DIGITAL IMAGE PROCESSING

Subject Code: **(A70436)**
Regulations : R16 JNTUH
Class :IV Year B.Tech ECE I Semester

Department of Electronics and communication Engineering

BHARAT INSTITUTE OF ENGINEERING AND TECHNOLOGY

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DIGITAL IMAGE PROCESSING (A70436)
COURSE PLANNER

I. COURSE OVERVIEW:

The students will be enlightened on digital image processing and to improve the appearance of an image to a human observer, to extract from image quantitative information that is not readily apparent to the eye and to calibrate an image in photometric or geometric terms.

Also the course provides an introduction to basic concepts and methodologies for digital image processing and to develop a foundation that can be used as the basis for further study and research in this field.

II. PREREQUISITE:

1. Basics of Mathematics
2. Signals and systems
3. Digital signal processing.

III. COURSE OBJECTIVE:

1.	This course provides an understand Image fundamentals and techniques
2.	This course build various Image enhancement, restoration and compression techniques
3.	This course develop various Image segmentation methods, Wavelet based and morphological Image Processing
4.	This course give the student a taste of the applications of the theories taught in the subject. This will be achieved through the project and some selected lab sessions.
5.	This course will introduce the students to some advanced topics in digital image processing

IV. COURSE OUTCOME:

S.No	Description	Bloom's Taxonomy Level
1	Students will be able to **Explain** the basic elements and applications of image processing	Comprehension Understanding (Level 2)
2	Students will be able to **Analyze** image sampling and quantization requirements and implications	Analyze (Level 4)
3	Students will be able to **Design** and implement two-dimensional spatial and frequency filters for image enhancement	Synthesis (Level 5)
4	Students will be able to Model and **Demonstrate** the image restoration problem in both time and frequency domains	Application (Level 3)
5	Students will be able to **Explain** the image segmentation and image compression problem	Comprehension Understanding (Level 2)

6	Students will be able to Develop & **Illustrate** Morphological Image Processing.	Comprehension Understanding (Level 2)

V. HOW PROGRAM OUTCOMES ARE ASSESSED:

PROGRAM OUTCOMES (PO)		LEVEL	PROFICIENCY ASSESSED BY
PO1:	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	Assignments
PO2:	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	3	Exercises
PO3:	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	3	------
PO4:	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	3	------
PO5:	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	3	Discussion, Seminars
PO6:	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	3	Design exercise, Prototypes
PO7:	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	2	Exercise, Seminars, Discussions
PO8:	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	2	Discussions

PO9:	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	3	-----
PO10:	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	2	Seminars, Discussions
PO11:	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	3	Workshops, Prototypes
PO12:	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	3	Seminar, Discussions

VI. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED

Program Specific Outcomes		LEVEL	PROFICIENCY ASSESSED BY
PSO1	**Professional Skills:** An ability to understand the basic concepts in Electronics & Communication Engineering and to apply them to various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementation of complex systems.	3	Lectures, Assignments
PSO2	**Problem-Solving Skills:** An ability to solve complex Electronics and communication Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.	3	Lectures, Assignments
PSO3	**Successful Career and Entrepreneurship:** An understanding of social-awareness & environmental-wisdom along with ethical responsibility to have a successful career and to sustain passion and zeal for real-world applications using optimal resources as an Entrepreneur.	3	Guest Lectures

VII. SYLLABUS:

UNIT I:

Digital image fundamentals, Sampling and quantization, Relation ship between pixels;

Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform

UNITV II:

Image Enhancement (spatial domain): Introduction, Enhancement in spatial domain, Enhancement through point operations, Types of point Operations, Histogram manipulation, Linear and non linear gray level transformation, local or neighborhood operation , median filter, spatial domain high pass filtering

Image Enhancement (Frequency Domain): Filtering in frequency domain, obtaining frequency domain filters from spatial filters, Generating filters directly in the frequency domain, Low pass (smoothing) filters in frequency domain, high pass (sharpening) filters in frequency domain

UNIT III:

Image Restoration: Degradation model, Algebraic approach to restoration, inverse filtering, least mean square filters Constrained Least Squares Restoration, Interactive Restoration

UNIT IV:

Image Segmentaton: Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation.

