SEMESTER –III

FORENSIC CHEMISTRY & TOXICOLOGY

THEORY

Course Code: P20/CHE/DSE/302 **Max.Hours : 60**
Course Type:DSE-2 **Hours Perweek : 4**
No. Of Credits: 4 **Max.Marks: 100**

COURSE OBJECTIVES

- Introduction to Forensic chemistry**,** Qualitative and quantitative forensic analysis of inorganic and organic material.
- Examination of petroleum products by various methods, Chemistry of fire and Analysis of trace evidence.
- Introduction to Toxicology-Classification of poisons and Toxicological investigations.
- Principles of Toxicology- Methods of transportation of toxicant

COURSE OUTCOMES

CO1: Discuss different analytical methods in Forensic chemistry.

CO2 Explain various methods of petroleum products examination.Understand Chemistry of fire and Analysis of trace evidence.

CO3 Classify Poisons and discuss Toxicological investigations.

CO4 Describe Principles of Toxicology- Toxicokinetics and Toxicodynamics

MOUDLE:1: FORENSIC CHEMISTRY-I (15 Hrs)

Forensic Chemistry - Introduction - Types of cases / exhibits - Preliminary screening - presumptive tests (colour and spot tests) - Examinations procedures involving standard methodsand instrumental techniquesQualitative and quantitative forensic analysis of inorganic and organic material - Chemical fertilizers (N,P,K) _ Insecticides (Endosulfan, Malathion, Carbaryl) - Metallurgical analysis (Fe, Cu, Zn, Au, Ag) – Natural products (tobacco, tea, sugars, rubber) – Industrial chemicals - Sulphuric, Nitric and Hydrochloric acids, Sodium, Potassium hydroxide, Ammonium nitrate, Potassium chlorate, Organic

solvents like Methanol, Ethanol, Acetone, Chloroform and Ether Organic chemicals like Acetanilide, P- Aminophenol, and Nitrobenzene etc. with reference to forensic work.

MOUDLE:2 FORENSIC CHEMISTRY-II **(15 Hrs)**

Examination of petroleum products - Distillation and fractionation - various fractions and theircommercial uses - Standard method of analysis of petroleum products – Analysis of petroleumproducts for adulteration and arson residues. Chemistry of fire - Investigation and evaluation of fires – Causes of fire - Analysis of arsonresidues by conventional and instrumental methods. Analysis of trace evidence - Cosmetics, Dyes, Trap related evidence materials, Paints, Pigments,Fibres, Oils fats, Greases, Industrial dusts, Chemicals and Plant materials.

MOUDLE:3: FORENSIC TOXICOLOGY-I **(15 Hrs)**

Toxicology- Introduction- History- Scope- Areas of Toxicology- Role of forensic toxicologist-Poisons- Classification of poisons- Types of poisoning- Sample collection and preservation oftoxicological exhibits in fatal and survival cases- Storage of samples- Signs and symptoms of poisoning- Toxicological investigation/examination of poisoned death- Interpretationoftoxicologicaldata- Courtroom testimony in toxicological cases.Case Histories.

MOUDLE:4: FORENSIC TOXICOLOGY-II **(15 Hrs)**

Principles of Toxicology- Introduction – Pharmacokinetics - Methods of transportation of toxicant- Absorption- Distribution- Storage of toxicants- Redistribution - Metabolism- Oxidation– Reduction – Hydrolysis – Conjugation - Excretion- Other routes of elimination- Toxicokinetics-one and two compartmental model – Toxicodynamics- Spectrum of undesired(toxic) effects-Interaction of chemicals- Tolerance- Dose response relationship- Developmentaland reproductive toxicity- Mutagenicity- Toxicity testing.

Recommended books:

1. James, S. H. and Nordby, J. J.: Forensic Science: An Introduction to Scientific and Investigative Techniques, 2003.
2. Saferstein, R: Criminalistics - An Introduction to Forensic Science, Prentice Hall, 1995.
3. Sarkar, S: Fuels and Combustion, Orient Longman, 1990**.**
4. Verma, R. M: Analytical Chemistry – Theory and Practice, CBS Pub., 1994**.**
5. Svehla, G. Ed.: Vogel's Qualitative Inorganic Analysis, Longman, 1998.
6. Bassett: Vogel's Text Book of Quantitative Inorganic Analysis, Longman, 1978**.**
7. Vogel, A. I: Text Book of Practical Organic Chemistry including Qualitative OrganicAnalysis, ELBS, 1971.
8. Narayanan, T. V: Modern Techniques of Bomb Detection and Disposal, R. A. Security System, 1995.
9. Almirall, J. R. and Furton, K. G: Analysis and Interpretation of Fire Scene Evidence, CRC Press, 2004.
10. Bogusz, M. J: Handbook of Analytical Separations : Vol. 2 ,Forensic Science, Elsevier, 2000.
11. Bureau of Indian Standards: Specifications and Methods of Analysis for Petroleum Products.
12. Wilson and Wilson's Comprehensive Analytical Chemistry Volumes
13. Standard Methods of Chemical Analysiss
14. AOAC: Official Methods of Analysis
15. Daeid, N.N.: Fire Investigation: Theory and Practice, Taylor and Francis, 2003
16. Klaassen, C. D.,:Casarett and Doull's Toxicology: The Basic Science of Poisons, 5thed, McGraw-Hill, 1995.
17. Moffat, A.C. :Osselton, D. M. Widdop, B. : Clarke's Analysis of Drugs and Poisons in Pharmaceuticals, body fluids and postmortem material, 3rd ed., Pharmaceutical Press2004.
18. Bogusz, M. J.,: Hand Book of Analytical Separations, Vol. 2: Forensic Science, 1st ed., Elsevier Science ,2000.
19. Siegel, J.A., Saukko, P. J., Knupfer, G.,: Encyclopedia of Forensic Sciences (Vol3), Academic Press, 2000.
20. Paranjape, H.M., Bothara, G.K., Jain, M.M.: Fundamentals of Pharmacology, 1st ed.,Nirali Prakashan,1990.
21. Budhiraja, R.D.: Elementary Pharmacology and Toxicology, Popular Prakashan, 2nd ed., 1999.
22. Laboratory procedure Manual, Forensic Toxicology: DFS, 2005
23. Cravey, R.H; Baselt, R.C.: Introduction to Forensic Toxicology , Biochemical Publications, Davis, C.A. (1981Stolmen, A.; Progress in ChemicalModi, Jaisingh, P.; Textbook of Medical Jurisprudence& Toxicology, M.M. TripathiPublication (2001)Eckert; An Introduction to Forensic Science, CRC Press