SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF MEDICAL ELECTRONICS

QUESTION BANK

VII SEMESTER

MD3663 –Medical Image Processing

Regulation – 2023

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UNIT I – FUNDAMENTALS OF MEDICAL IMAGE PROCESSING AND TRANSFORMS

Overview of Image Processing system and human Visual system- Image representation – pixel and voxels, Gray scale and color models- Medical image file formats- DICOM, ANALYZE 7.5, NIFTI and INTERFILE- Discrete sampling model and Quantization- Relationship between the pixels, Arithmetic and logical operations- Image quality and Signal to Noise ratio- Image Transforms- 2D DFT, DCT.

PART A

Q.No	Questions	CO	BT Level	Domain
1	Define an image processing system in medical imaging.	CO 1	**BTL 1**	**Remembering**
2	Mention the role of the human visual system in image interpretation.	CO 1	**BTL2**	**Understanding**
3	How image representation carried in digital medical imaging.	CO 1	**BTL 1**	**Remembering**
4	Differentiate between pixels and voxels.	CO 1	**BTL 1**	**Remembering**
5	State the concept of gray scale representation.	CO 1	**BTL2**	**Understanding**
6	List the basic color models used in medical imaging.	CO 1	**BTL2**	**Understanding**
7	Identify the purpose of medical image file formats.	CO 1	**BTL2**	**Understanding**
8	Brief about the DICOM image file format.	CO 1	**BTL 1**	**Remembering**
9	Point out the features of the ANALYZE 7.5 format.	CO 1	**BTL2**	**Understanding**
10	Enlist the characteristics of the NIFTI file format.	CO 1	**BTL 1**	**Remembering**
11	Short note about the INTERFILE format used in nuclear medicine imaging.	CO 1	**BTL2**	**Understanding**
12	Write note about discrete sampling model in digital imaging.	CO 1	**BTL 1**	**Remembering**
13	Mention the process of quantization in image formation.	CO 1	**BTL2**	**Understanding**
14	Specify the relationship between neighboring pixels.	CO 1	**BTL2**	**Understanding**
15	What is the significance of pixel connectivity in image analysis.	CO 1	**BTL 1**	**Remembering**
16	Write the arithmetic operations performed on digital images.	CO 1	**BTL2**	**Understanding**
17	List the logical operations used in image processing.	CO 1	**BTL 1**	**Remembering**
18	Define image quality in medical imaging.	CO 1	**BTL2**	**Understanding**
19	Write a short note the term Signal-to-Noise Ratio (SNR).	CO 1	**BTL 1**	**Remembering**
20	Analyze the factors affecting SNR in medical images.	CO 1	**BTL2**	**Understanding**
21	Outline the purpose of image transforms in image processing.	CO 1	**BTL 1**	**Remembering**
22	Mention the applications of 2D-DFT in medical imaging.	CO 1	**BTL 1**	**Remembering**
23	Give the basic concept of Discrete Cosine Transform (DCT).	CO 1	**BTL 1**	**Remembering**
24	Compare DFT and DCT with respect to image processing applications.	CO 1	**BTL2**	**Understanding**

PART B					
1	With suitable diagram explain the Image Processing system Illustrate about Human Visual System eith neat sketch.	(16)	CO 1	**BTL3**	**Analyze**
2	Define pixels and voxels in the context of image representation. Compare and contrast their use in 2D and 3D imaging.	(16)	CO 1	**BTL4**	**Analyze**
3	Describe the different grayscale and color models used in digital imaging. Explain the significance of RGB, CMYK, and HSV color spaces in medical imaging.	(16)	CO 1	**BTL4**	**Analyze**
4	Discuss the DICOM file format in detail. Include its structure, importance in medical imaging, and advantages over other formats.	(16)	CO 1	**BTL 3**	**Apply**
5	Explain the ANALYZE 7.5 medical image file format. Highlight its structure and typical applications in neuroimaging.	(16)	CO 1	**BTL 3**	**Apply**
6	Describe the NIFTI file format and its advantages over ANALYZE 7.5 in medical image processing.	(16)	CO 1	**BTL4**	**Analyze**
7	Explain the INTERFILE format used in nuclear medicine. Discuss its significance and limitations.	(16)	CO 1	**BTL4**	**Analyze**
8	Analyze the discrete sampling model in digital imaging. Discuss how it relates to image acquisition and resolution.	(16)	CO 1	**BTL 3**	**Apply**
9	Define quantization in digital imaging. Explain its effect on image quality and how it differs from sampling.	(16)	CO 1	**BTL 3**	**Apply**
10	Illustrate the relationship between neighboring pixels in an image. Explain how spatial correlation affects image processing.	(16)	CO 1	**BTL 3**	**Apply**
11	Mention the common arithmetic operations used in image processing. Explain their applications with suitable examples.	(16)	CO 1	**BTL 3**	**Apply**
12	Write detailed note about logical operations in image processing. Discuss how AND, OR, NOT, and XOR are applied to binary images.	(16)	CO 1	**BTL 3**	**Apply**
13	Define image quality in the context of medical imaging. Discuss the factors that influence image quality.	(16)	CO 1	**BTL 3**	**Apply**
14	Explain the concept of Signal-to-Noise Ratio (SNR) in medical images. How does SNR affect the diagnostic utility of an image?	(16)	CO 1	**BTL4**	**Analyze**
15	Describe the 2D Discrete Fourier Transform (DFT) for images. Explain its role in frequency domain analysis and filtering.	(16)	CO 1	**BTL4**	**Analyze**
16	Elaborate the 2D Discrete Cosine Transform (DCT) and its applications in image compression and processing.	(16)	CO 1	**BTL4**	**Analyze**
17	Compare and contrast arithmetic/logical operations with image transforms (DFT, DCT). Discuss how these techniques are used to enhance medical image quality.	(16)	CO 1	**BTL 3**	**Apply**

UNIT II – ENHANCEMENT TECHNIQUES

Gray level transformation- Log transformation, Power law transformation, Piecewise linear transformation. Histogram processing- Histogram equalization, Histogram Matching. Spatial domain Filtering-Smoothing filters, sharpening filters. Frequency domain filtering- Smoothing filters, Sharpening filters- Homomorphic filtering -Medical image enhancement using Hybrid filters- Performance measures for enhancement techniques.

PART A

Q.No	Questions	CO	BT Level	Domain
1	Define gray level transformation and state its role in image enhancement.	CO 2	**BTL 1**	**Remembering**
2	Specify the principle of log transformation and mention one application.	CO 2	**BTL 1**	**Remembering**
3	State the mathematical expression for log transformation.	CO 2	**BTL 1**	**Remembering**
4	Brief about power law (gamma) transformation and its effect on image contrast.	CO 2	**BTL2**	**Understanding**
5	Compare log transformation and power law transformation in terms of dynamic range compression.	CO 2	**BTL 1**	**Remembering**
6	Illustrate the concept of piecewise linear transformation with its basic purpose.	CO 2	**BTL 1**	**Remembering**
7	List two advantages of piecewise linear transformation in contrast enhancement.	CO 2	**BTL2**	**Understanding**
8	Define histogram equalization and its objective.	CO 2	**BTL2**	**Understanding**
9	How histogram equalization improves image contrast?	CO 2	**BTL 1**	**Remembering**
10	State few limitation of histogram equalization.	CO 2	**BTL 1**	**Remembering**
11	Differentiate between histogram equalization and histogram matching.	CO 2	**BTL2**	**Understanding**
12	Write note about the process of histogram matching.	CO 2	**BTL2**	**Understanding**
13	Mention one application of histogram matching in medical imaging.	CO 2	**BTL 1**	**Remembering**
14	Define spatial domain filtering with an example.	CO 2	**BTL2**	**Understanding**
15	Short note about the working of smoothing filters in image processing.	CO 2	**BTL 1**	**Remembering**
16	List two types of spatial smoothing filters.	CO 2	**BTL2**	**Understanding**
17	Mention the purpose of sharpening filters.	CO 2	**BTL2**	**Understanding**
18	State the role of Laplacian operator in image sharpening.	CO 2	**BTL2**	**Understanding**
19	List two types of frequency domain smoothing filters.	CO 2	**BTL2**	**Understanding**
20	Differentiate between frequency domain smoothing and sharpening filters.	CO 2	**BTL2**	**Understanding**
21	Brief the concept of homomorphic filtering.	CO 2	**BTL 1**	**Remembering**
22	State the importance of homomorphic filtering in medical image enhancement.	CO 2	**BTL2**	**Understanding**
23	Specify the use of hybrid filters in medical image enhancement.	CO 2	**BTL 1**	**Remembering**