Morphological Image Processing: Dilation, Structuring element decomposition, The strel function, Erosion, Combining Dilation and Erosion, Opening and closing, The hit or miss transformation,

UNIT V:

Image Compression:

Redundancies and their removal methods, Fidelity criteria, Image compression models, Source encoder and decoder, Error free compression, Lossy compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards

TEXT BOOKS:

1. Digital Image Processing – Rafael .C. Gonzalez, Richard E Woods, Pearson Education.
2. Digital Image Processing – S. Jayaraman, S. Esakkirajan, T. Veerakumar

REFERENCE BOOKS:

1. Digital Image Processing using MAT LAB, Rafael, C. Gonzalez, Richard E woods and Stens L Eddings, 2nd Edn, TMH,2010
2. Fundamentals of Digital Image Processing, A.K. Jain, PHI, 1989
3. Digital Image Processing and Computer Vision, Somka, Hlavac, Boyle, Cengage Learning (India Edition) 2008
4. Introductory Computer vision Imaging Techniques and Solutions, Adrain Low, 2Nd Edn, 2008
5. Introduction to Image Processing & Analysis – John C. Russ, J. Christian Russ, CRC Press, 2010
6. Wavelet Transforms (Introduction to theory and applications), Raghuveer M. Rao and Ajit S. Bopardikar, Pearson, 2000
7. Digital image processing with matlab & labview – Vipula singh

VIII. COURSE PLAN (WEEK-WISE):

Lecturer No.	Week	Unit	Topic to be covered	Course Learning Outcomes	Reference
1	WEEK-1	1	Introduction to subject and overview	**Outline** what is an image and what is an digital image processing	T1, T2
2			Fundamental steps in image processing with a block diagram	**Discuss** various image fundamentals	
3			Basic concepts of digital image and image processing, gray scale explanation, sampling and quantization concepts	**Illustrate** sampling and quantization	
4			Elements of image processing, Relationship between pixels: Neighbor of a pixel, Connectivity, Adjacency, Path, etc,.	**Relate** relation between pixels	
5			Relationship of pixels contd…Some basic operations on images		
6	WEEK-		**Image transforms**, Fourier	**Explain** 2d fft properties	

	2		transform, one dimensional and two dimensional transform, properties of 2D FT: Separability, Translation, Periodicity and Conjugate symmetry		T1, T2
7			Average value, Distributivity and Scaling,	**Evaluate** the significance of the transforms	
8			Laplacian, Convolution and Correlation, Sampling , The Inverse FFT,		
9			2D-Discrete Fourier transform	**Demonstrate** various 2-D transforms	
10			2D-Walsh transform,		
11			2D-Hadamard Transform		
12	WEEK-3		Haar transform		T1, T2
13			Slant Transform,		
14			Hotelling transform and its significance		
15			Discrete Cosine Transform (DCT)		
16			Review of topics covered		
17	WEEK-4	2	**Image Enhancement (spatial domain):** Enhancement by point processing: simple intensity transformations-contrast stretching, image negatives, log or power transformations,	**How** to enhance image in spatial domain	T1, T2
18			dynamic range compression, intensity or gray level slicing,		
19			Enhancement by point processing contd...	**Classify** enhancement processing techniques	
20			Histogram processing: histogram equalization	**Analyze** histogram manipulation	
21			Histogram equalization contd…		
22			Histogram specification		
23	WEEK-5		Image subtraction, image averaging	**Illustrate** local processing approaches	T1, T2
			Mock Test-I		
			Bridge class-I		
24			Spatial Filtering: Smoothing filters, Sharpening filters	**Illustrate** filtering in spatial domain	

25			Spatial Filtering: Smoothing filters, Sharpening filters contd….		
26	WEEK-6		**Image Enhancement (Frequency Domain):** Enhancement in frequency domain: Low pass filtering	**Illustrate** filtering in frequency domain	T1, T2
27			Enhancement in frequency domain: Low pass filtering contd…		
28			High pass filtering, high boost filtering and unsharp masking		
29	WEEK-7		Homomorphic filtering		
			Bridge class-II		
			Bridge class-III		
30	WEEK-8	3	Degradation model: degradation model for continuous functions, discrete formulation	**Build** degradation model	T1, T2
31			Algebraic approach to restoration: Unconstrained Restoration		
32			Constrained Restoration		
33			Inverse filtering: Formulation, Removal of Blur Caused by Uniform Linear Motion		
34			Inverse filtering contd….		
35			Least Mean square (Wiener) filter	**Model** Least mean square filters	
36	WEEK-9		Constrained Least squares Restoration		T1, T2
37			Interactive Restoration	**Model** Interactive restoration	
38			Interactive Restoration contd…..		
			Bridge Class - V		
			Mock Test-II		
39	WEEK-10	4	Detection of discontinuities: point detection, line detection, edge detection	**Determine** edges and boundary	T1, T2
40			Edge detection contd…..		
41			Edge linking and Boundary detection: Local processing		

