

- (d) A.C. motors: Connecting up and reversing; single-phase, split-phase, and repulsion-induction motors; three-phase squirrel-cage and wound rotors; compensators, star-delta and resistance starters; alteration of starting-torque by compensator; effect of variation of frequency or voltage on performance of motor; power-factor; synchronous speed and slip; faults, such as heating, incorrect speed, bad starting, &c.; testing for faults; measurement of power taken by motor, and consumption and output of energy.
- (e) Transformers: connecting up; choke-coils and auto-transformers; voltage ratio of a transformer; star-delta connections and voltage ratios.

## B.

(1) *Practical Work*, including measuring power taken, altering direction of motor, increasing starting-torque, sorting out mixed up looped circuits, &c.

(2) *Practical Test of Workmanship as prescribed for the Electrical Wiremen's Registration Examination*.—Installation of (a) conduit, (b) capping and casing, (c) uncased wiring; making and insulating joints in cable; soldering cable sockets and terminals to the ends of cable; fixing of conductors to insulators; fixing of electrical accessories, fittings, and appliances; wiring and connecting up electrical accessories, fittings, and appliances; earthing of electrical apparatus; repairing of electrical accessories, fittings, and appliances; testing electrical apparatus and installations; reading electrical meters and instruments; method of resuscitation of persons in the case of electrical shock.

## SYLLABUS OF COURSE FOR ELECTRICAL FITTERS.

## PRELIMINARY EXAMINATION FOR ELECTRICAL FITTERS.

1. *Drawing*.

(a) *Geometry*.—The substance of Drawing II, Instrumental, as prescribed for the intermediate examination, but treated less fully, only geometrical constructions necessary for practice in mechanical drawing being included.

Use and care of drawing-instruments, including scales, pencils, pens, compasses, dividers, protractors, set-squares, and T squares. How to test the accuracy of drawing-instruments, and how to correct errors. Hand sketching in plan, elevation, and section.

(b) *Freehand Sketching*.—Making approximately accurate hand sketches of simple geometrical solids and of objects such as tools and simple machine parts; conventional representation of screw threads; description and functions of parts drawn; reasons for materials used.

(c) *Mechanical Drawing*.—Drawing to scale in pencil from dimensioned sketches of parts specified in (b) above. Skill in mechanical drawing will be regarded as of secondary importance compared with skill in freehand sketching, and questions will not be set in the written examination which involve accurate scale drawings of machine parts. Every candidate will be required to forward to the examiner his portfolio of drawings for inspection.

2. *Calculations and Graphs*.

Advantages and disadvantages of fractional and decimal methods of calculation; idea of accuracy of calculated results; significant figures; degree of accuracy of data obtained by various methods of measurement, with emphasis on the importance of the percentage error; meaning of 2", 2·0", 2·00"; metric fractional and decimal notations.

(a) *Mensuration*: Areas and volumes as prescribed for the intermediate examination; mid-ordinate method for finding area of curvilinear figures; methods of finding weights of typical sections of iron and steel; estimating weights from drawings and sketches.

(b) Ideas of variable and variability; formulæ, indices. Use of algebraic symbols and logarithms where advisable, in evaluating simple formulæ. A knowledge of algebraical operations sufficient to change the dependent variable in formulæ.

(c) The straight-line graph and its uses. Use of curvilinear graphs to obtain continuous values of one variable in terms of the other; plotting graphs from given data.

(d) In all calculation economy of labour and neatness of setting-out are to be emphasized. Particularly will it be insisted on that "rough checks" of calculations must be made, and that no calculations may be carried past the point where the data cease to be reliable.

3. *Elementary Mechanics and Physics*.

Mass; weight; force; work; relative density and specific gravity; measurement of volumes by displacement; principle of Archimedes;

## D