

MASTER OF SCIENCE (COMPUTER SCIENCE) (CBCS-2018 COURSE)
M.Sc. (Computer Science) Sem-I : WINTER :- 2021
SUBJECT: DIGITAL IMAGE PROCESSING

Day : Wednesday
Date 9/2/2022

W-20039-2021

Time : 02:00 PM-05:00 PM
Max. Marks: 60

N. B. :

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable calculator is **ALLOWED**.
- 4) Draw neat and labelled diagram **WHEREVER** necessary.

Q. 1 a) Explain Erosion and Dilation with the help of diagrams. Show that erosion and dilation are duals of each other. **(08)**

b) State convolution theorem and give steps for filtering in the frequency domain. **(07)**

OR

a) Explain the role of different components of a general purpose digital image processing system. **(08)**

b) Explain region oriented segmentation with respect to merging and splitting techniques. **(07)**

Q. 2 A) Answer **ANY ONE** of the following: **(08)**

- i) Given a 3-bit image of size 32×32 pixels having intensity distribution as shown in the table given below, where intensity levels are in the range 0-7. Apply histogram equalization technique and find the transfer function $T(r)$ which relates input image intensity level r_k to output image intensity level S_k .

Intensity level	Number of pixels
$r_0 = 0$	76
$r_1 = 1$	344
$r_2 = 2$	211
$r_3 = 3$	103
$r_4 = 4$	57
$r_5 = 5$	127
$r_6 = 6$	47
$r_7 = 7$	59

- ii) State the equations for 2-D discrete Fourier transform and its inverse. Describe any two properties of 2-D discrete Fourier transform.

B) Answer **ANY ONE** of the following: **(07)**

- i) Explain the different noise probability density functions encountered in image restoration.
- ii) Explain the following with respect to pixel: adjacency, boundaries, connectivity and regions.

P. T. O.

Q.3 Answer **ANY THREE** of the following: **(15)**

- a) Explain low pass filtering in frequency domain.
- b) Explain the different ways of estimating degradation function in brief.
- c) What is gamma correction? Explain.
- d) Explain image acquisition using a single sensor.
- e) Explain the basic of intensity thresholding.

Q.4 Answer **ANY THREE** of the following: **(15)**

- a) Contrast stretching
- b) Ideal High Pass Filter
- c) Unsharp Masking
- d) Chain Codes
- e) Minimum Polygonal Approximation

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