

(7) *Ohm's Law*.—Simple calculations relating to non-inductive circuits; variation of total resistance by connecting similar resistances in series or parallel; distribution of current and voltage in series or parallel circuits on D.C. or A.C. with unity power-factor; fall of potential, and very elementary treatment of potential gradient in electric circuits.

(8) *Measurements and Instruments*.—Resistance of voltmeters and ammeters, and the recognition of meters suitable for A.C. or D.C. Polarized and moving iron instruments with reference to external appearance and scale; connecting up instruments from diagrams of connections. Wattmeters and watt-hour meters; watts; kilowatts; kilowatt-hour; Board of Trade unit; kilovolt-ampere; reading watt-hour meter; simple calculations (D.C. or single-phase A.C. with unity power-factor) of cost of operating apparatus for definite periods of time. (NOTE: Roughly approximate methods of calculation may be used.)

(9) *Insulators*.—Properties of insulating-materials in common use, and their suitability for particular conditions; rubber- and paper-insulated cables; protective covering; causes of deterioration.

(10) *Bell Circuits*.—Connecting up call and reply bells; indicators; bells in series or parallel; bell transformers; care of Leclanche and dry cells.

(11) *Wiring Circuits and Systems*.—Diagrams of connections for house circuits; looping in; minimum number of wires required; two-way switch circuits; service panels; casing; conduit; insulators; sheathed single wire; temporary wiring.

(12) *Supply Systems*.—Two- and three-wire D.C.; two- and three-wire A.C.; three-phase four-wire A.C.; voltage relation between phases, and between phase and neutral; earthing.

(13) *Building-construction*.—A general idea of the construction of a building and the precautions to be taken to ensure the installation of conductors with the least damage to premises or weakening of joists, beams, walls, &c.; cutting floors; concealed work on finished buildings; attachment of electrical accessories to walls and ceilings to various materials.

(14) *Wiring Rules and Regulations*.—Knowledge of the Electric Wiring Regulations, and a general understanding of the underlying reasons for their adoption, with special reference to earthing of conduit and apparatus, size of conductor, outlets per circuit, bunching of wires, metallic continuity, protection from shock and fire risk. Minimum-resistance testing, &c. (NOTE: The carrying capacities of the common conductors should be known.)

(15) Treatment in case of electric shock.

B.

Practical Test in Actual Wiring.—Wiring and testing out circuits; wiring supply-boards; sweating thimbles; screwing and bending conduit; fixing fittings; making and insulating joints.

FINAL EXAMINATION FOR ELECTRICAL WIREMEN.

The syllabus will cover more completely the subjects of the intermediate examination, together with the following.

A.

(1) *Units*.—Electrical and mechanical units of work and power and their relations to one another; a more precise knowledge of terms and units as prescribed for the intermediate examination.

(2) *Electrical Measurements and Calculations*.—Voltage-drop in conductors carrying current; current taken by apparatus, and cost of energy for definite periods of time; measurement and calculation of power and energy supplied to three-phase circuits; the relation between kilovolt-amperes and kilowatts; a knowledge of the approximate power-factors and efficiencies of motors.

(3) *Electrical Machines and Appliances*.—Their general construction, installation, switching and control, care and maintenance, including—

(a) Secondary batteries: Rating, installation; charging and testing; care and maintenance.

(b) D.C. motors: Connecting up and reversing series, shunt, and compound-wound motors, including interpole motors, three- and four-wire starters; speed-control; effect of voltage-variation; faults in running, such as heating, sparking, incorrect speed, &c.; testing for faults; suitable types of motors for various conditions.

(c) D.C. generators: Connecting up; voltage-regulation; reversing rotation; reasons for not generating; running compound generator as motor.