

Syllabus for the screening test to be held for recruitment of **Assitant Chemical Analyser (Group -B)** , in the Directorate of Forensic Science laboratories under Home Department of Govt. of Maharashtra.

Standard :- M.Sc. degree

Maximum Marks :-100

Medium English

Duration :- One hour

Nature of the Paper :-Objective type

01. Basic Concepts in Analytical Chemistry

(25 Marks)

- a) **Preparation of solution , concentration units , mole molarity , molality , equivalent weight , normality , ppm , milliequivalents and other related units.**
- b) **Definition of the terms :-** Precision , deviation , mean deviation, standard deviation , accuracy , absolute error , types of errors , students ‘ *t* ’ test, Confidence limit , Criteria for rejection of observation.
- c) **Titrations :-** Acid-base, redox, precipitation, complexometric. Indicators, theory of indicators, Metal-ion indicators, non-aqueous titrations.
- d) **Gravimetric Analysis :-** Preparation of sample solution, precipitation, types of precipitates. Role of organic precipitants in gravimetric analysis. Some important organic precipitants.
- e) Sampling , extraction, purification and identification of substances.

02. Analytical techniques in Inorganic Chemistry :

(25 Marks)

- a) **Atomic spectroscopic techniques :-** Flame emission , uv – visible spectroscopy, AAS (Atomic Absorption Spectroscopy), SEM (Scanning Electron Microscopy), Energy Dispersive X-ray Spectrophotometry , Emission Spectroscopy.
- b) **Electro-analytical Techniques such as** polarography , Amperometry, Voltammetry, Electro-gravimetry, Cyclic Voltammetry and Stripping Voltammetry.

03. Analytical techniques in Organic Chemistry :

(25 Marks)

- a) **Spectroscopy** – theory and applications in Chemical analysis of UV-Vis , IR (FTIR), NMR, MS, Raman and fluorescence Spectroscopy.
- b) **Separation technique** – theory and applications in Chemical analysis of Crystallisation , Distillation, fractional distillation , Distillation under reduced pressure, Paper chromatography , TLC, HPTC, GLC, LC HPLC, GCMS, LCMS, Ion exchange chromatography, Adsorption chromatography, Reverse-phase chromatography.

04. Analytical Techniques in Biochemistry :

(25 Marks)

- a) **Methods for estimation** – Protein, Nucleic Acids, lipids , carbohydrates.
- b) Biological Buffers.
- c) DNA Finger Printing, RFLP (Restriction Fragment Length Polymorphism), PCR (Polymerase Chain Reaction), RT-PCR (Reverse Transcriptase Polymerase chain Reaction), RIA (Radio Immuno Assay).
- d) **Separation of Biomolecules** – Affinity chromatography , Molecular exclusion chromatography (gel filtration), One Dimension (PAGE) and two Dimensions electrophoresis. Iso-electric focusing , High voltage electrophoresis, SDS-PAGE, Agarose electrophoresis, capillary Electrophoresis.
- e) **Isotope tracer technique.**
- f) **Enzymes :-** Classification , Isoenzyme, DNA Polymerase enzymes.
- g) **Blood groups.**
