SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

&

DEPARTMENT OF MEDICAL ELECTRONICS

QUESTION BANK

VII SEMESTER

1906704 DIGITAL IMAGE PROCESSING

(Common to VII Semester Medical Electronics)

Regulation – 2019

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DEPARTMENT OF MEDICAL ELECTRONICS

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SUBJECT : 1906704 DIGITAL IMAGE PROCESSING

SEM / YEAR: VII/ IV year B.E.

	UNIT I - DIGITAL IMAGE FUNDAMENTALS			
	Steps in Digital Image Processing – Components – Elements of Visual Perception –Types of Images: Monochrome and Color model, Chromatic diagram, Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - color image fundamentals, RGB, HIS models.			
	PART - A			
Q.No	Questions	CO	BT Level	Competence
1.	List the basic steps in digital image processing.	CO1	BTL1	Remembering
2.	What is the objective of image enhancement?	CO1	BTL2	Understanding
3.	Name any four components of a digital image processing system.	CO1	BTL1	Remembering
4.	What is the role of a digital computer in DIP?	CO1	BTL2	Understanding
5.	Define brightness and contrast in image perception.	CO1	BTL1	Remembering
6.	What is meant by Weber ratio?	CO1	BTL1	Remembering
7.	Differentiate between monochrome and color images.	CO1	BTL2	Understanding
8.	What is a pseudo-color image?	CO1	BTL1	Remembering
9.	Define color model. Give an example.	CO1	BTL1	Remembering
10.	What is the significance of the chromaticity diagram?	CO1	BTL2	Understanding
11.	List the components of the RGB model.	CO1	BTL1	Remembering
12.	List the components of the HSI model.	CO1	BTL1	Remembering
13.	State one key difference between RGB and HSI models.	CO1	BTL2	Understanding
14.	Define hue and saturation in HSI model.	CO1	BTL1	Remembering
15.	Mention the two elements of image acquisition.	CO1	BTL1	Remembering
16.	What is image sensing in DIP?	CO1	BTL1	Remembering
17.	Define image sampling.	CO1	BTL1	Remembering
18.	What is quantization in image processing?	CO1	BTL1	Remembering
19.	What does bit depth mean in quantization?	CO1	BTL2	Understanding
20.	Define 4-neighbors and 8-neighbors of a pixel.	CO1	BTL1	Remembering
21.	List the color models involved in hardware.	CO1	BTL1	Remembering
22.	Outline the function of an image sensor.	CO1	BTL2	Understanding
23.	Classify the types of image sensing sensors.	CO1	BTL2	Understanding
24.	Mention the applications of image processing.	CO1	BTL2	Understanding

	PART- B			
1.	Explain the fundamental steps involved in digital image processing with a neat block diagram.	(13)	BTL4	Analyzing
2.	Discuss the components of a typical digital image processing system. Explain the role of each component with a neat diagram.	(13)	BTL4	Analyzing
3.	Explain the elements of visual perception. How does the human visual system influence image processing algorithms?	(13)	BTL3	Applying
4.	Compare and contrast different types of digital images (monochrome, binary, color, indexed). Give suitable examples.	(13)	BTL4	Analyzing
5.	Describe the RGB and HSI color models. Also derive the transformation equations between RGB and HSI.	(13)	BTL4	Analyzing
6.	What is a chromaticity diagram? Explain how it is used in color representation and interpretation.	(13)	BTL3	Applying
7.	Explain image sensing and acquisition in detail. Describe different types of sensors used and their working principle.	(13)	BTL3	Applying
8.	Discuss in detail the process of image sampling and quantization. How do sampling rate and quantization level affect image quality?	(13)	BTL4	Analyzing
9.	Describe the various types of pixel relationships. Explain adjacency, connectivity, region, and boundary with examples.	(13)	BTL3	Applying
10.	Discuss the basic concepts of image resolution, distance measures, and neighborhood relationships in a digital image.	(13)	BTL4	Analyzing
11.	i) Write in detail about image acquisition system. ii) Illustrate how the image is digitized by sampling and quantization process.	(7) (6)	BTL4	Analyzing
12.	Describe in detail about various sensors of Image acquisition systems	(13)	BTL3	Applying
13.	Explain the principle of operation of human eye with suitable diagrams.	(13)	BTL3	Applying
14.	Evaluate the various color models. Explain each of them in detail.	(13)	BTL4	Analyzing
15.	Explain in detail about: i) Image sampling, ii) Quantization.	 (7) (6)	BTL3	Applying
16.	Briefly define the following terms: i) Image restoration, ii) Compression, iii) Segmentation, iv) Morphological processing.	 (3) (3) (3) (4)	BTL3	Applying
17.	Describe about the following: i. Monochrome model ii. Color model.	 (7) (6)	BTL 3	Applying

