

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER
SYLLABUS FOR SCREENING TEST FOR THE POST OF
SENIOR SCIENTIFIC OFFICER- TOXICOLOGY DIVISION
(STATE FORENSIC SCIENCE LABORATORY, 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. (Toxicology), 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 in biological specimens.

Chemical examination and Physiology/Pharmacology of – Insecticides and pesticides – Organochloro, Organophosphorous, Carbamates and Synthetic Pyrethroids and their analysis.

Unit IV

Medicolegal aspects of wounds

Post-mortem Examination and PM changes

Asphyxial Death

Unit V

Principles, Technique, Instrumentation and Applications –

Atomic Absorption Spectroscopy. Mass Spectrometry, Raman Spectroscopy. Neutron Activation Analysis and N.M.R., UV-Visible, IR Spectroscopy, Fluorescence, X-ray fluorescence spectrometry (XRF). TEM, SEM and Inductively coupled plasma atomic emission spectroscopy (ICPAES)

Microscopy : Microscope and its parts, Function, Applications in Forensic Science.

Types of Microscopes : Simple, Compound, Phase contrast and Stereo Microscope.

Unit – VI

Principles, Technique, Instrumentation and Applications –

Chromatography – Column, Paper, TLC, Ion-Exchange, GC, HPLC, HPTLC, GC-MS and LC-MS.

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 VII

Forensic Toxicology including Chemistry

Poison – Definition, Classification, Mode of action, Factors modifying mode of action of poison. Methods of poison administration, Toxicological exhibits in poisoning cases, their collection and preservation. Extraction and Isolation of poisons from Visceral Organs and other Biological Specimens. Analysis of corrosive, Irritant and various plant poisons.

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 CO₂, CO and other Poisonous gases.

Analysis of some Metallic poisons – As, Sb, Pb, Ba, Cu, Hg, Zn and Thallium.

Analysis of Psychotropic Drugs : Sedatives, stimulants, opiates, drugs of abuse, Heroin, Methaqualone, Meprabomate, Mescaline, Mandrax, LSD, Amphetamines, Benzodiazepines, Haloperidols and other designer drugs.

Analysis of Abusive Drugs used in sports.

Food poisoning – Botulism and Ptomine poisoning.

Antigen Antibody reaction and Application of RIA and ELISA techniques in detection of common Snake Venoms.

Unit VIII

Alkaloids : Definition, Classification, Isolation, General Properties and Analysis of Morphine, Codeine, Brucine, Strychnine, Nicotine, Atropine, Hyosyamine, Cocaine.

Plant Poisons and their examination : Dhatura, Papaver Somniferum, Atropa balladona, Marking nut, Nux-Vomica, Oleander, Aconite, Abrus, Cannabis Sativa, Coca, Croton and various poisonous toxalbumins and plant fungi.

Unit IX

Chemical foundation of pH & pK values.

Acids, Bases, Buffers, Weak bonds & Covalent bonds.

Amino acids and peptides – Classification, chemical reactions and physical properties.

Sugars – Classification and reactions.

Lipids – Classification, structure and functions.

Proteins analysis, Hierarchy in structure, Ramachandran map.

Polysaccharides – Types, Structural features, Methods for compositional analysis.

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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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