

**SYLLABUS FOR LABORATORY ASSISTANT EXAMINATION**  
**UNDER COMMERCE & INDUSTRIES DEPARTMENT**

**GENERAL ENGLISH (100 marks)**

- (a) Essay Writing (Conventional) ..... 20 Marks
- (b) Idioms & Phrases (Objective Type) ..... 16 Marks
- (c) Comprehension of given passages (Objective Type) ..... 16 Marks
- (d) Grammar (Objective Type) ..... 16 Marks  
Parts of Speech : Nouns, Adjective, Verb, Adverb, Preposition, etc.
- (e) Composition (Objective Type) ..... 16 Marks
- i) Analysis of complex and compound sentences
  - ii) Transformation of sentences
  - iii) Synthesis of sentences
- (f) Correct usage and vocabularies (Objective Type) ..... 16 Marks

**Technical Paper – I : (150 Marks)**

**Unit I – Physics :**

Units, System of units, dimensions, fundamental units, derived units. Scalar quantities, Vector quantities, Distance and Displacement, Speed, Velocity, Acceleration, Equations of motion for straight line. Projectile motion – Range, Height, Time of flight. Newton's laws of motion, Inertial frame and Non inertial frame, Pseudo force. Friction : Types of friction, Advantages and disadvantages of friction. Circular motion : Angular velocity, Angular acceleration, Angular momentum, torque, Moment of inertia, conservation of energy, conservation of linear momentum, conservation of angular momentum, Centripetal force and Centrifugal force. Work, Energy, Power. Gravitation : Newton's law of gravitation, Gravitational force, gravitational potential, gravitational field, motion of satellites, Escape velocity, Kepler's laws. Properties of matter : Elasticity, Stress, strain, Hooke's law, Young's modulus, Rigidity modulus, Bulk modulus, Density, Pressure, Pascal's law, Buoyancy, Archimedes' principle, Bernoulli's theorem, Surface tension, Capillarity, Viscosity. Periodic motion, Simple Harmonic motion, Simple pendulum, Waves, mechanical wave, longitudinal and transverse waves, Sound waves, speed of sound, echo, doppler effect. Heat : Temperature and different scales, Gas laws – Boyle's law, Charle's law, Amonton's law, Avogadro's law,

combined gas law, Specific heat, Heat capacity, Latent heat, Conduction, Convection, Radiation, Newton's law of cooling, Black body, Kirchoff's law, Stefan's law.

## **Unit II – Chemistry :**

Matter, Elements, Atoms, Molecules, Compounds, Mixtures – homogeneous and heterogeneous, Solids, Liquids and Gases. Mole concept and applications, Physical change, Chemical change, Boiling point, Freezing point, Evaporation, Condensation. General trends of physical and chemical properties of elements in periodic table. Solutions, Colloidal solutions, Suspension. Tyndall effect, Brownian motion, Hardy-Schulze rule, Gold number. Atomic number, Mass number, Isotope, Isobar, Isotone, Radioactivity, Alpha particle, Beta particle, Gamma ray. Chemical bond, Ionic bond, Covalent bond, Coordinate bond, Metallic bond, Hydrogen bond, Vanderwaal's force. Exothermic and Endothermic reactions. Redox reaction, Oxidation, Reduction. Acids, Bases, Salts. Source of some common acids. Aqua-regia, pH value, Buffer solution, Bleaching powder, Plaster of Paris. Metals, Non metals, Helium, Argon, Metalloids, Minerals and ores, Ores of some important metals, Metallurgy, Alloys. Natural resources, Renewable and Non renewable natural resources. Coal, Charcoal, Carbon black, Petroleum, Flame.

## **Unit III – Biology :**

General characteristics of living beings, Cell, Cytology, Types of cells – Prokaryotic cells, Eukaryotic cells, Cell division – Mitosis, Meiosis. Functions of cell organelles – Cell wall, mitochondria, Plastids, Chloroplast, Lysosome, Nucleus. Chromosome, Nucleic acids – DNA, RNA and their functions. Functions, main sources and deficiency symptoms of Carbohydrates, Proteins, Vitamins, Fats. Types of Carbohydrates – Monosaccharides, Oligosaccharides, Polysaccharides. Water and its functions for biological system. Differences between animal cell and plant cell. Organic evolution, Homologous organs, Vestigial organs. Theories of evolution – Lamarckism, Darwinism, Mutation theory. Classification of animal into different phyla – Protozoa, Porifera, Coelenterata, Platyhelminthes, Aschelminthes, Annelida, Arthropoda. Respiratory systems – Aerobic and Anaerobic, Human respiratory system. Circulatory system – Heart, Blood, blood vessels – arteries, veins, capillaries, blood pressure. Skeleton – Axial skeleton, Appendicular skeleton system, Excretory system, Urine. Nervous system. Reproductive system, Endocrine system, endocrine glands, Effects of deficiency and excess of hormones. Bacterial, Viral and Protozoan diseases in human.