24	Enlist any two performance measures used to evaluate image enhancement techniques.		CO 2	**BTL 1**	**Remembering**
PART B					
1	Explain the concept of logarithmic gray level transformation and discuss its effect on the contrast of low-intensity regions.	(16)	CO 2	**BTL4**	**Analyze**
2	Describe power-law (gamma) transformation and illustrate its application in enhancing dark images.	(16)	CO 2	**BTL4**	**Analyze**
3	Apply piecewise linear transformation on ant example image histogram and justify the selection of breakpoints.	(16)	CO 2	**BTL4**	**Analyze**
4	Define histogram equalization and explain its role in improving image quality.	(16)	CO 2	**BTL 3**	**Apply**
5	Perform histogram matching with an example and explain the procedure.	(16)	CO 2	**BTL 3**	**Apply**
6	Compare and contrast histogram equalization and histogram matching with respect to image enhancement.	(16)	CO 2	**BTL 3**	**Apply**
7	Differentiate between smoothing and sharpening spatial filters, providing suitable examples.	(16)	CO 2	**BTL 3**	**Apply**
8	Design a smoothing filter to reduce salt-and-pepper noise in an image and explain its effectiveness.	(16)	CO 2	**BTL4**	**Analyze**
9	Apply a sharpening filter to a blurred image and evaluate its performance in edge enhancement.	(16)	CO 2	**BTL4**	**Analyze**
10	Explain frequency domain filtering and illustrate how smoothing filters reduce high-frequency noise.	(16)	CO 2	**BTL4**	**Analyze**
11	Design a high-pass filter in the frequency domain to enhance edges in a medical image.	(16)	CO 2	**BTL4**	**Analyze**
12	Discuss homomorphic filtering and evaluate its advantages over spatial domain enhancement techniques.	(16)	CO 2	**BTL4**	**Analyze**
13	Describe a hybrid filtering technique that combines spatial and frequency domain methods for medical image	(16)	CO 2	**BTL4**	**Analyze**
14	Given a low-contrast X-ray image, propose a hybrid image enhancement strategy and justify the selection of spatial and frequency domain filters used.	(16)	CO 2	**BTL4**	**Analyze**
15	Evaluate the effectiveness of hybrid filters on MRI images by employing appropriate quantitative performance metrics.	(16)	CO 2	**BTL 3**	**Apply**
16	List and explain the commonly used performance measures—such as PSNR, MSE, and SSIM—employed for assessing the quality of image enhancement techniques.	(16)	CO 2	**BTL 3**	**Apply**
17	Compare histogram equalization and homomorphic filtering using quantitative performance measures, and discuss which method is more suitable for medical imaging applications.	(16)	CO 2	**BTL 3**	**Apply**

UNIT III – SEGMENTATION AND RESTORATION TECHNIQUES

ROI definition -Detection of discontinuities–Edge linking and boundary detection – Region based segmentation- Morphological processing, Active contour models. Image Restoration- Noise models– Restoration in the presence of Noise – spatial filtering, Periodic noise reduction by frequency domain filtering- linear position- Invariant degradation- Estimation of degradation function, Inverse filter, Weiner filtering.

