Department of Forensic Science

Revised Syllabus of Advanced Diploma Course

Program Objectives of the Course:

a. To study the basics of Matrix Algebra, Set Theory and Image Fundamentals.
b. To study the basics of Image Enhancement and Edge detection operators.
c. To learn the science of image description and representation .
d. To learn the science of image forensics.

Program Outcomes:

Unit- I

- Students will learn about the basics of Matrix Algebra, Set Theory and Image Fundamentals.

Unit- II

- Students will learn about the basics of image enhancement and edge detection operators.

Unit- III

- Students will get deep knowledge about science of image description and representation.

Unit- IV

- Students will get deep knowledge about the science of image forensics.

Advanced Diploma Course (III Year)

1. Title: Advanced Diploma in Forensic Image Processing
2. Year of Implementation: 2020
3. Duration: One Year
4. Pattern: Annual
5. Medium of Instruction: English
6. Contact hours: 8 hours/week for III Year.
8. Structure of Course: For UG

Year	Paper No. and Name	Contact Hours	Credits (1Credid =12H)	Marks		
				Annual Exam	Internal	Total
3	AD FT 301:Image processing	48	4			100
	ADF L302: Forensic Image Processing Lab	96	4			100
	ADFP303:Project work	24	2			50
	Total	**168**	**10**			**250**
Total						

C: Certificate, D: Diploma, AD: Advanced Diploma, * : Name of Subject, T : Theory, L: Lab, P: Project

ADFT 301: Forensic Image Processing
(Contact Hrs: 48 Credits: 04)

Learning Objectives:

e. To study the basics of Matrix Algebra, Set Theory and Image Fundamentals.
f. To study the basics of Image Enhancement and Edge detection operators.
g. To learn the science of image description and representation.
h. To learn the science of image forensics.

(Minimum 4)

Unit I: Mathematics preliminaries and Image Fundamentals:

Matrix Algebra: Definitions, matrix arithmetic, transpose, powers, trace and determinant of matrices.

Set Theory: definition and representation of set, subset and power set, associative, commutative and distributive properties of set, definition and concepts of function.

Basic concepts of co-ordinate geometry, complex numbers and derivatives.

Image Fundamentals: definition and types of image, co-ordinate convention, Human visual system and computer vision system, digitization and Shannon sampling theorem, zooming and shrinking of an image, relationship between pixels: neighbors, adjacency, connectivity and path, Distance measures between pixels. (15)

Unit II: Image Enhancement:

Introduction and scope of image enhancement, Image enhancement in spatial domain: point

processing-basic point operators, histogram normalization and histogram equalization,

thresholding, Mask processing-mean filter, median filter, Gaussian and Laplacian filter. Image enhancement in frequency domain-concepts of Fourier transform and enhancement in frequency domain, power spectrum and phase angle, Low pass, high pass and band pass filters, homomorphic filtering, correspondence of filtering in the spatial and frequency domain.

Edge detection operators: Sobel, Prewitt, Roberts, Canny and Laplacian operators (15)

Unit III: Image Description and Representation:

Mathematical morphology: basic morphological concepts, binary dilation and erosion, opening and closing, hit-or-miss transformation, gray-scale dilation and erosion, opening and closing, top hat and geodesic transformation.

Compression: basic concepts of image compression, redundancy and fidelity criteria, image

compression models, lossy compression: vector quantization, loss less compression: run length coding, Huffman transformation, JPEG compression.

Wavelet: Basic concepts of wavelet and multi resolution processing

Feature Extraction: Basic concepts of feature extraction and description of images. (15)

Unit IV: Image Forensics:

Introduction and scope of image forensics, **Source Identification:** overview of image source

identification, digital camera and image sensors, identification based on sensor defects and

physical defects.

Authentication of image evidence: image tampering and its type, detection of image tampering based on scene, optics, sensor, processing and image property.

Steganography and digital watermarking: introduction and scope of Steganography and digital watermarking, comparative study Steganography and digital watermarking, basic concepts of Steganography and digital watermarking models, basic concepts of digital watermarking security and steganalysis. (15)

Learning Outcomes:

- After completion of the unit, Student is able to the basics of Matrix Algebra, Set Theory and Image Fundamentals
- Students will learn about the basics of image enhancement and edge detection operators.
- Students will get deep knowledge about science of image description and representation.
- Students will get deep knowledge about the science of image forensics.

Reference Books:

- Digital Image Processing by Gonzalez and Woods
- Digital Image Processing and Analysis by Chanda and Majumdar
- Feature Extraction and Analysis by Mark Nixon
- Digital Image Processing by Ionis Pitas
- Digital Image Processing by Anil K Jain
- Image Forensics by N Hussain

ADFL 302 (Practical): Image Processing Lab
(Contact Hrs: 96 Credits: 04)

Learning Objectives:

Students will be able to understand about the MATLAB.

To study the basic of MATLAB.

To study the MATLAB code for enhancement of image using mean and median filters.

To study the MATLAB code for implementing gray-scale morphological operators.

To study the MATLAB code for image detection.

List of Practical's

1. Write a MATLAB code for read and write of a digital image
2. Write a MATLAB code for enhancement of image using mean and median filters
3. Write a MATLAB code for enhancement of image using low pass and high pass filters
4. Write a MATLAB code for edge detection using Sobel and Prewitt operators
5. Write a MATLAB code for edge detection using Canny operator
6. Write a MATLAB code for implementing gray-scale morphological operators
7. Write a MATLAB code implementing binary morphological operators.
8. Write a MATLAB code for image tampering detection

Learning Outcomes:

Students will learn about the basics of MATLAB code.

Students will learn about the MATLAB code enhancing image using mean and median filters and low pass and high pass filters.

Students will learn about the MATLAB code detection of using Sobel and prewitt operators and canny operators, and tampering detection.

Reference Books:

- Digital Image Processing by Gonzalez and Woods
- Digital Image Processing and Analysis by Chanda and Majumdar
- Feature Extraction and Analysis by Mark Nixon
- Digital Image Processing by Ionis Pitas
- Digital Image Processing by Anil K Jain
- Image Forensics by N Hussain

ADFL 303:Project Work,
(Contact Hrs. 24, Credits: 02)

Every student should take up a project and submit in the report the work he/she has carried out. The project work will be assessed independently at the time of practical examination.