

Turbines.—Expansion in the impulse type and in the reaction type; steam flow through nozzles and blades; nozzle and blade dimensions; blade thrust; loss and leakage effects; stage efficiency; reheat factor; allocation of energy; trial procedure; velocity diagrams; velocity compounding; governing; temperature and entropy $T \phi$, $H \phi$ diagrams.

Condensers.—Condensing-plant; jet and surface condensers; air and extraction pumps; air-ejectors; de-aerators; evaporators; feed heaters; the feed circuit, feed treatment.

Refrigeration.—Vapour compression machines, absorption machines, compression compound, refrigerants.

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 fifteen hours' duration based on the above prescription and that his attendance and work have been satisfactory.

Heat Engines (b): Internal-combustion Engines

Cycles.—Ideal cycles applicable to the internal-combustion engine, and their representation by pressure-volume and temperature-entropy diagrams; air standard efficiencies and their modifications by the properties of actual working substances.

Classification of Engines.—The classification and cycles of operation of gas-engines, petrol-engines, heavy-oil engines and turbines, and jet-propulsion engines.

Combustion in Engine Cylinder.—Process of combustion in compression-ignition and spark-ignition engines, with special reference to detonation in the latter.

Testing and Performance.—Apparatus and procedure; indicators; characteristics of indicator diagrams; fuel-consumption and heat-distribution; engine losses; accuracy of measurement; representation and interpretation of test results; volumetric efficiency; consideration of the performance of actual engines in relation to ideal conditions.

Air-compressors.—Positive displacement, centrifugal, and turbo-compressors.

Constructional Details.—The general construction of internal-combustion engines, carburettors, electrical ignition systems, fuel-pumps and injection systems; governing and power control; gas-producers.

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.

Heating and Ventilating (a)

Heating.—Metabolism and comfort conditions. General consideration. Wet and dry bulb temperature. Effective temperature. Heat transmission by radiation, convection, and conduction. Thermal conductivity of building materials. Surface coefficients. Effect of wind and building exposure on heat transmission. The calculation of building heat losses. Consideration of a satisfactory temperature difference for New Zealand conditions. The insulation of buildings. The various systems of building heating. Choice of a suitable system. Steam and hot water boilers, feed treatment. Fuels. Fuel burning equipment. Calculation of air required for combustion. Heat losses in flue gases. Boiler efficiencies. General consideration of equipment used. Thermostatic control of heating systems.

Ventilation.—Standards of ventilation. Natural and mechanical ventilation. Fan types. Fan laws. Fan-rating tables. Ducts and grilles. The calculation of air quantities. Friction losses in ducts and grilles. Total and static head required at fan. Fan efficiencies and horse-power requirements. Fan construction and drives. Duct construction.