

ash-handling. Coal and oil firing. Types of oil and coal used. Boiler testing. Principles and constructional details of air and circulating pumps. Feed, bilge, sanitary, and ballast pumping systems. Evaporators, feed-water heaters, condensers, and fans. Turbo-electric drives and their control.

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 upon the above prescription and that his attendance and work have been satisfactory.

Alternatively, a candidate may be granted exemption from the laboratory work if he has spent a minimum of three months in either a power-station, and/or in a vessel at sea, and/or in an engineering workshop approved by the Principal and engaged upon the construction and repair of marine engines and boilers.

Marine Engineering (b)

Internal-combustion Engines.—Types, constructional details and working principles of propelling and auxiliary internal-combustion engines. Fuels and fuel injection systems. Air-compressors. Starting and reversing arrangements. Diesel-electric drives.

Layout of engine-rooms, steering engines, winches, thrust bearings, and hydraulic couplings. Electrical machinery and installations used on ships. Refrigeration plant and systems.

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Mathematics I (a)

Algebra.—Theory of quadratics. Indices; the exponential theorem. Logarithms, decimal and natural systems, practical applications, conversion. Arithmetical and geometrical series. Binomial theorem and its application to approximations.

Co-ordinate Geometry.—Point and straight line in one plane; distance between two points; simple loci; equations of straight lines; conversion from one form into another; distance between point and straight line; angle between two straight lines.

Trigonometry.—Solution of triangles. Identities; trigonometrical equations. Inverse circular functions.

Calculus.—Functions and limits; gradient; derivatives of simple functions from first principles; application to maxima and minima.

Mathematics I (b)

Algebra.—Functions, graphical representation; solution of equations by graphs; determination of laws connecting variables (from table of given experimental data). Elementary use of determinants. Use of nomograms.

Co-ordinate Geometry.—Conic sections; derived equations of circle, ellipse, parabola, and hyperbola in rectangular co-ordinate and parametric form. Simple properties of conics.

Trigonometry.—Complex numbers; vectors; De Moivre's theorem; graphical representation of complex numbers and vectors (Argand diagram).