

azimuth of the sun. He must know the marks of the lead line, and understand how to mark a log line to suit any glass. He must be able to find the time of high water at any port from its establishment, and be able to reduce soundings taken at any time to low water.

He must be able to work a day's work complete, including the bearings and distances of his ports of departure and destination, by Mercator's method, and to lay down his position thus found on a chart. He must understand the use of a sextant thoroughly, and be able to determine and apply its index error, and to ascertain whether it be in proper adjustment.

He must be able to ascertain his latitude by meridian or double altitudes of the sun, and by observation of a star, and be able to compare and rate chronometers, and to find his longitude by them by the usual rule and to verify the same by Sumner's method.

He must be able to lay down his position on the chart as thus ascertained as well as by dead reckoning, and to deduct the set and velocity of currents by any difference between the positions thus found.

He must give satisfactory proofs of his knowledge of general seamanship, and will amongst other things be examined as to the rigging and unrigging of vessels, the stowing of holds, the shifting of large spars and sails, the management of a vessel in stormy weather, securing cables, and casting a ship when on a lee shore. He will be examined as to his competence to construct rafts, and as to his resources for the preservation of passengers and crew in the event of a wreck.

He must also be acquainted with the lights and leading lights on the coasts and in the harbours which he is accustomed or intends to navigate, as well as with the soundings, tidal currents, &c.

In all cases, satisfactory testimonials of character, sobriety, and good conduct on board ship, must be produced before the candidate can be examined.

C.—*Qualifications for Engineers' Certificates.*

11. The engineer of a river steamer must be twenty-one years of age.

He must have served an apprenticeship to an engineer, or prove that for not less than three years he has been employed in some factory or workshop on the making or repairing of engines, and must have been in charge or driver of a steam engine for at least one year; or

He must have been in charge of a steam engine at work for not less than three years.

He must be able to give a description of boilers, and the methods of staying them; together with the use and management of the different valves, cocks, pipes and connections.

He must understand how to correct defects from accident, decay, &c., and the means of repairing such defects.

He must understand the use of the barometer, thermometer, and salinometer.

He must state the causes, effects, and usual remedies for incrustation and corrosion.

He must be able to state how a temporary or permanent repair could be effected in case of derangement of any part of the machinery or of a total break down.

He must be able to pass a creditable examination as to the details of the different working parts of the engine for which he is being examined, together with the use of each part.

He must write a legible hand, and understand the first four rules of arithmetic.

12. The engineer of a sea-going steamer must be twenty-two years of age.

He must have served an apprenticeship to an engineer, or prove that for not less than three years he has been employed in some factory or workshop on the making and repairing of engines, and must also have served not less than two years at sea in the engine room; or

He must have served at least four years at sea in the engine room, of which at least one must have been served as second engineer.

He must write a legible hand, and understand the first five rules of arithmetic and the use of decimals; also the mensuration of superficies and solids, and the extraction of the square root.

He must be able to give a description of boilers and the method of staying them; together with the use and management of the different valves, cocks, pipes and connections.

He must understand how to correct defects from accidents, decay, &c., and the means of repairing such defects.

He must understand the use of the barometer, thermometer, hydrometer, and salinometer.

He must state the causes, effects, and usual remedies for incrustation and corrosion.

He must be able to state how a temporary or permanent repair could be effected in case of derangement of any part of the machinery or total break down.

He must be able to pass a creditable examination as to the various constructions of screw and paddle engines in general use; and as to the details of the different working parts, external and internal, with the use of each part.

He must be acquainted with the principles of expansion, and able to prove, or at least to illustrate, the use of the expansion gear.

He must be able to explain the method of testing and altering the setting of the slide valves, and of testing the fairness of the paddle and screw shafts, and of adjusting them.

He must be generally conversant with surface condensation and super-heating.

He must be able to calculate safety valve pressures, and the strength of the boiler, and the strain on the stays at any pressure.

He must be able to take off and calculate indicator diagrams.

He must be able to make rough sketches of any part of the machinery, with figured dimensions fit to work from.

(E.)

THE following instructions have been approved by me, and are to be strictly complied with by all lightkeepers in the service of the New Zealand Government.

Wellington, December, 1866.

JOHN HALL,
Postmaster-General.