	PART - C			
1.	Explain in detail the steps involved in a digital image processing system. Discuss each step with a neat block diagram and its function.	(15)	BTL4	Analyzing
2.	Explain image sampling and quantization in detail. What are their effects on image resolution and quality? Use diagrams and examples.	(15)	BTL3	Applying
3.	Explain the various color models with appropriate examples.	(15)	BTL3	Applying
4.	With suitable diagrams, explain the image sensing and acquisition process. Also, describe the working of any two types of image sensors.	(15)	BTL3	Applying
5.	Discuss the chromaticity diagram in detail. How is it useful in representing color information? Discuss any one application.	(15)	BTL4	Analyzing

	UNIT II IMAGE ENHANCEMENT			
	Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters. Homomorphic filtering, Color image Enhancement.			
	PART- A			
Q.No	Questions	CO	BT Level	Competence
1.	Discuss about image filtering?	CO2	BTL2	Understanding
2.	What is meant by spatial domain processing in images?	CO2	BTL1	Remembering
3.	List any two gray level transformation functions.	CO2	BTL1	Remembering
4.	Define contrast stretching.	CO2	BTL1	Remembering
5.	What is thresholding in gray level transformation?	CO2	BTL2	Understanding
6.	Differentiate between linear and non-linear gray level transformations.	CO2	BTL2	Understanding
7.	What is a histogram and histogram equalization of an image?	CO2	BTL1	Remembering
8.	State one use of histogram specification.	CO2	BTL1	Remembering
9.	What is the purpose of histogram stretching?	CO2	BTL2	Understanding
10.	Differentiate between histogram equalization and specification.	CO2	BTL2	Understanding
11.	What is spatial filtering in image processing?	CO2	BTL1	Remembering
12.	What is the purpose of a sharpening filter?	CO2	BTL2	Understanding
13.	What is the difference between high-pass and low-pass filters in spatial domain?	CO2	BTL2	Understanding
14.	Name any two commonly used edge detection filters.	CO2	BTL1	Remembering
15.	What is the purpose of the Fourier Transform in image processing?	CO2	BTL2	Understanding
16.	What is the difference between frequency domain and spatial domain filtering?	CO2	BTL2	Understanding
17.	List any two types of frequency domain filters.	CO2	BTL1	Remembering
18.	Define Butterworth filter.	CO2	BTL1	Remembering
19.	What is the role of Gaussian filter in frequency domain?	CO2	BTL2	Understanding
20.	Explain the two categories of image enhancement.	CO2	BTL2	Understanding
21.	List various gray level transformation techniques.	CO2	BTL1	Remembering
22.	Distinguish between smoothing and sharpening filters.	CO2	BTL2	Understanding
23.	Outline the mechanics of spatial filtering.	CO2	BTL2	Understanding
24.	Write note about homomorphic filtering.	CO2	BTL2	Understanding