## Technical Paper – II (150 Marks)

### Unit I – Physics :

Light : Reflection of light, Laws of reflection, Reflection from plane mirror, Reflection at spherical surface, Refraction of light, Laws of refraction, Total internal reflection of light, Optical fibre, mirage. Lens, types of lenses, Power of lens, Camera, Microscope, Telescope. Dispersion of light, Prism, Mixing of colours. Interference of light waves, Diffraction of light waves, Scattering of light. Human eye, Defects of human eye – Myopia, Hypermetropia, Astigmatism, Presbyopia. Electricity : Charge, Conductors, Insulators, Coulomb's law, Electric field, Electric potential. Capacitance, Gauss' law, Electric current, Ohm's law, Resistance, Resistivity, Conductivity, Conductance, Combination of resistors – parallel and series combinations. Ammeter, Voltmeter, Galvanometer. Electric power, watt. Magnetic field, Ampere's law, magnetic force on moving charge, magnetic force of current carrying conductor. Atomic and Nuclear physics : Cathode rays, Anode rays, X rays, Photoelectric effect, Dual nature of light, De Broglie's equation, Photon, Mass-Energy relation, Nuclear fission, Nuclear fusion, Atom bomb, Hydrogen bomb.

### Unit II - Chemistry

Lattice in crystal, Bravais lattices, Crystal density, Imperfections in solids – Schottky defect and Frenkel defect. Electrolytes, Electrochemical cell, Kohlrausch's law, Corrosion, Rusting of iron, Battery. Air, constituents of air, Water, types of water – Soft water, Hard water, Heavy water, Pollutants, Green house effect, Global warming, Acid rain, Ozone depletion, Water pollution, Soil pollution, Green Chemistry. Carbon, Graphite, Diamond, Fullerenes, Organic compounds, Uses of some organic compounds and their reactions – Ethylene, Acetylene, Ethanol, Diethylether, Acetic acid, Oxalic acid, Chloroform, Glycol, Urea. Drugs and medicines, Narcotics, Antipyretics, Tranquilizer, Analgesic, Sedative, Antidepressant, Sulpha drugs, Antihistamine. Food preservatives, Soaps, Detergents, Fertilizers, Glass, Cement, Polymers, some important polymers with their monomers, uses and chemical reactions – Polyethylene, Polyvinylchloride, Bakelite, Nylon-66, Terylene, Kevlar, Lexan. Natural rubber, Vulcanisation.

### Unit III – Biology

Cryptogams, Phanerogams, Gymnosperms, Angiosperms. Plant morphology – root, stem, leaf, flower, fruit. Capillary water, Diffusion, Osmosis, Transpiration and Photosynthesis in plants. Genetics and Mendel's law, Sex chromosomes in human. Mutations – Germinal and Somatic mutations. Heredity diseases – Haemophilia A, Colour blindness, Sickle cell anaemia, Turner's syndrome, Kline Felter's syndrome, Down's syndrome, Cri-du-chat syndrome. Genetic engineering, Gene therapy, Test tube baby, Cloning, Bt crops. Green revolution, Kharif crop,

Rabi crop, Zaid crop. Animal husbandy. Common breeds of Indian cattles, Buffaloes, Goats, Sheeps.

### **Unit III – Aptitude Test 20 marks**

#### **○ Numerical And Figurework Tests: (4 Marks)**

These tests are reflections of fluency with numbers and calculations. It shows how easily a person can think with numbers. The subject will be given a series of numbers. His/Her task is to see how the numbers go together to form a relationship with each other. He/She has to choose a number which would go next in the series.

#### **○ Verbal Analysis And Vocabulary Tests: (6 Marks)**

These tests measure the degree of comfort and fluency with the English language. These tests will measure how a person will reason with words. The subject will be given questions with alternative answers, that will reflect his/her command of the rule and use of English language.

#### **○ Visual And Spatial/3-D Ability Tests: (4 Marks)**

These tests are used to measure perceptual speed and acuity. The subject will be shown pictures where he/she is asked to identify the odd one out; or which comes next in the sequence or explores how easily he/she can see and turn around objects in space.

#### **○ Abstract Reasoning Tests: (6 Marks)**

This test measures the ability to analyse information and solve problems on a complex, thought based level. It measures a person's ability to quickly identify patterns, logical rules and trends in new data, integrate this information, and apply it to solve problems.

## **Paper – II**

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