

Physics

Unit - I

Chapter 1 : Electricity and Capacitance 1-1 to 1-24

Syllabus : Capacitors and capacitance, Parallel plate capacitor, Effect of dielectric on capacitance, Combination of capacitors, Energy stored in a capacitor, Cells, EMF of cell, Internal resistance of cell, Kirchhoff's laws, Wheatstone's bridge, Potential gradient, Potentiometer.

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Unit - II

Chapter 2 : Radioactivity and Ultrasonic Waves

2-1 to 2-15

Syllabus : Radioactivity, α , β and γ particles / rays and their properties, Radioactive decay law, Half life period, Sound waves, Amplitude, Frequency, Time-period, Wavelength and velocity of wave, Relation between velocity, Frequency and time period of wave, Ultrasonic waves, Properties of ultrasonic waves, Piezoelectric effect. Piezo materials : Natural, Quartz, Synthetic : Gallium orthophosphate. Generation of ultrasonic waves using piezo electric effect, Applications of ultrasound waves, Doppler effect and its applications.

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Unit - III

Chapter 3 : Photoelectricity, X-Rays and LASERs

3-1 to 3-21

Syllabus : Plank's hypothesis, Properties of photon, Photoelectric effect, Threshold frequency. Threshold wavelength, Stopping potential, Work function, Characteristics of photoelectric effect, Einstein's photoelectric equation, Photoelectric cell and LDR, Principle, Working and applications. Production of X-rays by modern Coolidge tube, Properties and applications of X-rays. LASER, Properties of LASERs, Absorption, Spontaneous and stimulated emission, Population inversion, Active medium, Optical pumping, Three energy level system, He-Ne LASER, Applications of LASER.		
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Chemistry

Unit - IV

Chapter 4 : Water Treatment and Analysis 4-1 to 4-32

Syllabus : Hardness : Types of hardness, soap solution method, EDTA method.

Effect of hard water in boilers and prevention : Boiler corrosion, caustic embrittlement, priming and foaming, scales and sludges

Water softening : Lime soda process (hot lime soda and cold lime soda process), zeolite process, ion exchange process (cation exchange and anion exchange).

Municipal water treatment : Sedimentation, coagulation, filtration and sterilization.

Waste water : Characteristics, BOD and COD, Sewage treatment, recycling of waste water.

De-salination process by reverse osmosis.

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Unit - V

Chapter 5 : Electrochemistry and Batteries 5-1 to 5-24

Syllabus : Electrical conductance in metals and electrolytes : specific conductance, equivalent conductance, cell constant.

Conductance : Nature of solute, nature of solvent, temperature, concentration of dilution.

Electrodes : Hydrogen electrode, calomel electrode and glass electrode.

Conductometric Titration

Batteries : Dry cell, alkaline battery, lead Acid storage cell and Ni-Cd battery, H₂-O₂ fuel cell, Lithium ion battery..

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Unit - VI

Chapter 6 : Metals, Alloy and Insulators 6-1 to 6-22

Syllabus : Properties of metals like copper, aluminium, tungsten, platinum nickel.

Thermocouple alloy : Composition and characteristics of nickel alloy, platinum/rhodium, tungsten/ rhenium, chromel-gold/iron.

Electrical insulators : Classification, Solid - ceramics, mica, asbestos, urea formaldehyde resin and glass. Liquid-silicon fluid, Gaseous-inert gases, hydrogen and nitrogen gas.

Types of rubber : Natural and, synthetic, processing of natural rubber. Synthetic rubber : Properties and applications of Buna-N, Thiokol, Neoprene.

Process industry unit operations : Evaporation, condensation, Distillation, Energy balance and mass balance for above processes.

Nanomaterials : Applications of Fullerenes, Graphene.

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