SYLLABUS ; Junior Scientific Assistant (Chemistry) in FSL

Chemistry
Chemical periodicity, main group of elements and their compounds, concept of acids and bases, non-aqueous solvents, organometallic compounds-synthesis bonding & structure and reactivity, characterization of inorganic compounds. Group Theory and its applications. Elemental Analysis. Coordination Compounds. Spot test of elements.
Qualitative and Quantitative Analysis, Solvent Extraction, Advantage and Applications of pH extraction, masking agents, salting out techniques, relation between distribution ratio and distribution coefficient, advantage and application of solvent extraction, quantitative treatment of neutral chelate in extraction system, single extraction versus multiple extraction, solid phase extraction, accelerated solvent extraction, ultrasonic extraction, heat reflux extraction.
Spectrophotometry - Basic principles, Beer-Lambert's Law. Principle of applications of UV-Vis spectrophotometry, atomic absorption spectroscopy. Theory and applications of IR, Fourier Transform Infrared spectroscopy (FT-IR), Raman spectroscopy.
Chromatography - Introduction, principle, procedure and applications of Paper chromatography, Thin Layer Chromatography (TLC), High Performance Thin Layer Chromatography (HPTLC), Adsorption chromatography, Column chromatography, Gas Liquid Chromatography (GLC), Ion-exchange Chromatography, Reverse phase chromatography, High Pressure Liquid Chromatography (HPLC), Liquid chromatography-Mass spectrometry (LC-MS), Gas chromatography-Mass spectrometry(GC-MS).
Introduction and Classification of NDPS Drugs, Classification of Drugs, Different methods of extraction of Drugs, Mandatory Provisions of NDPS Act. Analysis of opioids, heroine, Brucine, strychnine, Nicotine, atropine, hyosyamine, Cocaine, Dhatura, Papavar somniferum (OPM), atropa belladonna, marking nut, Nux vomica, Oleander, Aconite, abrus, cannabis sativa, Coca, croton and canthridine.
Explosive Chemistry - Introduction, Assessment, Classification and Chemistry of Explosives, Various Types of IEDs, Analysis of low and high explosives by different conventional & instrumental techniques, Analysis of post blast residues by microscopic, chemical methods and various instrumental techniques.
Petroleum Chemistry- Paraffins, iso-olefins, Olefin Hydrocarbons, Nephthalenes, Cycloparaffins, Aromatic Hydrocarbons, Sulphur Compounds, Nitrogen Compounds, Oxygen Compounds, Organo-Metallic Hydrocarbons, Physical Properties of Petroleum Products - density, viscosity, surface tension, fluorescence, cloud point, smoke point, boiling point, optical properties, flash point, refractive index and calorific values, Analytical Techniques: Quantitative and Qualitative Steps in Analysis of Petroleum products and residues.
Toxicology
Introduction & scope of forensic toxicology.
Classification of poisons.
Isolation and Purification of poisons.
Gaseous and Volatile poisons: Analysis of methanol ethanol, Acetone, Chloroform, Ether, Denatured spirit and Hooch poisoning, analysis of CO, H_2S, phosphine and other poisonous gases.
Classification & Analysis of Inorganic poisons (Cations & Anions) : Arsenic, Antimony, Mercury, Bismuth, Lead, Copper, Zinc, Thallium, Manganese, Chromium, Aluminium, Barium, Cadmium, Nickel, Fluoride, Chloride, Bromide, Iodide, Borate, Chlorate, Bromate,

Iodate, Nitrate, Nitrite, Sulphate, Sulphide, Dichromate, Phosphate, Azide, Oxychloride, Thiocyanate, Perchlorate.
Classification & Analysis of Neutral poisons (Organic Non Volatile)/Pesticides: Insecticides, Fungicides, Rodenticides, Herbicides and other poisons.
Classification & Analysis of Acidic & Basic Drugs (Organic Non Volatile): Classification, isolation and general properties. Analysis of Barbiturates, Chloral hydrate, tranqualizers. Examination of synthetic and designer drugs of abuse.
Classification & Analysis of Plant poisons.
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 biological samples, blood and urine samples.
Detection of snake venom in crime exhibits.
Instrumental Analysis in Toxicology.
Forensic Science
Introduction & scope of forensic science.
Basic principles of forensic science.
Collection, Preservation, Packaging of the material at Crime Scene.
Chain of Custody.
Postmortem Changes in case of poisoning.
Bio-Chemistry
Introduction & scope of biochemistry.
Basic Biochemistry- Amino acids, Lipids, Proteins, Carbohydrates.
Chemistry of natural products – carbohydrates, proteins and peptides, fatty acids, nucleic acids, steroids and alkaloids.
Pathways of drug metabolism, excretion of drugs and poisons.