42			Global processing via Hough transform		
43	WEEK-11		Global Processing via Graph theoretic approach	**Determine** edges by graph theoretic method	T1, T2
44			Thresholding methods	**Design** threshold models	
45			Region based segmentation: basic formulation	**Develop** region segmentation	
46			Region growing by pixel aggregation		
47			Region splitting and merging		
48	WEEK-12		Morphological Image processing: Dilation and Erosion approaches salient features	**Illustrate** dilation, Erosion	T1, T2
49			Opening and closing operations		
50			Hit or Miss transformations		
			Bridge Class – VI		
			Bridge Class – VII		
51	WEEK-13	5	Redundancies and their removal methods: coding redundancy, interpixel redundancy, psychovisual redundancy	**Classify** various redundancies	T1, T2
52			Fidelity criteria	**Develop** compression models	
53			Image compression models: the source encoder and decoder, the channel encoder and decoder		
54			Error free compression: Huffman coding		
55			Problems on Huffman coding		
56	WEEK-14		Problems on Huffman coding	**Model** Error free compression	T1, T2
57			Arithmetic coding		
58			Problems on Arithmetic coding		
59	WEEK-15		Bit plane coding, run length coding	**Model** Error free compression	T1, T2
60			Problems on run length coding		
61			Lossless predictive coding		
62			Lossy compression: Lossy predictive coding	**Model** Error free compression	
63	WEEK-		Lossy predictive coding	**Model** Lossy compression	

64	16		Transform coding	Discuss Transform coding for compression	
65			JPEG 2000 standards	**Summarize** JPEG 2000 Standards	
			Bridge Class – VIII		
			Bridge Class - IX		

IX. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO 3
1	3	3	-	1	1	3	3	1	-	1	3	1	1	1	1
2	-	-	-	2	-	3	-	-	2-	-	-	-	1	1	1
3	3	3	2		1	-	3	1	-	1	3	1	-	-	-
4	3	-	-	2	1	-	-	-	2	-	3	1	1	1	1
5	-	3	-	1	-	-	3	1	-	1	-	1	1	1	1
6	3	-	-	-	1	3	-	1	2	1	3	-	-	-	-
AVG	2	1.5	0.34	0.5	0.67	1.5	1.5	0.67	1	0.67	2	0.67	0.67	0.67	0.67

X. QUESTION BANK (JNTUH)

UNIT I

Long Answer Questions

S. No	Question		Blooms taxonomy level	Course Outcomes
1	Explain the steps involved in digital image processing		Understand	1
2	Discuss about the following relationships between pixels with neat diagrams		Remember	1
	i)	Neighbours of a pixel		
	ii)	Connectivity		
	iii)	Distance measures		
	iv)	Path		
3	Write the expressions for Walsh transform kernel and Walsh		Remember	1
	transform (1D &2D).			
4	Briefly explain the forward and inverse transformation kernels		Understand	1
	of image transforms			
5	Name and explain some important properties of 2-D DFT		Understand	1
6	Discuss about the Slant transform (1-D & 2-D)		Remember	1
7	Discuss about the Hadamard transforms (1-D & 2-D)		Remember	1
8	Discuss about the Haar transform (1-D & 2-D)		Remember	1
9	Discuss about the Hotelling transforms (1-D & 2-D)		Remember	1

10	State and prove separability property of 2D-DFT.	Understand	1
11	State and prove the translation property	Remember	1
12	State distributivity and scaling property	Remember	1

Short Answer Questions

S. No	Question	Blooms taxonomy level	Course Outcomes
1	List the steps involved in digital image processing	Understand	1
2	How do you represent the digital images?	Remember	1
3	Explain about sampling and quantization of an image.	Understand	1
4	Explain a simple Image formation model	Understand	1
5	Name various arithmetic and logical operations that can be done on Images	Understand	1
6	What are the different fields in which Digital Image Processing is used?	Remember	1
7	Explain about some of the geometrical operations that can be done on images	Understand	1
8	Distinguish between Fourier Magnitude Spectrum, Fourier Phase Spectrum and Power spectrum.	Remember	1
9	Define discrete cosine transform	Understand	1
10	Define an Image	Understand	1
11	What is meant by pixel?	Understand	1
12	Define Resolutions	Remember	1
13	What is Dynamic Range?	Understand	1
14	What is meant by illumination and reflectance?	Remember	1
15	Find the number of bits required to store a 256 X 256 image with 32 gray levels	Remember	1
16	Write the expression to find the number of bits to store a digital image?	Understand	1
17	What is the need for transform?	Understand	1

