

**DETAILED SYLLABUS FOR THE POST OF LABORATORY ASSISTANT
(COMMON FACILITY SERVICE CENTRE) INDUSTRIES AND COMMERCE**

(Category Nos: 57/2019)

(TOTAL MARKS – 100)

PART I : PHYSICS (40 Marks)

Unit I (10 marks)

Measurements and units-fundamental and derived units,

Motion- Uniform speed and non uniform speed, Uniform velocity and non uniform velocity, Acceleration and retardation

Equation of motions -Motion- graph, Position – time graph, Velocity- time graph, Derivations of equation of motion from graph

Laws of motion -Newton's laws of motion, Law of conservation of momentum, Circular motion

Gravitation - Universal law of Gravitation, Kepler's law, free fall

Unit II (8 marks)

Force - Contact and non contact force, Frictional force

Force in fluids- Liquid pressure, Atmospheric Pressure, Buoyancy, Archimedes principle, Pascal's law, Capillarity, Viscous force

Work, Energy, Power - Work, Energy, Kinetic energy and Potential energy, Work energy principle, Law of conservation of energy, Power

Unit III (12 marks)

Reflection of light - Spherical mirrors, Ray diagram and Images formed by spherical mirrors, Formation of images in concave and convex mirrors, magnification, Image formation by plane mirror-Field of view of mirrors and the nature of images, Mirror equation and focal length, New Cartesian and sign conversion.

Refraction of Light - Speed of light and optical density, Refraction of light in different media, Total internal reflection, Optical fibre, Lens (Concave and Convex), Ray diagram of Formation of image using lens, New Cartesian and sign conversion, Magnification, Power of a lens

Vision - Eye and vision, Long sightedness, Short sightedness, Presbyopia, Rainbow, Primary colours and secondary colours, Persistence of vision, Scattering of light.

Wave motion- Transverse wave and Longitudinal wave, Characteristics of waves, Reflection of sound, Reverberation , Echo, Acoustic buildings, Ultrasonic sound, Sonar

Unit IV (10 marks)

Static electricity - Electric Charges, Earthing, Electrostatic induction, Distribution of electric charge

Current Electricity - Potential difference and current, Combination of cells, Voltmeter and Ammeter, Ohm's law, Conductivity

Effect of electric current - Joule's law, Arrangement of resistors in circuit - Series and parallel connection, Safety fuse, electric power, Lighting effect of electric current-Discharge lamps and LEDs

Magnetism- Natural Magnets and Artificial Magnets, Magnetic field, Magnetic Flux Density, Magnetic Induction, Permeability, Electromagnet

Magnetic Effect of electric current -Right hand thumb rule, Solenoid, Flemings left hand rule, Motor principle

Electromagnetic induction - Electromagnetic induction, Alternating current (AC) and direct current (DC), Generator, Self induction and mutual induction, Transformer, Inductor Power transmission and distribution, House hold electrification, Watt hour meter, Three pin plug and earthing

PART II : CHEMISTRY (40 Marks)

Module I (10 marks)

Structure of Atom and Periodic table: Sub atomic particles- proton, neutron and electron, their properties, atomic number, mass number, isotopes and isobars, isotopes of hydrogen, periodic table, groups and periods, atomic size along the period and down the group, elements and symbols of 1st, 2nd and 17th group, noble gases, notations of shells and sub shells, electronic configuration up to Z=10

Module II (5 marks)

Chemical bonding and reactions: oxidation and reduction, common oxidation states of H, Na, K, Ca, Mg, Cl. Catalyst and examples, ionic bond and covalent bond- examples NaCl, HCl, Cl₂, O₂, Acids- hydrochloric, sulphuric and nitric acids. Alkalies- NaOH, KOH, Salts- NaCl, Na₂CO₃, acids and alkalies in everyday use, pH of water, acids and alkalies

Module III (5 marks)

Metals and Non metals: abundance of elements in earth's crust and atmosphere, uses of metals- Fe, Al, Cu, Ore of Al, Fe, Cu, Zn, Minerals in beach sands of Kerala, Noble metals

Chlorine, Oxygen and ozone. Ozone layer, major cause for ozone depletion

Module IV (5 marks)

Carbon and its compounds: Carbon, allotropes of carbon, structure and properties of diamond and graphite, Property of Catenation, CO₂, CO, green house effect, Carbon dating

Module V (10 marks)

Organic Chemistry: Hydrocarbons, homologous series, alkanes, alkenes and alkynes, their nomenclature, common functional groups (CHO, CO, OH, COOH, NH₂, NO₂), uses of methane, ethane, propane, butane, acetylene, properties of ethanol and methanol, percentage of ethanol in wash, rectified spirit and absolute alcohol

Module VI (5 marks)

Polymers: Natural and synthetic polymers, monomer of polyethylene, PVC and natural rubber, vitamins and their sources, common fertilizers, common drugs- antipyretic, analgesic, anti-inflammatory

PART III :

Questions based on Experience in Physical&Chemical Laboratory

(20 Marks)

Sl No	Topic Details	Mark	Remarks
1	<p><u>General Topics for Physical&Chemical Laboratory</u></p> <p>Rubber:Field Latex and its properties,Latex products and methods of production,Types of rubber,Properties of rubber,Vulcunization of rubber,Rubber product manufacturing techniques,Rubber mixing mill and its types,Moulding of rubber compound and different types of moulding.</p> <p>Plastics:Types of plastics,Plastic product manufacturing techniques.</p>	6	
2	<p><u>Physical Laboratory</u></p> <p>Stress,Strain,Stress-Strain graph of elastomers,Modulus of elasticity,Cure characteristics-Cure time,Scorch time, Mooney viscosity,Tensile strength,ASTM standard for Tensile strength test,Tear strength,ASTM standard for Tear strength test, Shore Hardness test,Compression set testing,Abrasion resistance test,Ross flex test,Guage test,melting point test,Melt flow index Test,Heat deflection temperature test.</p>	7	
3	<p><u>Chemical Laboratory</u></p> <p>Dry rubber content of the latex>Total solid content of the latex>Total alkanity of the latex,Volatile fatty acid of the latex,Mechanical stability time of latex,Zinc content and purity of Zinc Oxide,Rubber hydrocarbon content of a rubber compound,Ash content of a rubber compound.</p> <p>Molarity,Molality Normality,Basics of acids and bases,General rules for handling chemicals</p>	7	

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 also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper