

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code

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Fifth Semester B.E. Degree Examinations, September/October 2024

DIGITAL IMAGE PROCESSING

Duration: 3 hrs

Max. Marks: 100

Note: 1. Answer any FIVE full questions choosing ONE full Question from each Module.
2. Missing data, if any, may be suitably assumed

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO:PI)</u>																		
<u>Module-1</u>																					
1.	a. What are the components of a general-purpose image processing system? Explain with neat diagram.	10	(2 :1: 1.2.1)																		
	b. How many minutes would it take to transmit a 1024×1024 image with 256 gray levels at 300 band rate?	10	(3 :1: 1.2.1)																		
(OR)																					
2.	a. How image acquisition system works by using linear and circular sensor strips? Explain with neat diagram.	10	(2 :1: 1.2.1)																		
	b. Let p and q be two pixels at coordinates (15, 45) & (55, 95), compute the Euclidean, Chessboard, & Manhattan distances.	10	(3 :1: 1.2.1)																		
<u>Module-2</u>																					
3.	a. Explain the homomorphic filtering approach for image enhancement. Explain with a neat diagram.	10	(2 :2: 1.2.1)																		
	b. Perform histogram equalization of a 6*6 image.	10	(2 :2: 1.2.1)																		
<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Gray level</td> <td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td> </tr> <tr> <td>Number of Pixels</td> <td>5</td><td>6</td><td>0</td><td>7</td><td>15</td><td>9</td><td>5</td><td>9</td> </tr> </table>				Gray level	0	1	2	3	4	5	6	7	Number of Pixels	5	6	0	7	15	9	5	9
Gray level	0	1	2	3	4	5	6	7													
Number of Pixels	5	6	0	7	15	9	5	9													
(OR)																					
4.	a. Explain the intensity transformations: Piece wise linear contrast stretching and Power Law.	10	(2 :2: 1.2.1)																		
	b. Define 2D DFT and its inverse. Explain any three properties of 2D DFT.	10	(2 :2: 1.2.1)																		
<u>Module-3</u>																					
5.	a. What are the three principal ways to estimate the degradation function for use in image restoration?	10	(2:3: 1.2.1)																		
	b. Discuss the mean square error filtering for image restoration.	10	(2 :3: 1.2.1)																		
(OR)																					
6.	a. Explain inverse filtering and wiener filtering.	10	(2:3: 1.2.1)																		
	b. Explain the order statistic filters used for image restoration in the presence of noise.	10	(2 :3: 1.2.1)																		

Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI- Performance Indicator)

Module-4

7. a. Develop a procedure for converting HSI to RGB and vice-versa. **10** (2 :4: 1.2.1)
b. Explain opening and closing Transformation for Morphological Image Processing with examples. **10** (2 :4: 1.2.1)

(OR)

8. a. Obtain the Haar transform matrix for N=4. **10** (2 :4: 1.2.1)
b. Explain the process of converting a gray level intensity to colour transformation with a block diagram **10** (2 :4: 1.2.1)

Module-5

9. a. Explain image gradient and gradient operators for edge detection. **10** (2 :5: 1.2.1)
b. Explain Marr-Hildreth edge detection. **10** (2 :5: 1.2.1)

(OR)

- 10 a. Explain shape numbers and Fourier descriptors. **12** (2 :5: 1.2.1)
b. Explain minimum perimeter polygon algorithm. **08** (2 :5: 1.2.1)

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