PhD Entrance Syllabus
Forensic Science

Unit – I

- **Forensic Science:** Definition, History & Development, Scope, Ethics in Forensic Science
- **Physical Evidence:** Nature, Types, Search methods, Collection, Preservation, Packing & Forwarding of Physical & Trace evidence for forensic analyses, Chain of Custody
- **Crime Scene:** Nature, Types, Preservation of Scene of Crime
- Criminal Investigations: Unnatural deaths, Criminal assaults, Sexual offences, Poisoning, Vehicular accidents
- **Courts:** Types, powers and jurisdiction, Admissibility of evidence in Courts, Definition of Experts, Provisions in Cr.P.C.,1973 & Indian Evidence Act relating to experts & their reports; Court Procedures pertaining to Expert Testimony & Witness
- Organization of Forensic Science Laboratories of Centre and State, NCRB and NICFS
- **Fundamental Rights**: Right of Equality (Articles 14 to 18) and Right of Freedom (Articles 19 to 22) as per Constitution of India
- **Criminal Profiling:** Profile of victim and culprit, its role in crime investigation, Lie detection (Polygraphy), Narco analysis, Brain mapping, scope and limitations
- Concept of quality control management in Forensic institutions

Unit – II

- **Microscopy:** Polarizing, Comparison, Stereoscopic, Fluorescent and Electron Microscopes
- **Spectrophotometry:** UV, Visible, IR, Raman, Atomic absorption, Emission
- **Neutron Activation Analysis**
- **X – rays and x-ray based techniques** such as XRD, XRF
- **Mass Spectroscopy**
- **Chromatographic Techniques:** TLC, GLC, HPLC, HPTLC
- **Hyphenated Techniques:** GC-MS, LC-MS, IR-MS and ICP-MS
- **Electrophoresis:** High and Low voltage electrophoresis, Immuno electrophoresis
- **Immunoassays:** Principle, Types, Techniques and applications

Unit – III

- **Detection and Identification of Blood stains**
- **Determination of Species of Origin**
- **Blood Group Systems**
- **Techniques of Determination of Blood groups of Blood Stains**
- **Detection of Seminal and other body fluids and their Blood Grouping**, Red cells Enzymes, Serum Proteins of forensic significance
- **Disputed Paternity & Maternity**
- **DNA:** Structure, DNA as genetic marker, DNA Extraction and Profiling Techniques

- **DNA Phenotyping** and **RNA Profiling** & their applications
- **Wild life Forensics:** Wild life (Protection) Act,1972, Scope, Evidences and Identification.

Unit – IV

- **Analysis of Ethyl alcohol** in beverages, liquors, biological fluids and breath
- **Analysis of Methanol and Denaturants**
- **Illicit liquors**
- **Analysis of Chemicals in Trap Cases**
- **Metabolism and Chemical examination of**: Insecticides & Pesticides, Tranquillizers & Sedatives, Hypnotics Stimulants, Narcotics, Opiates, Drugs of abuse; Analyses of above and their Toxicity
- **Plant poisons**
- **Metallic Poisons**
- **Extraction, Isolation & Clean-up procedures, Identification of common poisons from viscera, tissues and body fluids**

Unit – V

- **Fire arms**: Types, Classification, Ammunition and their Compositions
- **Forensic examination** of Firearms, Ammunition, Firearms' projectiles (Bullets, Shots, Slug etc.), Shell case
- **Gunshot residues analysis**
- **Concept of** Velocity, Penetration, Dispersion, Ricochet, Accidental Discharge, Determination of Range in firearm cases
- **Examination** of Country made firearms
- **Basics of Internal, External and Terminal Ballistics**
- **Tool marks: Meaning, Types and Examination**
- **Restoration of Erased Markings on Metal Surfaces**

Unit – VI

- **Fire and Arson:** Analyses of Petroleum Products and other incendiary materials
- **Explosives:** Definition, Types and Analyses
- **Bombs**: Country made bombs, Improvised Explosive Devices (IEDs) and their examination
- **Investigation** in Explosion and Arson related cases
- **Photography:** Types, application in criminal investigation & Forensic evidence examination

Unit – VII

- **Hair & Fibers**: Nature, Types, Structure and Examination
- **Pollens and Diatoms:** Their application in Forensic investigation

- **Dust & Soil:** Nature**,** Types, Forensic Examination
- **Paint, Lacquer & Varnishes**: Nature, composition and forensic examination
- **Glass:** Composition, Types, Fractures, Examination
- **Cement, Mortar and Concrete**: General Composition, Forensic Analysis
- **Computer Forensics:** Introduction, Types of Computer crimes, Digital evidence- Seizure, Acquisition and Forensic examination
- **Mobile Phone Forensics**

Unit – VIII

- **Fingerprints:** History, Characteristics, Types, Classification, Preservation, Development, Lifting and Comparison, Examination of Chance Prints, Computerization of Fingerprints, AFIS
- **Track Marks:** Foot Prints, Shoe Prints, Tire Marks, Their Preservation & Casting, Comparison, Skid marks. Gait pattern
- **Biometric Systems of Identification and its relevance**
- **Voice Analysis:** Introduction, Significance, Structure of Human Voice apparatus, Voice spectrography, Voice analysis, Legal aspects and limitations
- **marks**
- **Forensic Entomology:** Introduction, Insects of forensic importance, Insects on Carrion, Forensic applications

Unit – IX

- **Documents:** Definition, Types, Preliminary examination of documents
- **Reproduction** of documents through photographic and mechanical means and their examination
- **Examination** of Alterations such as Erasures, Obliterations & Additions
- **Indentations, Secret writings and Charred documents**
- **Inks, Papers** and their scientific examinations with modern methods
- **Age of documents**
- **Examination** of Typescripts, Printed matter including currency notes and lottery tickets. Mechanical impressions
- **Hand writings**: Class and Individual characteristics of Handwritings, Factors affecting handwritings, Standard samples for comparison, Comparison of hand-written texts
- **Anonymous and disguised writings**
- **Identification** of hand writings, signatures, detection of forged signature and forgeries
- **Examination of Credit Cards and Similar materials**

Unit –X

- Modes & Manner of deaths, Sexual offences and its medico legal importance, Amendments in law related to sexual offences
- Post– mortem examination and Post– mortem changes, Estimation of time since death

- **Injuries & Wounds:** Types, Medico legal importance, Gunshot wounds
- Determination of Species of Origin, Sex, Age, Stature, and individual identification through skeletal remains
- Identification through Skull superimposition and facial reconstruction
- Human dentition, Type of teeth, determination of Age, Bite marks