PART A

Q.No	Questions	CO	BT Level	Domain
1	Define the term Region of Interest in image processing.	CO 3	**BTL 1**	**Remembering**
2	What is detection of discontinuities in an image?	CO 3	**BTL 1**	**Remembering**
3	Point out the concept of edge detection.	CO 3	**BTL 1**	**Remembering**
4	State about edge linking in image analysis.	CO 3	**BTL2**	**Understanding**
5	Define boundary detection.	CO 3	**BTL 1**	**Remembering**
6	Write note about region-based segmentation.	CO 3	**BTL 1**	**Remembering**
7	Name two advantage of region growing over edge-based methods.	CO 3	**BTL2**	**Understanding**
8	What is morphological processing in digital images?	CO 3	**BTL 1**	**Remembering**
9	Specify about morphological erosion.	CO 3	**BTL2**	**Understanding**
10	Write a note on active contour models (snakes) in segmentation.	CO 3	**BTL2**	**Understanding**
11	Define image restoration.	CO 3	**BTL 1**	**Remembering**
12	Draw the noise model in image processing.	CO 3	**BTL 1**	**Remembering**
13	How restoration achieved in the presence of noise?	CO 3	**BTL 1**	**Remembering**
14	Brief the term spatial filtering.	CO 3	**BTL2**	**Understanding**
15	Write note about periodic noise.	CO 3	**BTL2**	**Understanding**
16	How is frequency domain filtering used to remove periodic noise?	CO 3	**BTL 1**	**Remembering**
17	Mention about linear position-invariant (LPI) degradation.	CO 3	**BTL2**	**Understanding**
18	What is a degradation function in image restoration?	CO 3	**BTL 1**	**Remembering**
19	What is inverse filtering? State its purpose.	CO 3	**BTL 1**	**Remembering**
20	List the applications of Wiener filtering.	CO 3	**BTL2**	**Understanding**
21	Name two edge detection operators suitable for noisy images.	CO 3	**BTL 1**	**Remembering**
22	Point out that how does edge linking improve boundary detection?	CO 3	**BTL 1**	**Remembering**
23	Mention few applications of morphological closing in image analysis.	CO 3	**BTL2**	**Understanding**
24	Compare active contour models with simple thresholding for segmentation.	CO 3	**BTL2**	**Understanding**

PART B

1	Define Region of Interest (ROI) and elaborate on its significance in various stages of image analysis with suitable examples.	(16)	CO 3	**BTL4**	**Analyze**
2	Describe the different types of discontinuities in digital images and explain how they are detected using gradient-based and Laplacian based operators.	(16)	CO 3	**BTL4**	**Analyze**
3	Illustrate the basic morphological operations (erosion, dilation, opening, closing) with diagrams and discuss their applications in image preprocessing	(16)	CO 3	**BTL4**	**Analyze**