	PART – B			
1.	Explain various gray level transformation functions. Illustrate each with graph and image examples.	(13)	BTL3	Applying
2.	Describe contrast stretching and thresholding techniques in detail with suitable diagrams and applications.	(13)	BTL4	Analyzing
3.	Discuss the working principle of sharpening spatial filters using Laplacian operator. Include mask examples.	(13)	BTL4	Analyzing
4.	Infer the difference between spatial correlation and convolution. Explain each with identical example.	(13)	BTL4	Analyzing
5.	i) Describe the histogram equalization method of image enhancement. ii) Discuss histogram specification technique in detail with equations.	(7) (6)	BTL4	Analyzing
6.	From the fundamentals explain with example: i) Spatial smoothening ii) Spatial sharpening	(7) (6)	BTL 3	Applying
7.	Explain Fourier Transform to enhance an image. Show filtering steps in the frequency domain, List its properties with examples.	(13)	BTL3	Applying
8.	i) Deduce about spatial enhancement techniques and Median filtering ii) Compare the various image transformation technique	(7) (6)	BTL4	Analyzing
9.	i) With example explain in detail about spatial averaging. ii) Describe in detail about various types of mean filters.	(7) (6)	BTL3	Applying
10.	Show the various techniques in frequency domain to enhance an image with necessary examples	(13)	BTL3	Applying
11.	Illustrate the 2D Fourier transform and its pair. State and prove their property.	(13)	BTL3	Applying
12.	Explain in detail about i) Spatial and Frequency domain enhancement ii) Discrete Fourier Transform	(13)	BTL3	Applying
13.	Evaluate the performance of Gaussian high-pass filter in sharpening applications. Use frequency domain graphs.	(13)	BTL4	Analyzing
14.	i) Distinguish between spatial & frequency domain image enhancement ii) Discuss Ideal, Butterworth, and Gaussian filters for both low-pass and high-pass operations.	(7) (6)	BTL4	Analyzing
15.	Discuss in detail about Homomorphic filtering.	(13)	BTL3	Applying
16.	With suitable diagram explain the process of color image enhancement.	(13)	BTL3	Applying

17.	i) State and explain sampling theorem in 2D ii) Write about aliasing in Images	(7) (6)	BTL3	Applying
	PART – C			
1.	Describe the constraints of histogram equalization and technique of histogram processing in detail.	(15)	BTL4	Analyzing
2.	Explain about the various grey level transformations with examples and plot the graph of the transformation functions.	(15)	BTL3	Applying
3.	Write about the various filters in terms of their performance with necessary illustrations.	(15)	BTL3	Applying
4.	With necessary illustrations explain about the Fourier transform in frequency domain and the combining sinusoids of frequency content.	(15)	BTL3	Applying
5.	Write in detail the following: i. Gray level transformation. ii. Color Image enhancement.	(7) (8)	BTL3	Applying

	UNIT III IMAGE RESTORATION			
	Image Restoration - Degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering.			
	PART A			
Q. No	Questions	CO	BT Level	Competence
1.	Specify the factors that cause image degradation.	CO3	BTL2	Understanding
2.	Define the degradation model used in image restoration	CO3	BTL1	Remembering
3.	Write the equation for converting wiener filter into inverse filter.	CO3	BTL2	Understanding
4.	Identify the drawback of inverse filtering. How it can be overcome?	CO3	BTL2	Understanding
5.	Why the restoration is called as unconstrained restoration?	CO3	BTL1	Remembering
6.	Classify the noise models involved in image restoration.	CO3	BTL1	Remembering
7.	List the various spatial restoration filters.	CO3	BTL1	Remembering
8.	Differentiate between Enhancement and Restoration.	CO3	BTL1	Remembering
9.	State the types of frequency domain restoration filters	CO3	BTL2	Understanding
10.	Write the types of Order statistics filters	CO3	BTL2	Understanding
11.	Introduce the three types of image degradation estimation models.	CO3	BTL1	Remembering
12.	Obtain the band pass filter transfer function from band reject filter.	CO3	BTL1	Remembering
13.	Write a note on Gaussian noise model.	CO3	BTL2	Understanding
14.	Outline about Rayleigh noise model.	CO3	BTL2	Understanding
15.	How the arithmetic and geometric mean filters are differing?	CO3	BTL1	Remembering
16.	List common types of noise in digital images.	CO3	BTL1	Remembering
17.	What are mean filters?	CO3	BTL1	Remembering
18.	Name two types of mean filters.	CO3	BTL1	Remembering
19.	What is an order-statistics filter? Give an example.	CO3	BTL1	Remembering
20.	When is a median filter preferred over a mean filter?	CO3	BTL1	Remembering
21.	What is an adaptive filter?	CO3	BTL1	Remembering
22.	Differentiate between band-pass and band-reject filters.	CO3	BTL2	Understanding
23.	Define a notch filter.	CO3	BTL1	Remembering
24.	What is optimum notch filtering?	CO3	BTL1	Remembering
	PART – B			
1.	(i) Explain the concept of inverse and pseudo inverse filters for image restoration. (ii) Explain in detail about spatial transformation techniques used for image restoration.	(7) (6)	BTL3	Applying
2.	Derive and explain the mathematical model of image degradation and restoration.	(13)	BTL3	Applying
3.	Discuss various types of noise models in digital images. Give suitable mathematical representations.	(13)	BTL4	Analyzing
4.	Explain the working of arithmetic and geometric mean filters with examples.	(13)	BTL3	Applying

