CBCS SCHEME - Make-Up Exam

USN | | | | | | | | | | |

BEC/BTE/BVL613C

# Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
## Digital Image Processing

Time: 3 hrs. Max. Marks: 100

***Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.***
***2. M : Marks , L: Bloom's level , C: Course outcomes.***

| | | Module – 1 | M | L | C |
|---|---|---|---|---|---|
| Q.1 | a. | With a block diagram, explain the fundamental steps involved in digital image processing. | 10 | L2 | CO1 |
| | b. | Explain the human visual system with a neat diagram. | 05 | L2 | CO1 |
| | c. | Consider the image segment shown in Table 1(c) with V = {1, 2}. Calculate the length of the shortest 4, 8 and m-path between p and q.<br>Table 1(c)<br>3 1 2 1 q<br>2 2 0 2<br>1 2 1 1<br>p 1 0 1 2 | 05 | L3 | CO1 |
| | | **OR** | | | |
| Q.2 | a. | Briefly explain the following :<br>(i) Neighbors of a pixel (ii) Connectivity (iii) City block distance<br>(iv) Checker board distance (v) Region | 10 | L2 | CO1 |
| | b. | Explain the Image acquisition using sensor strips and sensor arrays. | 10 | L2 | CO1 |
| | | **Module – 2** | | | |
| Q.3 | a. | Explain the two-dimensional Orthogonal and Unitary Transforms. | 10 | L2 | CO2 |
| | b. | Explain discrete cosine transform and its properties. | 10 | L2 | CO2 |
| | | **OR** | | | |
| Q.4 | a. | Explain Haar Transforms with equation and hence obtain 2×2 Haar Transform matrix | 10 | L2 | CO2 |
| | b. | State the following properties of 2D-DFT:<br>i) Translation ii) Periodicity iii) Rotation<br>iv) Convolution v) Linearity | 10 | L2 | CO2 |
| | | **Module – 3** | | | |
| Q.5 | a. | With necessary graphs, explain the following intensity transformation functions:<br>i) Image negative<br>ii) Log transformations<br>iii) Power law transformations | 10 | L2 | CO3 |
| | b. | Briefly explain Contrast Stretching and Bit plane slicing. | 10 | L2 | CO3 |

**OR**

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|---|---|---|---|---|---|
| **Q.6** | **a.** | For a given image 4×4 having gray scales between [0 , 9]. Perform histogram equalization and draw histogram image before and after equalization 4×4 image show in Table 6(a).<br>Table 6(a)<br>2 3 3 2<br>4 2 4 3<br>3 2 3 5<br>2 4 2 4 | **12** | **L3** | **CO3** |
| | **b.** | Explain Laplacian Mask for image sharpening using second order derivatives. | **08** | **L2** | **CO3** |
| | | **Module – 4** | | | |
| **Q.7** | **a.** | With the help of neat diagram, explain basic steps involved in frequency domain filtering. | **10** | **L2** | **CO4** |
| | **b.** | Explain Butterworth LPF and Gaussian LPF for image smoothing. | **10** | **L2** | **CO4** |
| | | **OR** | | | |
| **Q.8** | **a.** | Explain the pseudo colour image processing with examples. | **10** | **L2** | **CO1** |
| | **b.** | Explain different color models used in image processing. | **10** | **L2** | **CO1** |
| | | **Module – 5** | | | |
| **Q.9** | **a.** | With necessary equation and graphs, explain noise probability density functions. | **10** | **L2** | **CO5** |
| | **b.** | Write brief note on restoration in presence of only noise using<br>(i) Mean Filter<br>(ii) Order Statistic Filter<br>(iii) Adaptive Filters | **10** | **L2** | **CO5** |
| | | **OR** | | | |
| **Q.10** | **a.** | Explain the estimation of degradation function methods. | **10** | **L2** | **CO5** |
| | **b.** | Explain Wiener filtering and Inverse filtering in Image restoration. | **10** | **L2** | **CO5** |

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