Paper PGDFS201: Forensic Chemistry, Toxicology & Medicine

Unit I:

1. Forensic Chemistry: Introduction, Types of cases which require chemical analysis
2. Limitations of forensic samples, conventional methods of chemical analysis, presumptive tests (colour/sight tests), Microcrystal tests, Elemental analysis (organic and inorganic)
3. Examination of contact Traces: Introduction to cosmetics and detective dyes, collection, sampling and analysis
5. Drugs: Identification, Field and laboratory tests. Drug abuse in sports: Introduction, common prohibited substances, analytical approach

Unit II:

1. Forensic Toxicology: Introduction, Role of the toxicologist; Significance of toxicological findings
2. Poisons: Definition, Classification on the basis of their origin, physiological action and chemical nature; Poisons and Poisoning in India
3. Collection and preservation of viscera for various types of poisons: Choice of preservatives, containers and storage
4. Arson: Introduction, chemistry of fire, scientific investigation and evaluation of clue materials, collection and preservation, analysis of flammable residues
5. Vigilance case analysis and significance
Unit III:

1. Explosives: Classification, composition and characteristics of explosives, pyrotechnics, IEDs, explosion process and effects, types of hazards
2. Effect of blast wave on structures, human etc., with specific approach to scene of explosion
3. Post blast residue collection, reconstruction of sequence of events, evaluation and assessment of scene of explosion
4. Systematic examination of explosives and explosion residues in the laboratory using chemical and instrumental techniques and interpretation of results

Unit IV:

1. Systematic extraction, isolation, identification and estimation of poisons from viscera, blood and urine
2. Common narcotics (as poisons): opium and its derivatives; Alcohol analysis with reference to chemical poison; Barbiturates, Benzodiazepines derivatives, Amphetamines
3. Insecticides/ Pesticides: Organochlorine, organophosphorus and carbamates. Common inorganic poisons, salts of Arsenic, Mercury, Lead and Cyanides
4. Vegetable poisons: Nature, type, mode of action, extraction, isolation and identification of the following: Poisonous seeds, fruits, roots and Mushrooms.
5. Animal Poisons: Snake venom, composition, site of action, mode of action, effect on the body as a whole, and tests for identifications
Unit I:

2. Densitometry: HPTLC-method, Qualitative and Quantitative, Forensic Application
3. Gas chromatography: Theoretical principles, instrumentations and technique, columns, stationary phases, detector
4. Liquid chromatography: HPLC, Review of theory, Instrumentation, Technique, column, detectors, LC-MS, Forensic applications

Unit II:

1. Electrophoresis: Theory and General Principles; Various factors affecting electrophoresis; Low and High Voltage electrophoresis
2. Horizontal and Vertical Electrophoresis; Methods and applications
3. Immunotechniques: Immunodiffusion, Immuno-electrophoresis, Immunoprecipitation, etc.
4. Sodium dodecyl sulphate (SDS) polyacrylamide gel electrophoresis

Unit III:

1. X-ray: Introduction, Properties of X-Rays, Overview and principles of various X-Ray techniques
2. Fluorescence and Dark-field Microscopy: Principles, working and applications in forensic science
3. Bright and Phase contrast Microscopy: Principles and applications
4. Electron Microscopy: Principles and applications
Unit IV:

1. UV and Visible Spectrophotometry: Introduction, Fundamental laws of Spectrophotometry, deviation from Beer's Law, Instrumentation and techniques, qualitative and quantitative methods in UV-Visible spectroscopy and its Forensic applications

2. Mass Spectrometry: Introduction, Basic Principles and Theory, Instrumentations and technique and forensic applications