5.	Explain adaptive filters with equations. How do they perform better than standard filters?	(13)	BTL3	Applying
6.	Design a band-reject filter in the frequency domain and explain its use in periodic noise removal.	(13)	BTL4	Analyzing
7.	Explain adaptive filters with equations. How do they perform better than standard filters?	(13)	BTL3	Applying
8.	Explain Wiener filtering in detail. Derive the filter and show how it handles noise and blurring.	(13)	BTL3	Applying
9.	Design a restoration method using frequency domain filtering to remove motion blur.	(13)	BTL4	Analyzing
10.	How are mean filters implemented in spatial domain? Discuss their effect on Gaussian and salt-pepper noise.	(13)	BTL3	Applying
11.	Derive a wiener filter for image restoration and specify its advantages over inverse filter.	(13)	BTL4	Analyzing
12.	Describe constrained least square filtering for image restoration and derive its transfer function.	(13)	BTL4	Analyzing
13.	Explain the algorithm for following filtering (i)Adaptive filtering, (ii)LMS filter.	(7) (6)	BTL3	Applying
14.	(i) What is the term Order statistics filter means? Classify it. (ii) Simplify the operations of order statistic filter.	(4) (9)	BTL4	Analyzing
15.	Describe inverse filtering for removal of blur caused by any motion and describe how it restore the image.	(13)	BTL3	Applying
16.	Discuss the characteristics and design of band-pass filters for image restoration.	(13)	BTL4	Analyzing
17.	Derive the expression for Optimum notch filtering	(13)	BTL4	Analyzing

	PART-C			
Q.No	Questions		BT Level	Competence
1.	Explain the use of wiener filter or least mean square filter in image restoration.	(15)	BTL3	Applying
2.	Elaborate about Inverse filtering with necessary illustrations.	(15)	BTL4	Analyzing
3.	Discuss in detail about frequency domain restoration filters with necessary diagrams.	(15)	BTL4	Analyzing
4.	Classify the spatial filtering techniques elaborate any two category in detail with suitable expressions.	(15)	BTL3	Applying
5.	Draw the image degradation model, describe in detail about various noise models with appropriate equations.	(15)	BTL4	Analyzing

	UNIT IV IMAGE SEGMENTATION			
	Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Morphological processing- Erosion and Dilation, Segmentation by morphological watersheds – Basic concepts of Dam construction, Watershed segmentation algorithm.			
	PART A			
Q.No	Questions	CO	BT Level	Competence
1.	Define edge detection.	CO4	BTL1	Remembering
2.	What is the role of thresholding in image segmentation?	CO4	BTL1	Remembering
3.	Differentiate between region growing and region splitting.	CO4	BTL2	Understanding
4.	What is the purpose of the Hough Transform in edge linking?	CO4	BTL1	Remembering
5.	Define morphological erosion.	CO4	BTL1	Remembering
6.	List the conditions for a region to grow in region growing segmentation	CO4	BTL1	Remembering
7.	List the three types of discontinuity in digital image.	CO4	BTL 1	Remembering
8.	Mention the properties of second derivative around an edge.	CO4	BTL2	Understanding
9.	Name the different types of derivative filters.	CO4	BTL 1	Remembering
10.	Point out the principal applications of watershed segmentation.	CO4	BTL2	Understanding
11.	Write the Sobel horizontal and vertical edge detection masks.	CO4	BTL2	Understanding
12.	What is meant by object point and background point?	CO4	BTL1	Remembering
13.	State the problems in region splitting and merging based image segmentation.	CO4	BTL2	Understanding
14.	Differentiate between local and global thresholding technique for image segmentation	CO4	BTL2	Understanding
15.	Specify the steps involved in region splitting and merging.	CO4	BTL2	Understanding
16.	What is meant by object point and background point?	CO4	BTL1	Remembering
17.	Justify the need of morphological operations in image segmentation.	CO4	BTL2	Understanding
18.	Outline the two types of region based segmentation.	CO4	BTL2	Understanding
19.	Examine the condition to be satisfied by the partitions in region-based segmentation.	CO4	BTL 1	Remembering
20.	Write a note on gradient operator.	CO4	BTL 1	Remembering
21.	Outline the three points used in the concept of watersheds in segmentation.	CO4	BTL 1	Remembering
22.	What are the challenges in segmentation using morphological watersheds?	CO4	BTL 1	Remembering
23.	Differentiate between internal and external boundaries in morphological processing.	CO4	BTL2	Understanding
24.	What is dilation in morphological image processing?	CO4	BTL1	Remembering