4	Discuss edge linking and boundary detection techniques in detail. Compare local and global edge linking strategies with examples.	(16)	CO 3	**BTL4**	**Analyze**
5	Explain region-based segmentation methods such as region growing, region splitting and merging. Highlight their advantages and limitations.	(16)	CO 3	**BTL4**	**Analyze**
6	Describe active contour models (snakes). Explain internal and external energy terms and how they influence contour evolution.	(16)	CO 3	**BTL 3**	**Apply**
7	(i) Explain various noise models used in image processing. (ii) Discuss how noise characteristics influence the choice of restoration techniques.	(8) (8)	CO 3	**BTL 3**	**Apply**
8	(i) How spatial filtering techniques to removes noise from an image? (ii) Compare linear and nonlinear spatial filters with suitable examples.	(8) (8)	CO 3	**BTL4**	**Analyze**
9	Show the process of periodic noise reduction using frequency domain filtering. Include the steps for designing notch filters and illustrate with spectra.	(16)	CO 3	**BTL4**	**Analyze**
10	Apply morphological processing to solve a real-world problem such as character recognition, medical image enhancement, or object extraction.	(16)	CO 3	**BTL4**	**Analyze**
11	Using an example image, show how boundary detection can be improved by combining edge detection, thresholding, and linking techniques.	(16)	CO 3	**BTL4**	**Analyze**
12	Illustrate the operation of spatial filtering techniques to remove noise from an image.	(16)	CO 3	**BTL 3**	**Apply**
13	Analyze the limitations of edge-based segmentation and justify when region-based segmentation becomes more effective.	(16)	CO 3	**BTL4**	**Analyze**
14	Examine the effect of linear position-invariant (LPI) degradation on image quality. Provide mathematical representation and analyze its impact on restoration.	(16)	CO 3	**BTL4**	**Analyze**
15	Evaluate the performance of inverse filtering under different noise conditions. Explain why inverse filtering fails in practical scenarios.	(16)	CO 3	**BTL 3**	**Apply**
16	Elaborate the effectiveness of Wiener filtering for restoring images degraded by blur and noise. Discuss the role of power spectral densities in the filter design.	(16)	CO 3	**BTL 3**	**Apply**
17	Assess the importance of estimating the degradation function in image restoration. Compare direct, indirect, and blind estimation methods.	(16)	CO 3	**BTL 3**	**Apply**

UNIT IV – REGISTRATION AND VISUALISATION

Registration–Rigid body transformation, principal axes registration, and feature based. Visualisation-Orthogonal and perspective projection in medicine, Surface based rendering, Volume visualization in medical image. Significance of registration of various imaging modalities and appraise the concepts of image visualization.

PART A

Q.No	Questions	CO	BT Level	Domain
1	Define rigid body transformation in the context of medical image registration.	CO 4	**BTL2**	**Understanding**
2	List the parameters involved in a 3D rigid body transformation.	CO 4	**BTL 1**	**Remembering**
3	Identify the main objective of image registration in medical imaging.	CO 4	**BTL 1**	**Remembering**
4	State what is meant by principal axes registration.	CO 4	**BTL 1**	**Remembering**
5	Name any two medical imaging modalities that require registration.	CO 4	**BTL2**	**Understanding**
6	Define orthogonal projection used in medical image visualization.	CO 4	**BTL 1**	**Remembering**
7	State the concept of perspective projection.	CO 4	**BTL2**	**Understanding**
8	Mention two examples of feature-based registration techniques.	CO 4	**BTL 1**	**Remembering**
9	State the principle of feature-based image registration.	CO 4	**BTL2**	**Understanding**
10	Write that how principal axes registration aligns two images.	CO 4	**BTL2**	**Understanding**
11	Summarize the role of transformation models in image registration.	CO 4	**BTL 1**	**Remembering**
12	Differentiate between orthogonal and perspective projection.	CO 4	**BTL2**	**Understanding**
13	Write a note on surface-based rendering in medical visualization.	CO 4	**BTL 1**	**Remembering**
14	Show the importance of volume visualization in diagnostic imaging.	CO 4	**BTL2**	**Understanding**
15	Illustrate how rigid body transformation can be applied to align CT images.	CO 4	**BTL2**	**Understanding**
16	Mention the use of feature points in feature-based registration.	CO 4	**BTL 1**	**Remembering**
17	Apply principal axes registration to reduce misalignment between two MRI scans.	CO 4	**BTL 1**	**Remembering**
18	Show how perspective projection improves depth perception in medical images.	CO 4	**BTL2**	**Understanding**
19	Use surface rendering techniques to visualize anatomical structures.	CO 4	**BTL2**	**Understanding**
20	Illustrate how rigid body transformation can be applied to align CT images.	CO 4	**BTL2**	**Understanding**
21	Mention the use of feature points in feature-based registration.	CO 4	**BTL2**	**Understanding**
22	Differentiate between rigid body and non-rigid image registration.	CO 4	**BTL 1**	**Remembering**
23	Compare principal axes registration and feature-based registration methods.	CO 4	**BTL 1**	**Remembering**
24	Analyze the advantages of volume visualization over surface rendering	CO 4	**BTL2**	**Understanding**