UNIT 2

Long Answer Questions

S. No	Question	Blooms taxonomy level	Course Outcomes
1	Explain smoothing spatial filters and nonlinear order statistic spatial filters	Understand	3
2	Explain about Prewitt and Sobel edge Detectors	Remember	3
3	Describe image Histogram Equalization	Remember	3
4	Explain the method of using the second derivate for Image sharpening by Laplacian Operator	Remember	3
5	5.What is high boost spatial filtering? Compare it with high pass spatial filtering	Understand	3
6	6.Discuss how the Bit Plane Slicing is useful in image	Understand	3

	processing		
7	7.Discuss the importance of a kernel or mask or window in spatial filtering used for enhancement of a digital image	Analyze	3
8	How does the spatial filter with name Order static filter (non linear filter) or median filter work?	Evaluate	3
9	What is meant by image enhancement by point processing? Discuss any two methods in it.	Remember	3
10	.Define histogram of a digital image. Explain how histogram is useful in image enhancement?	Understand	3
11	. Write about Smoothing Spatial filters	Understand	3
12	. What is meant by the Gradiant and the Laplacian? Discuss their role in image enhancement.	Remember	3
13	.Description of Homo-morphic filtering	Remember	3
14	. Expression for 2-D IHPF, Expression for BHPF, Expression for GHPF with sketches. Explain their usefulness in Image enhancement	Apply	3
15	. Give the expression for 2-D ILPF, BLPF & GLPF functions and sketch them. Explain their usefulness in Image enhancement	Understand	3
16	. Expression for Butterworth Low Pass Filter in frequency domain and discuss	Remember	3
17	. Compare the characteristics of Low pass, High pass and Homo-morphic filters in image enhancement in frequency domain.	Analyze	3
18	. Discuss about Ideal High Pass Filter and Butterworth High Pass filter	Remember	3

Short Answer Questions

S. No	Question	Blooms taxonomy level	Course Outcomes
1	Narrate the concept of derivative filters.	Understand	3
2	Discuss how the derivative filters are used in Digital Image Enhancement?	Remember	3
3	Describe Histogram Specification	Understand	3
4	Explain Gray level transformation functions for contrast enhancement	Remember	3
5	Discuss the Image negatives transformations	Understand	3
6	Discuss the Contrast stretching transformations	Understand	3
7	Explain the Local enhancement	Understand	3
8	Explain the Image subtraction	Apply	3
9	Explain the Image averaging	Apply	3
10	What is the objective of image enhancement? Define spatial domain. Define point processing		3
11	Explain on procedure to derive frequency domain filtering from spatial domain	Remember	3

12	Explain the method to set the cut off frequencies in ILPF?	Analyze	3
13	Correspondence between filtering in the spatial & frequency domains	Understand	3
14	Explanation on the basic steps for filtering used to enhance an image in frequency domain	Understand	3
15	Explain the concept of homomorphism filtering	Understand	3

UNIT 3

Long Answer Questions

S. No	Question	Blooms taxonomy level	Course Outcomes
1	Explain the method of Least Mean Squares Filtering (Wiener) for image restoration	Understand	4
2	Explain model of image degradation/restoration process with a block diagram	Apply	4
3	Explain the method of Constrained Least Squares Filtering for image restoration	Understand	4
4	Explain three principle ways to estimate the degradation function for use in image restoration	Understand	4
5	Discuss the process of image restoration by direct inverse filtering?	Understand	4
6	Write about Noise Probability Density Functions for all noise models	Understand	4

Short Answer Questions

S. No	Question	Blooms taxonomy level	Course Outcomes
1	Compare image enhancement and restoration techniques?	Understand	4
2	Give the probability density functions for Rayleigh noise	Remember	4
3	Give the probability density functions for the Erlang noise models	Remember	4
4	Give the probability density functions for Gaussian noise models	Remember	4
5	Give the probability density functions for Salt and Pepper noise models	Remember	4

