RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

SYLLABUS FOR SCREENING TEST FOR THE POST OF SENIOR SCIENTIFIC OFFICER- CHEMISTRY DIVISION

(STATE FORENSIC SCIENCE LABORATARY, RAJASTHAN, JAIPUR)

The syllabus will include the topics/units which are in the Master's level Chemistry degree from recognized Universities by the University Grants Commission, New Delhi. As the entrant will apply for the post of S.S.O. (Chemistry), in the Forensic Science Laboratory in the State of Rajasthan, following units are also included in the syllabus of Screening test.

Unit I

Role of analytical chemistry, classification of analytical methods – classical and instrumental, Types of instrumental analysis, selecting an analytical method, Neatness and cleanliness. Laboratory operations and practices. Analytical balance. Techniques of weighing, errors. Volumetric glassware : cleaning and calibration of glassware. Sample preparation : dissolution and decompositions. Gravimetric techniques. Selecting and handling of reagents. Laboratory note books. Safety in the analytical laboratory.

Unit – II

Forensic Science : Definitions, History and Development Crime Scene Management and Investigation : Collection, Preservation, Packing and Forwarding of Physical and Trace evidences for analysis.
Legal and Court Procedure pertaining to Expert Testimony.

Unit – III

Analysis and estimation of illicit liquor including methyl, ethyl alcohol, denatured spirit, acetone, chloroform and ether in body fluids, blood and urine.
Analysis of petroleum products and petroleum residues on forensic exhibits.
Analysis of oils and fats.

Unit IV

Unifying principles : Electromagnetic radiation, interaction of electromagnetic radiation with matter-absorption, emission, transmission, reflection, refraction, dispersion, polarization and scattering.
Basic principles, instrumentation and applications of Ultraviolet and visible spectroscopy, Infrared spectroscopy, Atomic Absorption Spectroscopy, Mass Spectrometry, Fluorescence and Phosphorescence spectrophotometry.
Basic principles, instrumentation and applications of pH metry, Potentiometry, Conductometry.
Microscopy : Types of Microscopes, Microscope and its parts, Function, Applications in Forensic Science.

Unit V

Chromatography – Chromatographic Techniques : General Principles, paper chromatography, column chromatography, TLC, Adsoption chromatography, partition chromatography, Gas chromatography, Gas-liquid chromatography, Ion exchange chromatography, Exclusion (permeation) chromatography, affinity chromatography, HPLC, HPTLC, Capillary Chromatography.
Electrophoresis : Theory and principles.
Forensic Statistics : Mean, Mode, Median, Correlation and Regression analysis, Null Hypothesis, Variance, t-test, Chi-Square test. Type of Data, Measure of Central Tendency, Dispersion of Data, Correlation, Probability and Proof.

Unit – VI

Forensic Chemistry : Definition and Scope.
Preliminary Screening Methods for some chemical constituents – Spot tests and Crystal tests. Analysis of Toxic Anions – Nitrite, Nitrate Sulphide, Sulphate, Halides and Cyanides.
Analysis of CO_2, CO and other Poisonous gases.
Analysis of some Metallic poisons – As, Sb, Pb, Ba, Cu, Hg, Zn and Thallium.

Unit VII

Determination of Adulteration in Edible oils, Food Commodities, Fertilizers, Cement and Ornaments.
Pesticide analysis in food products.
Analysis of incendiary material from debris.
Analysis of Petroleum products for adulteration.
Trap cases – Analysis of Dyes used in Trap cases.
Analysis of Detergents and Soaps.

Unit VIII

Fire and Arson Investigation – Nature and Chemistry of Fire. Types of Arson cases. Detailed Examination of scene of crime. Collection and Preservation of evidences in a arson case.
Explosive – Nature, Classification and Composition, Ignition, Combustion and Detonation.
Examination of Explosive, Bomb and IED (Improvised Explosive Device).
Reconstruction of explosive cases.

Unit IX

Alkaloids : Definition, Classification, Isolation, General Properties and Examination of Morphine, Codeine, Brucine, Strychinine, Nicotine, Atropine, Hyosyamine, Cocaine, Heroin and Barbiturate. Alkaloids from Opium, Cannabis Sativa and Dhatura
Proteins – Definition, Classification, General Properties, Molecular weight determination, denaturation, Isoelectronic point, coagulation of proteins, salting and salting out of proteins and reactions.
Extraction, Isolation and Identification of Psychotropic Drugs – Sedatives, stimulants, opiates and drugs of abuse.

Unit X

Steroids - Definition, Classification, Isolation and General Properties.
Cholesterol, Bile acids, androsterone, testosterone, Estrone, Progesterone, Aldosterone.

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Pattern of Question Papers:

1. Objective Type Paper
2. Maximum Marks : 100
3. Number of Questions : 100
4. Duration of Paper : Two Hours
5. All Questions carry equal marks
6. There will be Negative Marking

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