PART B

1	Define image registration and list the different types of rigid body transformations used in medical imaging.	(16)	CO 4	**BTL4**	**Analyze**

2	State the concept of principal axes registration and identify its key mathematical assumptions.	(16)	CO 4	**BTL 3**	**Apply**
3	List the steps involved in feature-based image registration and explain the common features used in medical images.	(16)	CO 4	**BTL 3**	**Apply**
4	Write note about orthogonal projection and list its applications in medical image visualization.	(16)	CO 4	**BTL 3**	**Apply**
5	Illustrate the basic principles of volume visualization and state its importance in medical diagnosis.	(16)	CO 4	**BTL4**	**Analyze**
6	Describe principal axes registration and discuss how image moments are used for alignment.	(16)	CO 4	**BTL4**	**Analyze**
7	Explain feature-based registration and illustrate its workflow using medical image datasets. (16 marks)	(16)	CO 4	**BTL 3**	**Apply**
8	Discuss orthogonal and perspective projection techniques and compare their roles in medical visualization.	(16)	CO 4	**BTL4**	**Analyze**
9	Discuss about surface-based rendering techniques and explain their significance in anatomical visualization.	(16)	CO 4	**BTL4**	**Analyze**
10	Apply rigid body transformation techniques to register CT and MRI images of the brain and explain the outcome.	(16)	CO 4	**BTL 3**	**Apply**
11	Show that how principal axes registration can be used to align two disoriented medical images.	(16)	CO 4	**BTL4**	**Analyze**
12	Use feature-based registration methods to match multimodal medical images and justify the chosen features.	(16)	CO 4	**BTL4**	**Analyze**
13	Implement perspective projection for 3D medical image visualization and explain its clinical relevance.	(16)	CO 4	**BTL4**	**Analyze**
14	Apply volume visualization techniques to medical image data and interpret the visual output.	(16)	CO 4	**BTL4**	**Analyze**
15	Analyze the differences between rigid body registration and feature-based registration with respect to medical imaging accuracy.	(16)	CO 4	**BTL4**	**Analyze**
16	Compare and contrast principal axes registration and feature-based registration in multimodal image alignment.	(16)	CO 4	**BTL 3**	**Apply**
17	Examine the effectiveness of orthogonal versus perspective projection in medical diagnosis and surgical planning.	(16)	CO 4	**BTL4**	**Analyze**

UNIT V – APPLICATIONS OF MEDICAL IMAGE ANALYSIS

Medical Image compression- DCT and Wavelet transform based image compression, Pre-processing of medical images -Retinal images, Ultrasound –liver, kidney, Mammogram. Segmentation of ROI -blood vessels, lesions, tumour, lung nodules, feature extraction- shape and texture, Computer aided diagnosis system – performance measures (confusion matrix, ROC, AUC).

