

**THE KAVERY ENGINEERING COLLEGE***(An Autonomous Institution)***B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025***Sixth Semester**Biomedical Engineering***BM3652 – Medical Image Processing***Regulations - 2021***Duration : 3 Hrs****Maximum : 100 Marks****PART – A (ANSWER ALL QUESTIONS) (Marks 10\*2=20)**

| <b>Q.No</b> | <b>Questions</b>                                                                                                 | <b>BLT</b> | <b>CO</b> | <b>Marks</b> |
|-------------|------------------------------------------------------------------------------------------------------------------|------------|-----------|--------------|
| 1.          | List any two differences between pixel and voxel.                                                                | L1         | 1         | 2            |
| 2.          | Write the equations for discrete Fourier transform for one-dimensional and two-dimensional functions for images. | L2         | 1         | 2            |
| 3.          | Define histogram equalization and mention its utility.                                                           | L1         | 2         | 2            |
| 4.          | Mention the advantages of homomorphic filtering?                                                                 | L2         | 2         | 2            |
| 5.          | List two common edge detection operators.                                                                        | L2         | 3         | 2            |
| 6.          | Define Invariant degradation.                                                                                    | L1         | 3         | 2            |
| 7.          | Define rigid body transformation in image registration.                                                          | L1         | 4         | 2            |
| 8.          | Write the use of surface rendering in CT visualization.                                                          | L2         | 4         | 2            |
| 9.          | What is image compression?                                                                                       | L1         | 5         | 2            |
| 10.         | State the importance of Feature Extraction in medical image processing                                           | L2         | 5         | 2            |

**PART – B (ANSWER ALL QUESTIONS) (Marks 5\*16 = 80)**

| <b>Q.No</b> | <b>Questions</b>                                                                                                     | <b>BLT</b> | <b>CO</b> | <b>Marks</b> |
|-------------|----------------------------------------------------------------------------------------------------------------------|------------|-----------|--------------|
| 11. a       | With neat sketch and explain in detail about human visual perception system.                                         | L2         | 1         | 16           |
|             | <b>Or</b>                                                                                                            |            |           |              |
| b           | List out the important properties of the two-dimensional Fourier transform and DCT.                                  | L2         | 1         | 16           |
| 12. a       | Compare the three basic gray level transformations used for image enhancement with suitable equations.               | L4         | 2         | 16           |
|             | <b>Or</b>                                                                                                            |            |           |              |
| b           | Compare various filtering techniques used for medical image enhancement with suitable MATLAB coding examples.        | L4         | 2         | 16           |
| 13. a i     | Describe the edge linking and boundary detection procedure in detail.                                                | L2         | 3         | 8            |
|             | <b>Or</b>                                                                                                            |            |           |              |
| i           | Describe how morphological operations are used to enhance the boundaries of anatomical structures in medical images. | L2         | 3         | 8            |

|     |   |                                                                                                                                                                 |    |   |    |
|-----|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|----|
|     | b | Develop the expression for Wiener filtering technique used for restoring degraded medical images.                                                               | L2 | 3 | 16 |
| 14. | a | Apply MATLAB coding to describe in detail about the four main steps of the image registration process.                                                          | L3 | 4 | 16 |
|     |   | <b>Or</b>                                                                                                                                                       |    |   |    |
|     | b | Describe the application of surface-based rendering and volume visualization techniques in medical imaging.                                                     | L3 | 4 | 16 |
| 15. | a | i Describe the three important redundancy techniques used in digital image compression.                                                                         | L3 | 5 | 6  |
|     |   | i Explain the need for pre-processing in medical image analysis with suitable example.                                                                          | L3 | 5 | 10 |
|     |   | <b>Or</b>                                                                                                                                                       |    |   |    |
|     | b | Explain how performance evaluation is done using the confusion matrix, ROC curve, and AUC. Support your answer with examples and interpretation of each metric. | L3 | 5 | 16 |