

spectroscopy. Fluorescent lamp circuits. Starting. Flicker. Illumination systems. Design and layout of illumination systems to meet specific requirements. Calculation of maximum and minimum illumination. Influence of lighting fittings, diffusers and reflectors. Glare and contrast. Control and switch points.

Materials.—The testing of iron including the separation of hysteresis and eddy current losses and the calculation of these losses. Characteristics of permanent and high-permeability magnetic materials.

The measurement of permittivity power factor and electric strength of insulating materials at power and audio frequencies.

Paper (d) : Electrical Measurements

General theory. Basic laws of electrostatics and electromagnetism, and their application in instrument and measurement technology to the calculation of capacitance and electrostatic stress, magnetic field strength and magnetic forces. Self and mutual inductance, induced E.M.F. Eddy current loss; current penetration in conductors, and flux penetration in magnetic materials. Units and standards. Derivation of C.G.S. electrostatic and electromagnetic units; their dimensions and their relationship to practical units; the m.k.s. system. International units. Absolute measurements of current and resistance. Standards and substandards.

Instruments and accessories; materials and construction. The theory, design, construction, testing, and use of indicating, recording, and integrating instruments and meters. The theory and testing of instrument transformers. Moving-coil and cathode-ray oscillographs.

Measurements. Alternating current and direct current bridge and potentiometer measurements. Resonance methods of measuring effective resistance and reactance. Principal properties of, and methods of testing, magnetic, conducting, and insulating materials. Measurement of non-electrical quantities by electrical means.

The principles of measurements at power, audio, and radio frequencies of inductance, capacitance, resistance, voltage, current, power, and 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 120 hours' duration based on the prescriptions (a), (b), (c), and (d) above, and that his attendance and work have been satisfactory.

Engineering Chemistry (a)

Fuels and Combustion.—Elementary thermo-chemistry. Combustion. Air required. Products of combustion. Heat losses. Properties and uses of coal. Ultimate and proximate analyses. Calorific values. Liquid and gaseous fuels. The manufacture of coal-gas, water-gas, carburetted-water gas, coke-oven gas, producer gas. Domestic and metallurgical cokes.

Heat Transfer.—Heat transfer by radiation, conduction, and convection. Industrial furnaces.

Lubricants.—Oils and greases (animal, vegetable, and mineral), properties, requirements. Physical tests. Viscosity. Boundary and flooded lubrication.

Industrial Water-supply.—Permanent and temporary hardness. Boiler-feed water treatment. Water-treatment plant for boilers. Dye-houses and allied industrial equipment.

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.