

69. Paper 7.**CONSTRUCTION, WORKING, AND UPKEEP OF SHIPS.** (3 hours.)

Classification of ships. Registration societies. Displacements. Weight of hull. Capacity. Draught. Freeboard. Block coefficient. Gross deadweight and net tonnage. The interpretation of plans. Principal structural members. Longitudinal and transverse framing. Scantlings. Reverse frames. Beams. Cellular double bottoms, &c. Watertight subdivision, water-ballast arrangements. Elements of structure—*e.g.*, keels, decks, bulkheads, shell-plating, rivets and riveting, hatches, &c. Types of ship. Tonnage rules, &c. Consideration of construction—weight, fittings. Shipyard practice. Laying off. Mould loft. Scribe board, launching, &c. Materials of construction and their properties. Steel and iron. Notions of strains and stresses in metals—tension, torsion, compression, bending, and shearing. Stresses and strain in ships.

Stability. The theory and calculations involved in a determination of the stability of a vessel in light and loaded condition. Experimental determination of stability of a ship. Use of stability curves and information. Dynamic stability—rolling, &c. Ballasting, loading. Effect of admission of water into interior of a ship. Trim.

70. Paper 8.**COMMERCIAL AND LEGAL KNOWLEDGE.** (2 hours.)

- (a) A shipmaster's knowledge of the Merchant Shipping Acts relating to registry, masters and seamen, safety of ships, delivery of goods, liability of shipowners, wreck and salvage, pilotage and emigrants.
- (b) A shipmaster's knowledge of the general management of ship's business, documents and procedure with Customs, &c., obligations and liabilities of owner and master with respect to passengers, cargo, and ship. Charter parties and expenses involved (various kinds). Demurrage, claims, &c.
- (c) Port machinery—use of quays. Sheds, warehouses, docks, and waterside termini. Administration and working of ports. Cranes and their use—steam, hydraulic, floating, movable. Coaling apparatus. Mineral and grain elevators. Graving docks. Floating docks.

71. Paper 9.**OCEANOGRAPHY AND ECONOMIC GEOGRAPHY.** (3 hours.)

A fuller knowledge of meteorology and meteorological instruments than that required for master. Winds, current ice limits, &c., for the globe. General characters of the seas—depths, surface temperatures, surface densities. Oceanic circulation. Floating ice.

Principal world products and sources of supply: Mineral—*e.g.*, coal, ores, stones, oils and their products. Vegetable—*e.g.*, cereals, fruit, textile plants, forests for wood, gums, and rubber. Coffee, tea, sugar, spices, &c. Animal-food, chilled and frozen meats and fish. Comparative knowledge of imports and exports, tonnage, movements of ships, port activities. Main routes of communication. Freight variations and their causes.

72. Oral.—The candidate will be examined in the seaman-ship syllabus laid down for a master's foreign-going certificate (*see* para. 60), and he will be expected to reach a higher standard in his answers than a candidate for a master's certificate.

The candidate will also be examined orally on the syllabuses for his written work, and questions will be so designed as to allow the candidate, where desirable, to amplify his written work.

73. Sailing-ship Endorsements.—A candidate for a sailing-ship endorsement of any grade who has not previously held an endorsement of a lower grade or an Ordinary certificate of a lower grade issued prior to January, 1931, must prove that he has served twelve months in the foreign trade or eighteen months in the home trade, in a square-rigged sailing vessel. Service in vessels with auxiliary steam or motor power, which use their propelling machinery only in calms or during light winds, is considered as service performed in sailing-vessels. Amongst square-rigged vessels are classed full-rigged ships, barques, brigs, barquentines, and brigantines.