

## ONE YEAR ADVANCED DIPLOMA IN CRIMINAL LAW & FORENSIC SCIENCE

### SEMESTER – II

#### 1.2.4. Introduction to Forensic Science & Forensic Physical Sciences

##### UNIT I - History of Scientific Investigation, Physical Evidence & Crime Scene Processing

- 1.0 – History & Development of Forensic Science
- 1.1 – Development of Forensic Science in India
- 1.2 – Forensic Science Institutions at State & Regional Levels
- 1.3 – Physical Evidence & its role in Crime Investigation
- 1.4 – Crime Scene Processing
- 1.5 – Principles & Laws governing Forensic Science
- 1.6 – Handling of Physical Evidence
- 1.7 – Packaging and Labeling Evidence
- 1.8 – Chain of Custody of Evidence
- 1.9 – Checklist of physical evidence – crime wise
- 1.10 – Checklist of physical evidence – FSL section wise

##### UNIT II – FINGERPRINTS & TRACK MARKS

- 2.0 – Historical Perspective
- 2.1 – Terminology
- 2.2 – Fingerprint Patterns
- 2.3 – Taking of Fingerprints
- 2.4 – Taking of Palm & Sole Prints
- 2.5 – Taking of Fingerprints of Dead bodies
- 2.6 – Role of fingerprints in Disaster Victim Identification
- 2.7 – Purpose of Taking fingerprints
- 2.8 – Fingerprints at the Scene of Crime
- 2.9 – Expert at the Scene of Crime
- 2.10 – Fingerprint Photography

### Course Coordinator



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- 2.11 – Comparison of Fingerprints
- 2.12 – Thumb impression on Documents
- 2.13 – Comparison of Fingerprints using Modern Technology
- 2.14 – Role of Fingerprints ion Biometrics
- 2.15 – Forgery of Fingerprints
- 2.16 – Dissimilarities in Identical Fingerprints
- 2.17 – Law relating to Fingerprints
- 2.18 – Footprints
- 2.19– Footwear marks
- 2.20 – Hoof marks & Paw marks
- 2.21– Gait pattern
- 2.22 – Tyre Impressions
- 2.23 – Skid Marks

### **UNIT III – QUESTIONED DOCUMENTS**

- 3.0 – Introduction
- 3.1 – Scope of Document Examination
- 3.2 – Different types of Cases
- 3.3 – Different types of Questioned documents
- 3.4 – Examination of writings/signatures/initials
- 3.5 – Forgeries and their Detection
- 3.6 – Different types of Tampering
- 3.7 – Other types of Examinations
- 3.8 – Instruments
- 3.9 – Photography
- 3.10 – Handling & Preservation of Documents
- 3.11 – Glossary
- 3.12 – References

### **UNIT IV – BALLISTICS**

- 4.0 – Introduction
- 4.1 – Classification of Ballistics
- 4.2 – Firearms
- 4.3 – Ammunition
- 4.4 – Mechanism of Firing
- 4.5 – Identification of Firearms
- 4.6 – Bullet Identification
- 4.7 – Direction of Fire

- 4.8 – Range of Fire
- 4.9 – Detection of residues on hands
- 4.10 – Gunshot Residue
- 4.11 – Determining the range of firing by studying the GSR pattern
- 4.12 – Entrance & Exit Wounds
- 4.13 – Handling, Collection & Preservation of Evidence
- 4.14 – Nature of Evidence received by Ballistics Section
- 4.15 – Precautions & Guidelines

## **UNIT V – FORENSIC PHYSICS**

- 5.0 – Introduction
- 5.1 – Glass
- 5.2 – Paint
- 5.3 – Soil, Dirt & Dust
- 5.4 – Restoration of Obliterated marks
- 5.5 – Tool Marks
- 5.6 – Spurious Articles
- 5.7 – Counterfeit Currency

