

59. Paper 7. (Written.)**ENGINEERING KNOWLEDGE** (including carriage of refrigerated cargoes).
(3 hours.)

(The requirements will not go beyond the knowledge that could be obtained by a deck officer who takes an intelligent interest in the machinery of the ship and supplements by a little reading what he has learnt in this way.)

- (a) The meaning of general engineering terms—*e.g.*, horse-power, slip and pitch of propeller, link, latent heat of steam superheated steam, &c.

A general knowledge of a marine boiler and furnaces and the procedure for raising steam. The general action of a reciprocating steam-engine. Principle of the condenser. Distribution of steam from boiler to engines—valves and pipelines. Admission to engine—slide valves, eccentrics, expansion link. Starting-gear. Simple description (without detail) of various parts of engines and boilers—*e.g.*, connecting-rod, crank, piston and rings, packing of piston rods, relief valves and cylinder drains, line shafting, couplings, tail shaft, stern tube and packing. Auxiliaries and their uses—circulating pump, air pump, feed pump, bilge pump. Action of propeller. Thrust block. Attachment of propeller to shaft.

Oil-fired furnaces and use of oil fuel. A simple knowledge of turbine machinery and of Diesel engines. Warming up and turning engines. Stopping and going astern—how done. A knowledge of what is required in the engine room on the receipt of manœuvring orders from the bridge. Fuel consumption and economical speeds. Power and speed curves. Effect of alterations of speed on fuel consumption and estimation of adequacy of fuel to complete a given voyage.

- (b) An elementary knowledge of refrigeration on board ship. Types of refrigeration on board ships. Types of refrigeration employed in special cases. Stowage and general handling of refrigerated cargoes.

60. Oral Portion.

1. (a) Exceptional circumstances—loss of rudder; shifting a damaged rudder. Construction of jury rudders. Making and launching of rafts. Collision. Leaks. Damage of all kinds. Running repairs and precautions in case of accidents. Grounding—methods of refloating. Beaching a vessel. Steps to be taken when disabled and in distress.
 - (b) Preservation of crew and passengers in the event of wreck. Abandoning a wrecked ship. Rockets and rocket apparatus. Communications with the shore.
 - (c) Assisting a vessel in distress. Rescuing crew of a disabled ship.
 - (d) Towing and being towed.
 - (e) Bad weather manœuvres. Precautions at anchor and at sea. Use of oil. Anchoring and working anchors and cables in all circumstances. Approaching rivers and harbours and manœuvring in them.
 - (f) Drydocking. General procedure and precautions to be observed. Distribution of weight. Drydocking with full cargo for inspection of propellers or shafting. Bilge beds. Leaving the vessel water borne. Putting into port with damage to ship and/or cargo, both from business and technical points of view. Safeguarding of cargo.
 - (g) Prevention of fire at sea. Spontaneous combustion of fuel cargoes. Full knowledge of the use of fire-extinguishing appliance and precautions to be observed in cases of danger to life. Special reference to extinguishing of oil-fuel fires.
 - (h) Methods of fumigating holds and living spaces and safeguards in applying them.
 - (i) General organization of ship's work and handling of crew.
2. Regulations for prevention of collisions at sea, &c.—As para. 42, Section 5. (Oral) Second Mate.
 3. Signals.—As para. 42, Section 6 (Oral) Second Mate.
 4. The Examiner may ask the candidate questions arising out of the written work if he deems it necessary on account of weakness shown by the candidate.