Papers (c) and (d) : Equipments and Circuits

Manual and machine telegraph terminal apparatus for land-line and submarine cable. Photo-telegraphy. Telegraph repeaters, including regenerative and electronic types. Principles of manual and automatic exchange switching and of subscribers' apparatus. Principles of exchange layout and cabling ; junction signalling. Routiners and routine testing. Trunking and grading. Layout and operation of multi-exchange areas. Multi-channel carrier systems. Local distribution schemes ; flexibility schemes.

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.

Locomotive Engineering (a)

Types of locomotives.

Factors governing the selection of locomotives for different purposes, tractive force, adhesion and resistance, determination of leading dimensions, cardinal points of design, boilers including brick arches, boiler mountings, and steam-using auxiliaries including injectors, feed-pumps and feed-water heaters, lubricators, dynamos, steam-heating, regulator, boosters, mechanical stokers and oil-firing. Superheaters, spark-arresters, ash-pans, dampers, grates, smoke-boxes, blast pipe, and chimney.

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.

Alternatively, a candidate in this subject will be required to present a certificate from his employer, and approved by the Principal of the institution attended, that he has spent a minimum of three months engaged upon the construction, repair, and maintenance of locomotives.

Locomotive Engineering (b)

The engine, including bogies, cylinders, valves and valve gears, pistons, cross heads, connecting and coupling rods, wheel-centres, tires, crank-pins, axles, axle-boxes, lubrication, compound expansion, frames, springs including compensating gear, brakes, flexibility on curves. Tanks, bunkers and tenders, superstructure. Mechanical equipment of electric locomotives and electric stock. Internal-combustion locomotives and rail cars. Testing of locomotives. Locomotive depots and maintenance of locomotives.

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.

Alternatively, a candidate in this subject will be required to present a certificate from his employer, and approved by the Principal of the institution attended, that he has spent a minimum of six months in all engaged upon the construction, repair, and maintenance of locomotives.

Marine Engineering (a)

Steam-engines.—Types, constructional details and working principles of both reciprocating engines and turbines. Determination of i.h.p. adjustment of irregularities disclosed by indicator diagrams. Turbine gears. Valve gears. The principle of working and calibration of dynamometers and torsion meters. Types of marine boilers and their constructional details, superheaters, economizers, air-preheaters, soot-blowers, and