

# **RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER**

## **SYLLABUS FOR SCREENING TEST FOR THE POST OF SENIOR SCIENTIFIC OFFICER- NARCOTICS DIVISION (STATE FORENSIC SCIENCE LABORATORY, RAJASTHAN, JAIPUR)**

### **Unit I**

Analytical Chemistry: Classification of analytical methods – Classical and Instrumental, volumetric, titrimetric and gravimetric techniques, selection of proper analytical techniques: types and range of determination, accuracy, precision and errors, sample preparation, handling of reagents with safety, density and viscosity measurements.

Statistical Analysis: 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 II**

Analysis of unknown samples :-

Organic: Physical examination, element detection (N, S, Cl, Br, I, F), Functional Group analysis (-OH, -COOH, -NO<sub>2</sub>, -NH<sub>2</sub>, -CONH<sub>2</sub>, -CO-, -CHO, Hydrocarbons)

Inorganic: Qualitative analysis of cations and anions with special reference to cations i.e. As, Sb, Pb, Ba, Cu, Hg, Zn and Tl and anions i.e. NO<sub>2</sub><sup>-</sup>, NO<sub>3</sub><sup>-</sup>, S<sup>2-</sup>, SO<sub>4</sub><sup>2-</sup>, SO<sub>3</sub><sup>2-</sup>, halides and cyanides.

Analysis of poisonous gases: CO, H<sub>2</sub>S, PH<sub>3</sub>, CH<sub>4</sub> and NH<sub>3</sub>.

### **Unit III**

Spectroscopic and other techniques :-

Unifying principles : Electromagnetic radiation, interaction of electromagnetic radiation with matter- absorption, emission, transmission, reflection, refraction, dispersion, polarization and scattering.

Basic principles, instrumentation and applications: UV- Visible, FTIR, AAS, Mass, Spectroscopy, Fluorescence and Phosphorescence spectrophotometry, ESR Spectroscopy. Fundamentals of Acids, Bases and Buffers, pH, pK<sub>a</sub>, and pK<sub>b</sub> values, principles, instrumentation and applications of pH metry, Potentiometry, Conductometry and Microscopic analysis in forensic Science.

## **Unit IV**

Chromatography and Electrophoresis : General Principles and types of chromatographic techniques: Paper chromatography, column chromatography, Thin layer chromatography, adsorption chromatography, partition chromatography, Gas chromatography, Gas-liquid chromatography, Ion exchange chromatography, Exclusion (permeation) chromatography, affinity chromatography, HPLC, HPTLC, Capillary Chromatography and Electrophoresis.

## **Unit V**

Basic Organic Chemistry: Important preparations and properties of alkanes, alkenes, alkynes, aromatic hydrocarbons, alcohols, phenols, carboxylic acids, aldehydes, ketones, amines and nitro compounds.

## **Unit VI**

Proteins: Classification, Structure and Properties, Molecular weight determination, Isoelectric point, coagulation and denaturation. Carbohydrates: Classification, Structure and Reactions. Fats and Lipids: Classification, Structure and Reactions. Alkaloids: Classification, Isolation and Identification.

## **Unit VII**

Extraction, isolation & identification of Alkaloids viz- Morphine, Codeine, Brucine, Strychnine, Nicotine, Atropine, Hyoscyamine, Cocaine, Heroin and Datura alkaloids. Extraction, isolation & identification of sedative, depressants, stimulants, opiates and drugs of abuse.

## **Unit VIII**

Medicinal Chemistry: General drugs, Designer Drugs, Drugs of abuse, mode of administration and pharmacological action of drugs of forensic importance. Drugs Act, Excise Act and NDPS Act.

## **Unit IX**

Narcotics drugs and psychotropic substances: Definition, types, appearance, production and chemical characteristics. Common terminology of various drugs. Drug action on central nervous system. Sampling and analytical techniques for qualitative & quantitative analysis.

## **Unit X**

Plants of Narcotic importance and their morphology: Papaver somniferum, Cannabis sativa, Coca plant and analysis of their active constituents.

Psychotropic substances: Amphetamines, Benzodiazepines and their derivatives. Barbiturates, Lysergides, Mescalines and Psilocybin etc.

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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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