	PART – B			
1.	Describe about edge detection with necessary illustrations and mathematical operators.	(13)	BTL1	Remembering
2.	Explain the various edge detection techniques with suitable examples and masks.	(13)	BTL3	Applying
3.	Discuss the edge linking methods using Hough Transform with an appropriate algorithm and applications.	(13)	BTL 4	Analyzing
4.	Describe thresholding techniques for image segmentation. Differentiate between global, adaptive, and local thresholding.	(13)	BTL 4	Analyzing
5.	(i) With neat diagrams, explain the steps involved in watershed segmentation. (ii) Point out the features of Catchment basins and divide lines in watershed algorithm.	(7) (6)	BTL 4	Analyzing
6.	Apply the watershed segmentation algorithm to a sample image and interpret the result.	(13)	BTL 4	Analyzing
7.	Discuss the mathematical morphology approach for image segmentation and highlight its advantages.	(13)	BTL 4	Analyzing
8.	Design an image segmentation system using morphological watershed and explain how markers improve the result.	(13)	BTL 4	Analyzing
9.	Evaluate the performance of different edge detectors (Sobel, Prewitt, Canny) in detecting fine edges.	(13)	BTL 4	Analyzing
10.	Apply the watershed segmentation algorithm to a sample image and interpret the result.	(13)	BTL 4	Analyzing
11.	Write short notes on: (i) Edge Linking (ii) Boundary Detection	(7) (6)	BTL3	Applying
12.	With suitable examples explain region splitting and merging technique.	(13)	BTL3	Applying
13.	Outline in detail about the following: (i) Edge linking and boundary detection using local processing (ii) Global processing via Hough transform	(7) (6)	BTL3	Applying
14.	Examine in detail about Morphological watersheds in segmentation with necessary illustrations.	(13)	BTL3	Applying
15.	Examine the following terms (i) Region Splitting and merging. (ii) Erosion and Dilation.	(7) (6)	BTL 4	Analyzing
16.	Define thresholding and explain the various methods of thresholding in detail.	(13)	BTL3	Applying

17.	How is line detected in an image? Describe with suitable operators the detection of horizontal, vertical and lines at ±45 degrees.	(13)	BTL4	Analyzing
	PART-C			
Q.No	Questions		BT Level	Competence
1.	Describe about region-based image segmentation techniques with necessary diagrams.	(15)	BTL3	Applying
2.	Examine in detail the following: (i) Detection of Discontinuity in an image (ii) Detection of similarity using region based techniques.	 (8) (7)	BTL4	Analyzing
3.	Discuss in detail about the following: (i) Edge Linking and Boundary detection. (ii) Global processing via the Hough Transform	 (8) (7)	BTL3	Applying
4.	(i) Write in detail about role of illumination in thresholding. (ii) With necessary illustrations explain Basic adaptive and optimal global thresholding.	(5) (10)	BTL3	Applying
5.	(i) Explain watershed algorithm with necessary fundamentals. (ii) Write in detail Application of Markers in segmentation.	(10) (5)	BTL3	Applying

	UNIT V IMAGE REPRESENTION AND RECOGNITION			
	Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.			
	PART A			
Q.No	Questions	CO	BT Level	Competence
1.	What is data compression?	CO5	BTL1	Remembering
2.	State the need for image compression in multimedia systems.	CO5	BTL2	Understanding
3.	What is Huffman coding?	CO5	BTL1	Remembering
4.	Define Run Length Encoding (RLE).	CO5	BTL1	Remembering
5.	List any two advantages of Huffman coding.	CO5	BTL2	Understanding
6.	Differentiate between lossless and lossy compression.	CO5	BTL2	Understanding
7.	What are shift codes in data compression?	CO5	BTL1	Remembering
8.	Define JPEG. What type of compression does it use?	CO5	BTL1	Remembering
9.	What is MPEG and how is it different from JPEG?	CO5	BTL2	Understanding
10.	Define boundary representation in image description.	CO5	BTL1	Remembering
11.	Define texture in the context of image analysis.	CO5	BTL1	Remembering
12.	What are patterns in pattern recognition?	CO5	BTL1	Remembering
13.	What are pattern classes? Give one example.	CO5	BTL1	Remembering
14.	Mention any two applications of pattern recognition.	CO5	BTL2	Understanding
15.	Define length of a boundary.	CO5	BTL 1	Remembering

