

Subject : 3) Digital Image Processing

Day : Monday
Date : 15/04/2019

Time : 03.00 PM TO 06.00 PM
Max. Marks :60

S-2019-1234

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of scientific calculator is **ALLOWED**.

- Q.1**
- a) Explain the role of different components of a general purpose digital image processing system. **(08)**
 - b) Following is 1-D intensity profile of an image. Calculate and plot first and second order derivatives for it. Explain the nature and use of each derivative. **(07)**

10	10	10	10	9	8	7	6	5	5	5	5	5	12	5	5	8	8	8	8	8	8	8
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OR

- a) Give three different ways of acquiring image and explain any one in detail. Mention one applications of each method. **(07)**
 - b) Explain the basics of filtering in the frequency domain. **(08)**
- Q.2** A) Answer **ANY ONE** of the following: **(08)**

- a) Given a 3-bit image of size 64x64 pixels having intensity distribution as shown in the table given below, where intensity levels are in the range 0-7. Apply histogram equalizations technique and find the transfer function $T(r)$ Which relates input image intensity level r_k output image intensity S_k .

Intensity Level	Number of pixels
$R_0 = 0$	790
$R_1 = 1$	1023
$R_2 = 2$	850
$R_3 = 3$	656
$R_4 = 4$	329
$R_5 = 5$	245
$R_6 = 6$	122
$R_7 = 7$	81

- b) Explain the following properties of 2 D discrete Fourier.
 - i) Translation
 - ii) Rotation
 - iii) Distributive
 - iv) Separability
- B)** Answer **ANY ONE** of the following: **(07)**
- a) What is sampling and quantization? Explain its concept with necessary diagram.
 - b)
 - i) Define city-block and chess board distance between any – two points of a digital image.
 - ii) Find city – block and chess board distance between points P (25, 25) and Q (30, 25)

P.T.O.

Q.3

Answer **ANY THREE** of the following:

(15)

- a) Describe different ways of estimating degradation functions.
- b) Explain the use of digital image processing state any two application.
- c) Explain one dimensional image strip represented by $\{1\ 2\ 5\ 9\ 4\ 3\}$ is to be convolved with a filter kernel given by $\{-1\ 0\ 1\}$. Give the step by step procedure of finding the answer.
- d) Give the orientation of the lines which will be detected using following four masks:

-1	-1	-1
2	2	2
-1	-1	-1

2	-1	-1
-1	2	-1
-1	-1	2

-1	2	-1
-1	2	-1
-1	2	-1

-1	-1	2
-1	2	-1
2	-1	-1

- e) Explain 2 – D Fourier transform.

Q.4

Write short notes on **ANY THREE** of the following:

(15)

- a) Fundamental steps in edge detection
- b) Opening and closing operations
- c) Chain codes
- d) Power – Law transformation
- e) Image Segmentation

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