SCHOOL OF BIOMEDICAL SCIENCES

DEPARTMENT OF FORENSIC SCIENCE

SYLLABUS

PH.D. ENTRANCE EXAMINATION

SUBJECT: FORENSIC SCIENCE

Unit – I: Forensic Science

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; Photography: Types, application in criminal investigation & Forensic evidence examination

Unit – II: Instrumentation

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, Immunoelectrophoresis; Immunoassays: Principle, Types ,Techniques and applications

Unit – III: Forensic Biology and Serology

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; WildlifeForensics: Wildlife (Protection) Act,1972, Scope, Evidences and Identification; Hair & Fibers: Nature, Types, Structure and Examination; Pollens and Diatoms: Their application in Forensic investigation; ForensicEntomology: Introduction, Insects of forensic importance, Insects on Carrion, Forensic applications

Unit – IV Forensic Chemistry and Toxicology

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; 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.

Unit – V: Ballistics

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: Cyber Forensics

Computer Forensics: Introduction, Types of Computer crimes, Digital evidence- Seizure, Acquisition and Forensic examination; Mobile Phone Forensics

Unit – VII: Forensic Physics

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; Voice Analysis: Introduction, Significance, Structure of Human Voice apparatus, Voice spectrography, Voice analysis, Legal aspects and limitations

Unit – VIII: Fingerprints and other impressions

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

Unit – IX: Questioned Documents

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: Forensic Medicine

Modes & Manner of deaths, Sexual offences and its medicolegal importance, Amendments in law related to sexual offences; Post–mortem examination and Post-mortem changes, Estimation of time since death; Injuries & Wounds: Types, Medicolegal 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 mark.