UNIT 4

Long Answer Questions

S. No	Question	Blooms taxonomy level	Course Outcomes
1	What are the derivative operators useful in image segmentation? Explain their role in segmentation	Understand	5
2	What is thresholding? Explain about global thresholding	Remember	5
3	Explain about basic adaptive thresholding process used	Understand	5

	in image segmentation		
4	Explain in detail the threshold selection based on boundary characteristics	Understand	5
5	Explain about region based segmentation	Understand	5
6	What are the derivative operators useful in image segmentation? Explain their role in segmentation	Apply	5
7	Explain about the Global processing via the Hough Transform for edge linking	Apply	5
8	Explain about the Global processing via graph-theoretic techniques for edge linking	Understand	5
9	Explain about Region Splitting and Merging with an example	Apply	5
10	Write about the importance of Hit-or-Miss morphological transformation operation on a digital binary image	Understand	6
11	Explain the opening operation in image morphology with examples?	Analyze	6
12	Explain the closing operation in image morphology withexamples?	Understand	6
13	Discuss the main steps involved in Continuous Wavelet Transform	Understand	6

Short Answer Questions

S. No	Question	Blooms taxonomy level	Course Outcomes
1	Write about edge detection	Remember	5
2	Explain about the Local processing for edge linking	Understand	5
3	Write short note on Region Growing	Remember	5
4	Write the mask for prewitt operator	Remember	5
5	Write the mask for sobel operator	Remember	5
6	Write the mask for laplacian operator	Remember	5
7	Define segmentation	Remember	5
8	Describe dilation morphological transformations on a binary image	Apply	6
9	Describe erosion morphological transformations on a binary image	Apply	6
10	Write short notes on Structuring elements in image morphological transformations	Understand	6
11	Write short notes on Hit-miss Transformation	Understand	6
12	What are the Applications of morphology	Remember	6

UNIT 5

Long Answer Questions

S. No	Question	Blooms taxonomy level	Course Outcomes
1	Explain about fidelity criterion	Understand	5
2	Explain about image compression models	Understand	5
3	Explain a method of generating variable length codes with an example	Understand	5
4	Explain arithmetic encoding process with an example	Apply	5
5	Explain LZW coding with an example.	Apply	5
6	Explain the concept of bit plane coding method	Understand	5
7	Explain about lossless predictive coding	Understand	5
8	Explain about lossy predictive coding	Understand	5
9	Explain with a block diagram about transform coding system	Understand	5

Short Answer Questions

S. No	Question	Blooms taxonomy level	Course Outcomes
1	How to calculate the memory required to store an image	Understand	5
2	Define image compression	Remember	5
3	What is image compression	Remember	5
4	Explain Coding Redundancy	Understand	5
5	Explain Interpixel Redundancy	Understand	5
6	Explain Psychovisual Redundancy	Understand	5
7	What are the characteristics of lossy compression	Remember	5
8	What are the characteristics of lossless compression	Remember	5

XI. Objective type questions:

UNIT-I

1 Image is defined as ()
a)2 d function b) 3 d function c) 1d function d) none

2 Image is a group of **pixels**

3 Walsh transform is used for **image compression**

4 8 bit image is also known as()
a) Color image b) B& W image c**) gray level image** d) none

5 Number of pixels present in MXN size image is()
a) M/N bits **b)MN bits** c) MN Kbytes d) none

6. Among the following image processing techniques which is fast, precise and flexible
a) optical **b) digital** c) electronic d) photographic

7. An image is considered to be a function of a(x,y) where a represents
a) height of image b) width of image **c) amplitude of image** d) resolution of image

8). Image negatives a gray level transformation is defined as:
a. s=L-1-r b. s=L-r c. s=r-1-L d. none

Unit-II:

1. The relative frequency of occurrence of various gary levels present in an image is known as()

a) Bit plane b) pyramid **c)histogram** d) none

2. Smoothing filters also known as **LPF**
3. Sharpening filters also known as **HPF**
4. Image noise can be eliminated using()
   a) HPF **b) LPF** c) BPF d) none
5. Which is the image processing technique used to improve the quality of image for human viewing?
   a) Compression b) enhancement c) restoration d) analysis
6. Median filter eliminates salt and pepper noise

7. Which type of enhancement operations are used to modify pixel values according to the value of the pixel_s neighbors?
a) point operations b) local operations c) global operations d) mask operations

8. What is spatial resolution?
a)it is the largest discernible detail in an image b)it is the smallest discernible detail in an image c) a & b d) None