16.	Explain few boundary descriptors.	CO5	BTL 1	Remembering
17.	State the description of Fourier descriptors.	CO5	BTL 1	Remembering
18.	Categorize the types of regional descriptors.	CO5	BTL 1	Remembering
19.	Describe Topological features?	CO5	BTL 1	Remembering
20.	Define and explain gray level co-occurrence matrix	CO5	BTL 2	Understanding
21.	Mention about pattern and pattern class	CO5	BTL 2	Understanding
22.	Analyze training pattern and training set.	CO5	BTL 2	Understanding
23.	Point out the difference between structural and spectral approach.	CO5	BTL 2	Understanding
24.	What is recognition based on matching?	CO5	BTL 2	Understanding
	PART-B			
1.	Explain in detail the need for data compression and classify various compression techniques**.**	(13)	BTL3	Applying
2.	Describe the steps of Huffman coding algorithm with a suitable example.	(13)	BTL3	Applying
3.	Discuss the working of shift codes and their role in data compression. Provide suitable examples.	(13)	BTL3	Applying
4.	Explain arithmetic coding technique. Compare it with Huffman coding in terms of efficiency.	(13)	BTL3	Applying
5.	Describe the JPEG compression standard. Explain DCT and quantization steps in detail.	(13)	BTL3	Applying
6.	Explain MPEG compression techniques and how temporal redundancy is handled.	(13)	BTL3	Applying
7.	Describe various boundary representation techniques. Explain chain codes and polygonal approximation.	(13)	BTL3	Applying
8.	Describe regional descriptors. Explain topological and statistical features with examples.	(13)	BTL3	Applying
9.	Explain texture analysis and discuss any two statistical methods used to describe texture.	(13)	BTL3	Applying
10.	Discuss the steps involved in pattern recognition based on matching.	(13)	BTL3	Applying
11.	With neat diagrams, explain different types of pattern classes and classification techniques.	(13)	BTL3	Applying
12.	Discuss a comparative study of Huffman, RLE, Arithmetic Coding, JPEG, and MPEG in terms of compression ratio and quality.	(13)	BTL4	Analyzing
13.	Summarize (i)Distinguish between lossless and lossy compression. (ii)Categorize image compression standard with its block diagram.	 (7) (6)	BTL4	Analyzing
14.	Explain i) State the different approaches of textures? ii) Define the parameters of descriptors in image representation.	 (7) (6)	BTL3	Applying

15.	Solve and find a Huffman code and average length of the code and its redundancy for the source emits letters from an alphabet A={a1,a2,a3,a4,a5} with probabilities P(a1)==0.2, P(a2)=0.4, P(a3)=0.2, P(a4)=0.1 and P(a5)=0.1.	(13)	BTL4	Analyzing
16.	Analyze a coder which a source emits letters from an alphabet A={k1,k2,k3,k4,k5} with probabilities P(k1)=p(k3)=0.2, P(k2)=0.4, P(k4)= P(k5)=0.1, entropy = 2.122bits/symbol. Find a Huffman code for this source and the average length of the code and its redundancy.	(13)	BTL4	Analyzing
17.	(i)Summarize the decision theoretic methods for recognition (ii)State about the recognition based on matching method with equations.	(7) (6)	BTL4	Analyzing
	PART – C			
1.	What is image compression? Explain any four variable length coding compression schemes.	(15)	BTL 1	Remembering
2.	Write about the various boundary descriptors in detail with neat diagram.	(15)	BTL 1	Remembering
3.	Summarize on the following image representation technique i) Chain code, ii) Polygonal approximation.	(8) (7)	BTL 2	Understanding
4.	Analyze the different techniques for the representation of shapes in digital image. Explain the principle behind “Fourier Descriptor” based shape representation.	(15)	BTL 4	Analyzing
5.	Develop the block diagram of MPEG encoder and discuss its operation.	(15)	BTL 3	Applying