

**DETAILED SYLLABUS OF BLENDING ASSISTANT IN TRAVANCORE SUGARS
AND CHEMICALS LIMITED**

CAT NO – 063/2023

PART - 1 - LABORATORY ASSISTANT (CHEMICAL PLANT TRADE) – 25 Marks

Module 1 (6 marks)

Empirical formula of chemical compounds, Balancing chemical equations, Principles of Material balance as applied in chemical industries; Examples of application of Material balance in heavy chemicals manufacturing.

Module 2 (6 marks)

Water chemistry, Use of water in various industrial applications, Principles of water analysis, Steam generation; various chemical process; Meaning of the terms Hardness; Turbidity, TDS, TSS, pH, COD, BOD. Spectrophotometer, Application and specification of spectrophotometer.

Module 3 (10 marks)

Introduction to Microbiology, Introduction to bacteria cell, Lovibond comparator, Identification of different microorganisms, Microbiology techniques: Applications, Examples of gram positive and gram negative microbes, Methods of media preparation and incubation, Inhibition of yeast growth (by streptomycin), Methods and reactions involved in preparation of Alcohol, beer, wines etc.

Module 4 (3 marks)

Purification of Organic compounds, Types of organic reactions, Classification and nomenclature of aliphatic and aromatic hydrocarbons, Functional groups.

PART - 2- ATTENDANT OPERATOR (CHEMICAL PLANT TRADE) – 25 Marks

Module 1 (7 marks)

Manufacturing process of sugar :- Raw materials, chemical reactions, Process description and uses.

Manufacturing process of ethyl alcohol :- Raw materials, chemical reactions, Process description and uses.

Module 2 (5 marks)

Mixing operation :- Introduction, Classification of mixing equipment and its applications, Mixers for mixing solid-solid, solid-liquid, solid-gas.

Module 3 (7 marks)

Definition of fire, Chemistry of fire, Fire triangle, Causes of fire in chemical industries, Different types of fire extinguishers, Accident- Causes and effects of accident, Prevention of accidents, Flash point, Fire point, Auto-ignition temperature, Housekeeping- Importance of housekeeping in chemical industries.

Module 4 (6 marks)

Definition of fluid, ideal fluid, real fluid, compressible fluid, incompressible fluid. Properties of fluid :-viscosity, mass density, flow measurements- Classification of flow measuring instruments, Construction, working and uses of orifice meter, venture meter, rotameter, pitot tube and its all troubleshooting.

PART - 3 - Chemistry - 50 MARKS

Topics

Structure of Atom [Marks – 5]

- > Discovery of Sub-atomic Particles
- > Atomic Models
- > Developments Leading to the Bohr's Model of Atom
- > Bohr's Model for Hydrogen Atom
- > Towards Quantum Mechanical Model of the Atom
- > Quantum Mechanical Model of Atom

Chemical Bonding and Molecular Structure. [Marks – 5]

- > Kössel-Lewis Approach to Chemical Bonding
- > Ionic or Electrovalent Bond
- > Bond Parameters
- > The Valence Shell Electron Pair Repulsion (VSEPR) Theory
- > Valence Bond Theory
- > Hybridisation
- > Molecular Orbital Theory
- > Bonding in Some Homonuclear Diatomic Molecules
- > Hydrogen Bonding

Thermodynamics [Marks – 4]

- > Thermodynamic Terms
- > Applications
- > Measurement of ΔU and ΔH : Calorimetry

- Enthalpy Change, ΔH of a Reaction Reaction Enthalpy
- Enthalpies for Different Types of Reactions
- Spontaneity
- Gibbs Energy Change and Equilibrium

Equilibrium [Marks – 4]

- Equilibrium in Physical Processes
- Equilibrium in Chemical Processes- Dynamic Equilibrium
- Law of Chemical Equilibrium and Equilibrium Constant
- Homogeneous Equilibria
- Heterogeneous Equilibria
- Applications of Equilibrium Constants
- Relationship between Equilibrium Constant K, Reaction Quotient Q and Gibbs Energy G
- Factors Affecting Equilibria
- Ionic Equilibrium in Solution
- Acids, Bases and Salts
- Ionization of Acids and Bases
- Buffer Solutions
- Solubility Equilibria of Sparingly Soluble Salts

Organic Chemistry-Some Basic Principles and Techniques [Marks – 6]

- General Introduction
- Tetravalence of Carbon: Shapes of Organic Compounds
- Structural Representations of Organic Compounds
- Classification of Organic Compounds
- Nomenclature of Organic Compounds
- Isomerism
- Methods of Purification of Organic Compounds
- Qualitative Analysis of Organic Compounds
- Quantitative Analysis

Hydrocarbons [Marks – 4]

- Classification
- Alkanes

- Alkenes
- Alkynes
- Aromatic Hydrocarbon
- Carcinogenicity and Toxicity

Solutions. [Marks – 4]

- Types of Solutions
- Expressing Concentration of Solutions
- Solubility
- Vapour Pressure of Liquid Solutions
- Ideal and Non-ideal Solutions
- Colligative Properties and Determination of Molar Mass
- Abnormal Molar Masses

Chemical Kinetics. [Marks – 4]

- Rate of a Chemical Reaction
- Factors Influencing Rate of a Reaction
- Integrated Rate Equations
- Temperature Dependence of the Rate of a Reaction
- Collision Theory of Chemical Reactions

Alcohols And Phenols. [Marks -5]

- Classifications
- Nomenclature
- Structures of functional Groups
- Alcohols and Phenols
- Some Commercially Important Alcohols

Aldehydes, Ketones and Carboxylic Acids. [Marks – 4]

- Nomenclature and Structure of Carbonyl Group
- Preparation of Aldehydes and Ketones
- Physical Properties
- Chemical Reactions
- Uses of Aldehydes and Ketones

- > Nomenclature and Structure of Carboxyl Group
- > Methods of Preparation of Carboxylic Acids
- > Physical Properties
- > Chemical Reactions
- > Uses of Carboxylic Acids

Biomolecules [Marks – 5]

- > Carbohydrates
- > Proteins
- > Enzymes
- > Vitamin
- > Nucleic Acids
- > Hormones

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.