9. Image enhancement in frequency domain uses the following 2D DFT property()
a)Scaling b) Rotation c)centering d) none

10. Smoothing filters also known as LPF
11. Homomorphic filter is used for contrast enhancement
12. Lapalcian filter also known as
    a)HPF b) LPF c) BPF d) none
13. Max filter eliminates dark points
14. Which image processing technique is used to eliminate electronic noise by mathematical process?
    a) Frame averaging b) Image understanding c) Image compression d) none
15. Frequency domain refers:
    a) Processing techniques are based on modifying the Fourier transform of an image
    b. its processing techniques are based on modifying the laplace transform of an image.
    c) a & b
    d) None

Unit-III

1 Which of the following is a simple image restoration technique which eliminates noise
a)weighted restoration b) smoothing c)inverse d) none

2 Constrained least square restoration requires PSD
3 Inverse filtering is used for noise removal
4 Constrained least square restoration is a()
a)Weighted restoration b) non weighted restoration c) frequency domain d) none
5 Image degradation techniques removes blurring
6 Which is a fundamental task in image processing used to match two or more pictures?
a) Registration b) segmentation c) computer vision d) image differencing

Unit-IV

1 Image segmentation uses the following opearators()
a)Scaling b) Rotation c)derivative d) none

2 First order derivative operator is used for Edge detection
3 Graph theoretic approach is used for Edge linking

4 Region oriented segmentation includes

a) Merging b) Splitting c) Both a and b d) none

5 Robert's operator is used for edge detection

1. What algorithm is used in fingerprint technology?

a) Intensity based algorithm b) pattern based algorithm c) feature based algorithm d) Recognition algorithm

2. In which technique which is used to determine changes between two images?

a) Image differencing b) segmentation c) skin texture analysis d) image differencing

3. Select one of the most appropriate applications of Computer vision?

a) Medical computer imaging b) remote sensing c) geographical map d) medical diagnosis

4. The initial step in any image processing technique is

a) Segmentation b) masking c) image acquisition d) normalization

5. Dilation-Morphological image operation technique is used to

a) Shrink brighter areas of the image

b) Diminishes intensity variation over the image

c) Expands brighter areas of the image

d) Scales pixel intensity uniformly

6. Which technique is used for the images of the same scene are acquired from different viewpoints

a) multiview analysis b) multitemporal analysis c) multisensory analysis d) image differencing

7. Localization of iris, pupil, and eyelids come under

a) Normalization b) masking c) extraction d) segmentation

8. Morphological processing deals:

a) With tools for extracting image components that are useful in the representation and description of shape**.**

b) With tools for changes in image components that are useful in the representation and description of shape

c) a & b

d) None

Unit-V

1. Image compression is used for reducing the following parameter()

a) Size b) memory c)noise d) none

2. Lossy compression technique reduces the quality of the image

3. Image compression is

a) Making image look better

b) Sharpening the intensity-transition regions

c) Minimizing degradation over image

d) Reducing the redundancy of the image data

4. First application of digital image was in the:

a) News paper industry b) communication system c) a & b d) None of these

5. Which sensor is used for obtaining the video source in 3d face recognition system

a) Optical b) electronic c) 3d sensor d) 2d sensor

XII. GATE QUESTIONS / UGC - NET:

DIP is not applicable for GATE and IES

XIII. WEBSITES:

1. www.imageprocessingplace.com
2. www.theiet.org.

XIV. EXPERT DETAILS:

XV. JOURNALS:

International:

1. **IEEE Transactions on Pattern Analysis and Machine Intelligence,** ISSN:0162-8828 , Monthly.
2. **IEEE Transactions on Image Processing,** ISSN:1057-7149 , Monthly.
3. **Computer Vision and Image Understanding,** ISSN:1077-3142 , Monthly.
4. **International Journal of Imaging Systems and Technology,** ISSN:0899-9457 , Quarterly

National:

1. Journal of Image Processing.
2. Journal of Signal and Image Processing

XVI. LIST OF TOPICS FOR STUDENT SEMINARS:

1. Image enhancement for medical images.
2. Types of compression techniques.
3. Lossy and lossless compression
4. Transform coding method and wavelet method.
5. Morphological processing.
6. Edge detection techniques.

XVII. CASE STUDIES / SMALL PROJECTS:

1. Using MATLAB detection of tumor.
2. Implementation of speckle noise removal using various enhancement techniques in medical and SAR images.
3. Implementation of image compression for medical images.
4. Implementation of wavelets for segmentation of images.
5. Processing color images using various histogram approaches.