### **1.2.5. Forensic Chemical and General Science**

## **UNIT I – FORENSIC CHEMISTRY & EXPLOSIVES**

- 1.0 – Introduction
  - 1.1 – Analysis of Alcohol used in Liquors/Drinks
  - 1.2 – Adulteration of Petroleum Products
  - 1.3 – Cement, Mortar & Concrete
  - 1.4 – Fire Investigation
  - 1.5 – Oils & Fats
  - 1.6 – Acids & Alkalis
  - 1.7 – Examination of Chemicals used in Trap Cases
  - 1.8 – Introduction and Origin of Explosives
  - 1.9 – Development
  - 1.10 – Composition of Explosives
  - 1.11 – Classification of Explosives
  - 1.12 – Improvised Explosive Device
  - 1.13 – Explosions
  - 1.14 – Explosive Train
  - 1.15 – Effects of Explosion
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- 1.16 – Explosion Scene Investigation
- 1.17 – Collection and types of Physical Evidence
- 1.18 – Laboratory Analysis of Explosives
- 1.19 – Instrumental Analysis
- 1.20 – Contamination Control

## **UNIT II – TOXICOLOGY & NARCOTICS**

- 2.0 – Introduction
- 2.1 – Classification of Poisons
- 2.2 – Scope
- 2.3 – Categories
- 2.4 – Gaseous and Volatile Poisons
- 2.5 – Inorganic Poisons (Metallic & Anions)
- 2.6 – Neutral Poisons (Organic Non-volatile)
- 2.7 – Basic Drugs/Poisons (Organic Non-volatile)
- 2.8 – Acidic Drugs/Poisons (Organic Non-volatile)
- 2.9 – Miscellaneous Poisons
- 2.10 – Introduction to Narcotics
- 2.11 – Opium/Morphine/Heroin Compounds
- 2.12 – Cannabis
- 2.13 – Benzodiazepines
- 2.14 – Barbiturates

## **UNIT III – FORENSIC ENGINEERING & FAILURE ANALYSIS**

- 3.0 – Introduction
- 3.1 – Failure Mechanisms (Types of Failures)
- 3.2 – Failures in Electrical Fields
- 3.3 – Failures of Metallic Orthopaedic Implants
- 3.4 – Electrical Component Failures
- 3.5 – Failure Analysis of Integrated Circuits
- 3.6 – Some Typical Failure Investigations
- 3.7 – Investigation into Accidents
- 3.8 – Structural Failure involving Civil Construction Material
- 3.9 – Video Authentication
- 3.10 – Forensic Speaker Identification

## **UNIT IV – CYBER FORENSICS & MULTI-MEDIA FORENSICS**

- 4.0 – Introduction
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- 4.1 – Definition & Scope
- 4.2 – Nature of Crimes
- 4.3 – IT Law
- 4.4 – Physical Evidence
- 4.5 – Search & Seizure of Computers
- 4.6 – Common mistakes committed by the IOs
- 4.7 – Checklist for Typical Crimes
- 4.8 – Current Challenges in Cyber Forensics
- 4.9 – Anti-Forensics
- 4.10 – Areas of Research
- 4.11 – Glossary

## **UNIT V – EXPERT TESTIMONY, QUALITY ASSURANCE & FORENSIC PSYCHOLOGY**

- 5.0 – Introduction
- 5.1 – Expert Witnesses
- 5.2 – Report
- 5.3 – The Court
- 5.4 – Introduction to Quality Assurance
- 5.5–The Quality System
- 5.6 – The Quality Manual
- 5.7 – Internal Audit Program
- 5.8 – Accreditation
- 5.9 – Introduction to Forensic Psychology
- 5.10 – Psychology gets a new branch
- 5.11 – Criminal Profiling Facts vs. Fiction
- 5.12 – A short history of Criminal Profiling
- 5.13 – FBI Crime Scene Analysis
- 5.14 – Investigative Psychology: The Canter Approach
- 5.15 – Polygraph/Lie-detector

### **1.2.6. Forensic Medicine, Biology & DNA**

## **UNIT I – FORENSIC MEDICINE, HUMAN ANATOMY & PHYSIOLOGY**

- 1.0 – Introduction
  - 1.1 – Role of Medico-Legal Expert in Crime Investigation
  - 1.2 – Scope of the Services
  - 1.3 – Introduction to Human Anatomy & Physiology
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- 1.4 – Terminology
- 1.5– Structure of the Body
- 1.6 – Human Skeleton
- 1.7 – Vital Systems of the Body

