

*Engineering Drawing and Design II (b).* (Two papers—three hours each)

Design involving application of kinematics—for example, screw mechanisms ; gear wheels ; cams.

Design of bearings for given loads ; use of ball and roller journal and thrust bearings ; lubrication. Design of machine and engine details such as pulleys, couplings, clutches, power-transmission drives, and pressure transmission.

The design and preparation of working drawings of electrical machine parts from outline data or sketches—*e.g.*, switches ; starters for D.C. and A.C. motors ; commutators and brush gear for electrical machines.

Candidates will be expected to show competency in making dimensioned hand sketches in good proportion.

*Engineering Drawing and Design II (c).* (Two papers—three hours each)

Design involving application of kinematics—for example, screw mechanisms ; gear wheels ; cams.

Design of bearings for given loads ; use of ball and roller journal and thrust bearings ; lubrication. Design of machine and engine details such as pulleys, couplings, clutches, power-transmission drives, and pressure transmission.

Simple jigs and fixtures.

Influence on design of fatigue and stress concentration.

Candidates will be expected to show competency in making dimensioned hand sketches in good proportion.

*Engineering Materials*

The chemistry, metallography, and mechanical properties of the commoner metals of industrial importance, with special attention to iron and steel ; the chief alloys of these metals and the conditions under which they are formed ; variation of properties by thermal and mechanical treatments ; outlines of manufacture of steel, wrought iron, and cast iron. Methods of crack detection and use of x-ray for inspection.

Techniques of making cement, concrete, bricks, ceramics, and plastics, and their properties.

The properties and preservation of timber, including plywoods.

Road and runway making materials and their preparation ; bituminous surfaces.

Fuels and the products of combustion.

Water treatment ; corrosion ; weathering and disintegration.

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.

*Heat Engines (a) : Steam-engines*

*Thermodynamics*.—Reversible and irreversible processes ; entropy ; temperature-entropy and total heat-entropy diagrams ; Carnot, Rankine, regenerative and reheating cycles, heat pumps.

*Steam Generators*.—Smoke-tube and water-tube boilers ; boiler fuels ; combustion in boilers, furnaces and draught ; air supply and regulation ; flue gas analysis.

*Reciprocating Steam-engines*.—The incomplete Rankine cycle ; action of steam in cylinder compounding ; jacketing ; effects of super-heating ; Willan's law ; testing procedure and equipment ; indicators ; combined diagrams ; trial data and heat balances. Governors ; reversing gears ; valve diagrams.