

Physics (a)

Properties of Matter.—Mass, force, weight. Velocity and acceleration ; composition and resolution of vectors. Work, energy, power. Principle of moments ; the balance. Elasticity ; Hooke's law ; Young's modulus.

Heat.—Expansion of solids, liquids, and gases. Compensation for expansion ; utilization of expansion. Common thermometers, pyrometers, thermocouples, resistance pyrometers. Conduction, convection and radiation of heat. Relations between pressure, volume, and temperature of a gas ; absolute temperature. Heat units. Calorimetry. Change of state ; specific heat ; latent heat, vapour pressure, dew-points. Determination of melting and boiling points. Regelation. Refrigeration.

Electricity and Magnetism.—Effects of electric current. Primary and secondary cells. Potential difference and electromotive force. Ohm's law. Electrical units of current, e.m.f., and resistance. Electricity and chemical change ; electrolysis. Potentiometers. Wheatstone bridge. D.C. measuring-instruments. Units of energy and power and their relationships.

Production of electric charges. Electric fields. Electrostatic units. Field strength, potential, capacitance. Properties of magnets ; use of alloy steels ; magnetic fields, lines of force ; field strength.

Light.—Propagation of light. Reflections at plane and curved surfaces. Refraction, index of refraction. Mirrors. Thin lenses ; combination of lenses. Photometers. Measurement of light ; units of intensity, flux, illumination and brightness. The prism ; deviation ; minimum deviation ; dispersion.

Sound.—Sound as wave motion. Transverse and longitudinal waves. Velocity of sound in air, solids, liquids. Superposition of sound waves ; reflection and refraction of sound ; resonance. Interference, beats. Determination of frequency.

A candidate in this subject will be required to present a certificate from the Principal of the institution attended that he has carried out a course of practical work of at least thirty hours' duration based on the above prescription and that his attendance and work have been satisfactory.

Physics (b)

Heat.—Heat and energy ; mechanical equivalent of heat. Gas laws. Isothermal and adiabatic expansion. P/V diagrams.

Electricity and Magnetism.—Magnetic moments. Intensity of magnetization. Magnetic properties of iron and steel. Calculation of ampere turns for magnetic circuits. Electro-magnetic induction, direction and magnitude of e.m.f. ; self and mutual inductance. Hysteresis ; measurements of field strength and plotting of B/H curve.

Elements of A/C wave form ; phase displacement, amplitude, frequency, generation of a sinusoidal e.m.f. A/C measuring instruments. Effects of inductance and capacitance.

Transmission, modulation, and reception of electro-magnetic waves. Action of diode and triode valves. Photo-electric cells. Conduction of electricity through gases. Cathode rays and x-rays.

Light.—The spectrum ; colour, spectrum analysis, spectrometer.

Achromatic combination. Optical instruments, telescope, microscope, projector.

Wave theory. Interference ; the bi-prism, Newton's rings. Polarization of light ; double refraction. Velocity of light.

Sound.—Forced vibrations. Stationary vibrations ; nodes, antinodes. Vibrations of columns of air. Vibrations of strings ; the monochord. Musical instruments. The phonograph. The microphone.

A candidate in this subject will be required to present a certificate from the Principal of the institution attended that he has carried out a course of practical work of at least sixty hours' duration based on the above prescription and that his attendance and work have been satisfactory.