



CHEMISTRY
(Skill Development Course)
(3rd Semester)

Course No.:CHM-SEC-201

Forensic Chemistry

Contact Hours: 60; Credits: 03

Full Marks = 100 [End Semester Exam (70) Internal Assessment (30)]

Pass Marks = 40 [End Semester Exam (28) Internal Assessment (12)]

Unit-1: Instrumentation

Fundamental principles and forensic applications of thin layer chromatography, gas chromatography and liquid chromatography. Fundamental principles of Ultraviolet-visible spectroscopy, infrared spectroscopy, Colorimetric analysis and Lambert-Beer law.

Unit-2: Development of Fingerprints

Latent prints. Constituents of sweat residue. Latent fingerprints' detection by physical and chemical techniques. Mechanism of detection of fingerprints by different developing reagents. Application of light sources in fingerprint detection. Preservation of developed fingerprints.

Unit-3: Basics of Toxicology

Significance of toxicological findings. Techniques used in toxicology. Toxicological analysis and chemical intoxication tests. Lethal dose 50 and effective dose 50.

Unit-4: Narcotics, Drugs and Psychotropic Substances

Definition of narcotics, drugs and psychotropic substances. Broad classification – Narcotics, stimulants, depressants and hallucinogens. General characteristics and common example of each classification. Natural, synthetic and semi-synthetic narcotics, drugs and psychotropic substances. Designer drugs. Tolerance, addiction and withdrawal symptoms of narcotics, drugs and psychotropic substance.

Unit-5: Cases Involving Arson and Explosives

Chemistry of fire. Collection and preservation of arson evidence. Analysis of fire debris. Analysis of ignitable liquid residue. Scientific investigation and evaluation of clue materials. Information from smoke staining. Classification of explosives – low explosives and high explosives. Synthesis and characteristics of TNT, PETN and RDX. Mechanism of Explosion process. Blast waves. Searching the scene of explosion. Post blast residue collection and analysis.

Suggested demonstrations

1. Separation of explosive substances (e.g., aromatic nitro compounds) using thin layer chromatography
2. Detection and preservation of fingerprints
3. Demonstration of instrumental techniques (e.g., Ultraviolet-visible spectroscopy, infrared spectroscopy, Colorimetric analysis, etc.)



Suggested Readings

- W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, *Techniques of Crime Scene Investigation*, CRC Press, Boca Raton (2013).
- S. Ballou, M. Houck, J.A. Siegel, C.A. Crouse, J.J. Lentini and S. Palenik in *Forensic Science*, D.H. Ubelaker (Ed.), Wiley-Blackwell, Chichester (2013).