f = \{1 \ 2 \ 4\}$
 2) $I = \{1 \ 3 \ 5 \ 1\}$ and $f = \{1 \ 1\}$

OR

Que. - 1

- (a) The intensity values in an image have PDF $P_r(r) = \begin{cases} \frac{4r}{(L-1)^2}; & \text{for } 0 \leq r \leq L-1 \\ 0; & \text{otherwise} \end{cases}$ find the equation for transformed image. Apply the same transform for the image given below. Take $L=10$. [12]
 (05)

$$B = \begin{bmatrix} 3 & 5 & 2 \\ 4 & 2 & 1 \end{bmatrix}$$

- (b) Perform the histogram specification for the given 8×8 image histogram (07)

r_k	0	1	2	3	4	5	6	7
P_k	2	2	10	10	20	8	6	8

with specified histogram

r_k	0	1	2	3	4	5	6	7
S_k	0	0	0	0	20	20	16	8

Que. - 2

- (a) Apply the DFT to the following image and prove that DFT works. [11]
 (06)

$$A = \begin{bmatrix} 3 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

- (b) Discuss the Butterworth High Pass Filter (BHPF). (05)

Que. - 3 Write any Three [12]

(a) Construct the Shannon-fano code for given table. (04)

Symbol	A	B	C	D	E
Probability	12	8	7	6	5

(b) Discuss Arithmetic coding. (04)

(c) Discuss Homomorphic filtering in frequency domain. (04)

(d) What is coding redundancy? Calculate the entropy for the symbols given in table below. (04)

Symbol	1	2	3	4	5	6
Probability	0.5	0.1	0.1	0.2	0.04	0.06

Section - II

Que. - 4 [12]

(a) Discuss JPEG digital image storage type. (04)

(b) Write short note on Image Sampling. (04)

(c) Discuss the rod and cone distribution in the structure of the human eye. (04)

OR

Que. - 4 [12]

(a) Discuss different types of brightness adaptation and discrimination. (04)

(b) Calculate time in minute to transfer an image of 560 X 512 resolutions with 256 gray levels between peripheral devices communicating at 2000 baud rate. Assume data package contains one start and one stop bit. (04)

(c) Discuss PNG and GIF image storage type. (04)

Que. - 5 [11]

(a) An image has size 512 × 512. What is the storage requirement if the size is binary or if it is 24 bit color? (05)

(b) Explain the detail with constructional features and working of the Vidicon tube. (06)

Que. - 6 Write any Three [12]

(a) A medical image has a size of 8 × 5 inches. The sampling resolution is 7cycles/mm. How many pixels are required? Will an image of size 512 × 256 enough? (04)

(b) Discuss Triangulation Geometry. (04)

(c) Discuss Machine Vision Components. (04)

(d) Write short note on Quantization, how it is differ from bit plane slicing. (04)

END OF PAPER