SYLLABUS FOR THE POST OF SCIENTIFIC OFFICER - TOXICOLOGY SECTION IN FORENSIC SCIENCE LABORATORIES (POLICE DEPARTMENT) KARNATAKA STATE

1. Introduction, definition, principles, scope and branches of Forensic Science.

2. Crime Scene Investigation: Definition of crime scene, Classification of crime scenes indoor & outdoor, primary & secondary, macroscopic & microscopic crime scenes, Significance of crime scene and ethics of crime scene investigation.

3. Physical Evidence: Definition, Classification, Sources, Significance and value of physical evidence. Linkage between crime scene, victim and criminal. Study of crime scenes relating to homicide, suicide, murder, mass disaster (Vehicle and Train accidents, Air-crash, Industrial accidents etc).

4. History and definition of Forensic Toxicology, General principles and management of acute poisoning, Definition, classification of poisons, mode of action, signs and symptoms in cases of common poisons. Heavy metal poisoning and metal antagonists, lead, mercury, arsenic. Organophosphorous, Organochloro, Carbamate pesticides and Pyrethroids poisoning cases. Environmental impact on insecticides, Drug dependence and its management, Clinical toxicology, Action and administration of Drugs and Poisons, Different methods of extraction of drugs and poisons, clean up procedures and analysis.

5. Qualitative analysis: Sample preparation, dissolution, digestion and fusion, Nature of trace analysis, spot tests and spectroscopic methods. Screening tests commonly engaged in chemical and toxicological analysis of alcohol, drugs, pesticides, poisons and their metabolites from autopsied samples, blood and urine samples.

6. Quantitative analysis: Volumetric and Gravimetric analysis.

7. Solvent extraction: Advantage and application, Derivation of the relation between the percentage extraction and number of extraction, relation between distribution ratio and distribution coefficient, quantitative treatment of neutral chelate in extraction systems, pH extraction curve, masking agent, salting out technique, multiple extractions, solid phase extraction.

8. Chromatography: Introduction – IUPAC definition – development methods – classification Theory (distribution coefficient rate of travel, retention time, adjusted retention time, retention volume, corrected retention volume, adjusted retention volume, Specific retention volume, relative retention, column capacity, separation number, peak capacity). Shapes of chromatographic peak, column efficiency, zone broadening, Van Deemter equation, resolution, optimization of column performance.

9. Introduction, principle, procedure and applications of – Paper chromatography, Thin Layer Chromatography (TLC) and High Performance Thin Layer Chromatography (HPTLC).

10. Gas Chromatography: Principles, Carrier gas, stationery phase, instrumentation, sample injection, column, detectors (FID, ECD, TCD, automatic emission detector and thermionic detectors). Effect of temperature of retention, temperature programming, GC-MS, qualitative and quantitative analysis of alcohols.

11. High Performance Liquid Chromatography (HPLC)**:** Scope, Instrument, stationery phase, structural types of columns, packing column for bonded phase. Detector (absorbance detector, RI detector and electrochemical detector, Pre-column and post column derivatisation, mobile phase selection, effect of solvent strength, optimization.

12. Spectrophotometry**:** Basic principles, Beer-Lambert's Law. Principle and biochemical applications of UV-Vis spectrophotometry.