## **UNIT II – IDENTIFICATION OF THE LIVING AND DEAD & POST-MORTEM CHANGES**

- 2.0 – Definition
- 2.1 – Data Useful for Identification
- 2.2 – Introduction to Post-Mortem changes
- 2.3 – Immediate Signs of Death
- 2.4 – Early Signs of Death
- 2.5 – Late Signs of Death
- 2.6 – Post-mortem Interval

## **UNIT III – INJURIES, WOUNDS, MEDICOLEGAL ASPECTS OF INJURIES, ASPHYXIAL DEATHS & SEXUAL OFFENCES**

- 3.0 – Definitions
  - 3.1 – Classification
  - 3.2 – Introduction to Medicolegal aspects of injuries
  - 3.3 – Causes of Death from Wounds
  - 3.4 – Nature of the Injury
  - 3.5 – Mode of Death
  - 3.6 – Volitional Acts after Injury
  - 3.7 – Sequence of Injuries
  - 3.8 – Period of Survival
  - 3.9 – Relative position of the assailant and the victim
  - 3.10 – Gravity of Injuries
  - 3.11 – Novus Actus Interveniens
  - 3.12 – Burns
  - 3.13 – Traffic Accidents
  - 3.14 – Railway Injuries
  - 3.15 – Aircraft Injuries
  - 3.16 – Blast Injuries
  - 3.17 – Bomb Injuries
  - 3.18 – Barotraumas
  - 3.19 – Asphyxia
  - 3.20 – General Features
  - 3.21 – Types of Asphyxial Deaths
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- 3.22 – Hanging
- 3.23 – Strangulation
- 3.24 – Throttling
- 3.25 – Drowning
- 3.26 – Suffocation
- 3.27 – Sexual Asphyxias
- 3.28 – Classification of Sexual Offences
- 3.29 – Guidelines for Investigation
- 3.30 – Rape
- 3.31 – Unnatural Sexual Offences

#### **UNIT IV – FORENSIC SEROLOGY & DNA**

- 4.0 – Definition & Scope
- 4.1 – Blood
- 4.2 – Examination of Other (Body) Physiological Fluids
- 4.3 – Seminal Stains
- 4.4 – Examination of Saliva Stains
- 4.5 – Examination of Urine Stains
- 4.6 – Examination of Faecal Stains
- 4.7 – Examination of Milk Stains
- 4.8 – Human Body Remnants Examination
- 4.9 – Guidelines for Sample Collection
- 4.10 – History & Introduction of DNA Fingerprinting
- 4.11 – History to DNA Fingerprinting
- 4.12 – DNA Techniques used in Forensic Investigations
- 4.13 – DNA Profiling in Investigations
- 4.14 – STR Loci commonly used in DNA Typing
- 4.15 – Practical Applications of Forensic DNA Fingerprinting

#### **UNIT V – FORENSIC BIOLOGY, ARCHAEOLOGY, FORENSIC ANTHROPOLOGY & FORENSIC ODONTOLOGY**

- 5.0 – Definition & Scope
  - 5.1 – Hair
  - 5.2 – Fibres
  - 5.3 – Diatoms
  - 5.4 – Plant Material
  - 5.5 – Forensic Entomology
  - 5.6 – Forensic Craniometry
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- 5.7 – Guidelines for Sample Collection
- 5.8 – History of Forensic Archaeology
- 5.9 – Basic Principles
- 5.10 – Archaeology in Forensic Science
- 5.11 – Types of Physical Evidence & Cases
- 5.12 – Method of Analysis
- 5.13 – History & Introduction of Forensic Anthropology
- 5.14 – Types of Physical Evidence & Cases
- 5.15 – Method of Analysis
- 5.16 – Cause & Manner of Death
- 5.17 – Burnt Bones
- 5.18 – Specialist Techniques
- 5.19 – History & Introduction of Forensic Odontology
- 5.20 – Human Dentition
- 5.21 – Types of Physical Evidence & Cases
- 5.22 – Method of Analysis
- 5.23 – Mass Disasters
- 5.24 – Bite Mark