

Total number of printed pages-5

53 (CS 715) DSIP

2021

(Held in 2022)

**DIGITAL SPEECH AND IMAGE
PROCESSING**

Paper : CS 711

Full Marks : 100

Time : Three hours

***The figures in the margin indicate
full marks for the questions.***

Answer any five questions.

1. 5×4
- (a) What do you understand by image processing and computer vision ?
 - (b) Explain the gamma transformation with a diagram.
 - (c) Explain the geometric and affine transformations in detail.
 - (d) What is image registration ?

Contd.



2. 5×4

(a) Explain the forward and inverse transformations.

(b) Explain histogram matching for continuous and discrete cases.

(c) What are *two* basic properties of intensity values for image segmentation ?

(d) What is the difference between in line and point detection ?

3. 8+6+6

(a) How to convert the HSI color model in RGB ? Mention the formulation also.

(b) Describe tonal correction. How to use histogram equalization in color image ?

(c) Explain the color image smoothing with two methods. Which color component is useful in color image sharpening and segmentation ?

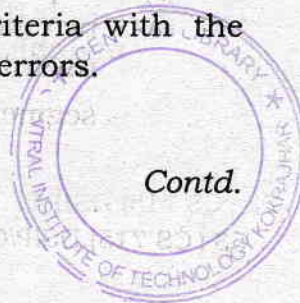
4.

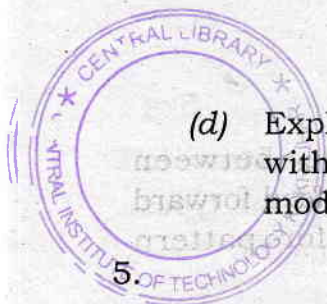
5×4

- (a) What is significance of redundancy in image compression? Mention the types of redundancy in digital images.
- (b) Explain the coding redundancy. Use the table below which is related to gray-level distribution of an image to calculate the average number of bits required to represent each pixel. Find the redundancy value also.

r_k	$p_r(r_k)$	Code 1	$l_1(r_k)$	Code 2	$l_2(r_k)$
$r_0 = 0$	0.19	000	3	11	2
$r_1 = 1/7$	0.25	001	3	01	2
$r_2 = 2/7$	0.21	010	3	10	2
$r_3 = 3/7$	0.16	011	3	001	3
$r_4 = 4/7$	0.08	100	3	0001	4
$r_5 = 5/7$	0.06	101	3	00001	5
$r_6 = 6/7$	0.03	110	3	000001	6
$r_7 = 1$	0.02	111	3	000000	6

- (c) Explain the fidelity criteria with the formulation of related errors.





(d) Explain the general compression model with the source encoder and decoder model diagram.

5×4

(a) Explain the computer vision system with diagram.

(b) What do you mean by mathematical morphology?

(c) Which morphological algorithm is used to extract the boundary in the image?

(d) Define dilation and erosion with structuring element.

6.

5×4

(a) Define patterns and pattern classes with their arrangements.

(b) Use the tree descriptors for describing classes in satellite image of Kokrajhar town.

(c) What is the purpose of matching? Explain the approaches used for matching in the images.

(d) What is the difference between perceptron and multilayer feed forward neural network model for pattern classes ?

7. (a) Write down the short notes on : **(any two)** 10

(i) Skeleton (Morphological)

(ii) Multi-Level Intensity Slicing

(iii) Color Slicing Transformation

(b) Differentiate between : **(any two)** 10

(i) Thinning and Thickening
(Morphological)

(ii) Opening and Closing
(Morphological)

(iii) Median filter and Majority filter
(Morphological)