PART A					
Q.No	Questions		CO	BT Level	Domain
1	Define medical image compression.		CO 5	**BTL 1**	**Remembering**
2	Identify the role of Discrete Cosine Transform (DCT) in image compression.		CO 5	**BTL 1**	**Remembering**
3	State one advantage of wavelet transform–based image compression.		CO 5	**BTL2**	**Understanding**
4	List the basic steps involved in DCT-based image compression.		CO 5	**BTL 1**	**Remembering**
5	Mention any one limitation of DCT compression in medical images.		CO 5	**BTL 1**	**Remembering**
6	Differentiate between DCT and wavelet transform in terms of frequency representation.		CO 5	**BTL2**	**Understanding**
7	Define image pre-processing in medical image analysis.		CO 5	**BTL 1**	**Remembering**
8	Mention two common pre-processing techniques used for retinal images.		CO 5	**BTL2**	**Understanding**
9	Identify a noise type commonly found in ultrasound liver images.		CO 5	**BTL2**	**Understanding**
10	Specify any two pre-processing method used for kidney ultrasound images.		CO 5	**BTL2**	**Understanding**
11	List any two pre-processing steps applied to mammogram images.		CO 5	**BTL2**	**Understanding**
12	Write note about the purpose of contrast enhancement in medical images.		CO 5	**BTL 1**	**Remembering**
13	Define segmentation in medical imaging.		CO 5	**BTL 1**	**Remembering**
14	Identify the ROI segmented in blood vessel analysis.		CO 5	**BTL2**	**Understanding**
15	State one segmentation challenge in lesion detection.		CO 5	**BTL2**	**Understanding**
16	Point out the methods used for tumour segmentation.		CO 5	**BTL2**	**Understanding**
17	Summarize the applications of lung nodule segmentation.		CO 5	**BTL2**	**Understanding**
18	What is feature extraction? Give its role in medical imaging..		CO 5	**BTL2**	**Understanding**
19	Identify two shape feature used for tumour characterization.		CO 5	**BTL2**	**Understanding**
20	State one texture feature used in medical images.		CO 5	**BTL 1**	**Remembering**
21	Mention the significance of texture features in lesion detection.		CO 5	**BTL 1**	**Remembering**
22	Enlist any two shape descriptors used in medical imaging.		CO 5	**BTL2**	**Understanding**
23	Why feature extraction is important for CAD systems?		CO 5	**BTL2**	**Understanding**
24	Write a note about feature extraction in medical image analysis.		CO 5	**BTL 1**	**Remembering**
PART B					
1	Explain the necessity of medical image compression and the role of DCT in reducing data redundancy.	(16)	CO 5	**BTL 3**	**Apply**
2	Describe the complete algorithm of DCT-based medical image compression with mathematical representation.	(16)	CO 5	**BTL4**	**Analyze**
3	Discuss the principles of wavelet transform–based image compression for medical applications.	(16)	CO 5	**BTL4**	**Analyze**
4	Compare DCT and wavelet transform compression techniques in terms of energy compaction and visual quality.	(16)	CO 5	**BTL4**	**Analyze**
5	Evaluate the advantages and limitations of wavelet-based compression for diagnostic images.	(16)	CO 5	**BTL 3**	**Apply**

6	Illustrate the block diagram of a medical image compression system using transform coding.	(16)	CO 5	**BTL4**	**Analyze**
7	Describe the pre-processing techniques used for enhancing retinal images.	(16)	CO 5	**BTL4**	**Analyze**
8	Analyse the noise characteristics of ultrasound liver images and suitable filtering approaches.	(16)	CO 5	**BTL 3**	**Apply**
9	Illustrate the pre-processing workflow for kidney ultrasound images.	(16)	CO 5	**BTL4**	**Analyze**
10	Illustrate blood vessel segmentation methods used in retinal image analysis using appropriate sketch.	(16)	CO 5	**BTL4**	**Analyze**
11	Analyse the challenges involved in lesion segmentation in medical images.	(16)	CO 5	**BTL4**	**Analyze**
12	Discuss tumour segmentation techniques and their clinical importance.	(16)	CO 5	**BTL4**	**Analyze**
13	Describe shape-based features used for tumour characterization	(16)	CO 5	**BTL4**	**Analyze**
14	Analyse the confusion matrix and derive performance measures used in CAD systems.	(16)	CO 5	**BTL 3**	**Apply**
15	Appraise ROC curve and AUC analysis for evaluating diagnostic system performance.	(16)	CO 5	**BTL 3**	**Apply**
16	Elaborate the architecture and working of a Computer-Aided Diagnosis (CAD) system.	(16)	CO 5	**BTL 3**	**Apply**
17	Define and explain ROI segmentation and its significance in medical diagnosis	(16)	CO 5	**BTL4**	**Analyze**