

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular End Semester Examination – Summer 2022

Course: B. Tech.

Branch : EXTC /EXTC(SANDWICH)

Semester :VI

Subject Code & Name: BTETC603 Digital Image Processing

Max Marks: 60

Date:23/08/2022

Duration: 3.45 Hr.

Instructions to the Students:

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

Q.1 Solve Any Two of the following.

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|--|------------|-------|
| | (Level/CO) | Marks |
| A) 1. Define Image, Brightness, Dynamic Range, Gray level, Hue, Saturation. | (L1/CO1) | 6 |
| 2. Compute the Euclidean Distance (D1), City-block Distance (D2) and Chessboard distance (D3) for points p and q, where p and q be (5, 2) and (1, 5) respectively. Give answer in the form (D1, D2, D3). | | |
| B) Draw and explain the fundamental steps in digital image processing. | (L1/CO2) | 6 |
| C) What is the need of Fourier transform? Explain all the properties of DFT with proof. | (L1/CO1) | 6 |

Q.2 Solve Any Two of the following.

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|--|----------|---|
| A) Write a short note on | (L2/CO2) | 6 |
| 1. Match Band Effect | | |
| 2. Simultaneous contrast point | | |
| 3. Sampling and Quantization | | |
| B) Perform Opening and Closing morphological operations on the given image. Use without replication. | (L1/CO3) | 6 |

0	1	1	1	0
0	1	1	1	0
0	1	1	1	0
0	1	1	1	0
0	1	1	1	0

Image

0	1	0
1	1	1
0	1	0

Mask

- | | | |
|--|----------|---|
| C) Explain CMY model and the HSI colour image model in detail. | (L1/CO1) | 6 |
|--|----------|---|

Q.3 Solve Any Two of the following.

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|---|----------|---|
| A) Write a note on Max Lyod quantizer and derive the equations for decision and reconstruction level. | (L2/CO2) | 6 |
| B) Explain Hit-Miss algorithm. Solve the following using Hit-Miss algorithm. | (L2/CO3) | 6 |

Image=

1	1	1	0
1	1	0	1
1	1	0	0

 B=

0	0
0	1

 W=

1	1
1	1

C) Write short notes on Thinning, Thickening and Region filling morphological operations. (L1/CO1) 6

Q.4 Solve Any Two of the following.

A) Compute Discrete Cosine Transform matrix for N=4. (L1/CO2) 6

B) For a given 2x2 image U and 2x2 transformation matrix A. Find the transformed matrix and reconstruct the given image using A_{00} and A_{01} only. (L3/CO3) 6

$$A = \frac{1}{2} \begin{bmatrix} \sqrt{3} & 1 \\ -1 & \sqrt{3} \end{bmatrix}, \quad U = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$$

C) Write notes on Walsh Transform and Hadamard Transform for 1D and 2D. (L1/CO1) 6

Q.5 Solve Any Two of the following.

A) Explain in detail types of Smoothing filters and Sharpening filters. (L2/CO2) 6

B) 1. What is meant by Image Restoration? Draw the degradation model and explain. (L2/CO3) 6

2. Write short note on Wiener Filtering.

C) For the one-dimensional function $f(x)$, given below. Using modified cubic interpolation, find out the value at location $x = 6.3$. (L2/CO2) 6

x	1	2	3	4	5	6	7	8	9	10
F(x)	1.5	2.5	3	2.5	3	2.4	2	2.5	1	2.4

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