

6E7101

Total No. of Questions : 22

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Roll No. :

6E7101

B.Tech. VI-Sem. (Main/Back) Exam. May, 2025

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

6AID3-01 Digital Image Processing

CS, IT, AID, CAI, CDS, CCS, CIT, CSD

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in Form No. 205)

1.

2.

PART-A

[10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Discuss about contrast stretching and intensity slicing.

Q.2. What are the types of image enhancement available?

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- Q.3. What are the types of edge detection operators available?
- Q.4. What is the role of Hough Transform in global processing?
- Q.5. Why noise is always considered to be additive, in images?
- Q.6. What is the role of Fourier transform in the context of image processing?
- Q.7. How do frequency domain filters contribute to image transformation?
- Q.8. What is the significance of Wavelet Transforms?
- Q.9. What is the concept of degradation function?
- Q.10. Identify the types of redundancies in image compression.

PART-B

[5x4=20]

(Analytical/Problem-solving Questions)

Attempt any five questions

- Q.1. Show the bit plane slicing of the following image :

7	6	5
4	3	2
1	1	0

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- Q.2. Prove whether the Fourier Transform of a discrete time signal is continuous or discrete. Explain with an example.
- Q.3. Explain HIS color model with an appropriate figure. Explain the conversion procedure from RGB color space to HSI color space.
- Q.4. Describe how homomorphic filtering separates illumination and reflectance components.
- Q.5. Write notes on Run length encoding and Shift codes.

- Q.6. Explain any two boundary representation schemes and illustrate with an example.
- Q.7. Discuss image segmentation based on various thresholding techniques.

PART-C

[3x10=30]

(Descriptive/Analytical/Problem-solving/Design Question)

Attempt any three questions

- Q1. Describe histogram equalization. Obtain histogram equalization for the following image segment of size. Write the inference on the image segment before and after equalization :

20 20 20 18 16
15 15 16 18 15
15 15 19 15 17
16 17 19 18 16
20 18 17 20 15

- Q.2 Decode the arithmetic coded message, 0.23355 for the coding model :

Symbol	Probability
A	0.2
E	0.3
I	0.1
O	0.2
u	0.1
!	0.1

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And also explain LZW coding with an example and explain Redundancies and their removal methods.

Q.3 Consider the image 'I' below and the filters 'F' and 'L'

'I'	'F'	'L'
1 1 1	1/8	1
1 8 1	1/8 1/2 1/8	1 -4 1
1 1 1	1/8	1

(a) Correlate the image 'I' with the filter 'F' and compute the output image.

(b) Apply filter 'L' to the same image 'I' to produce a 3 by 3 output image.

Q.4 Explain following terms with example :

(a) Lookup Table

(b) Additive vs. Subtractive color system

(c) Hue and Saturation

(d) Hue-Max-Min-Diff (HMMD) Color Space

Q.5. Consider an image- Show the output of any edge detection algorithm :

1	2	5
5	5	5
5	3	2

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