

- (b) Landfalls in thick weather. Construction and use of line of soundings. The general use of a single position line in making land, including clearing marks. The use of bearings obtained by wireless direction finder, bearings given from shore station, or the use of wireless beacons.
- (c) The use of a Gnomonic Chart and transfer of a Great Circle or composite track from such a chart to Mercator's Chart. (N.B.—The Examiner may ask oral questions on the above syllabus.)

48. Paper 4. (Written.)

SHIP CONSTRUCTION AND STABILITY. (3 hours.)

- (a) A general knowledge of the principal structural members of a ship. Midship sections of different types of ships, giving the parts their proper names. Scaling dimensions on a midship section to make intelligible reports.
- Ability to set out in a clear manner a report on damage sustained by corrosion or by accident.
- Construction and stiffening of watertight bulkheads.
- Collision bulkhead.
- Stern frame and stem and how secured.
- Stresses and strains in ships through effect of seas or loading and ballasting.
- A knowledge of those portions of a ship specially strengthened to withstand such stresses, or where excessive damage by corrosion is liable to occur.
- Rivets and riveting. Testing a line of rivets. Testing watertight work.
- Rudders and steering gear. Inspection and maintenance.
- Hatches and hatch gear. Hawsepipes and cable lockers.
- (b) Buoyancy and reserve buoyancy. The righting couple when a ship is inclined. Metacentre and metacentric height. Transverse and longitudinal metacentres. Stiff and tender ships—how to obtain stiffness. Stability at large angles of inclination and what this depends on.
- Preparation of data for ascertaining metacentric heights of a ship in any particular condition.
- Determination of centre of gravity of a ship in any condition, the centre of gravity in light condition being given. Use of stability curves and data supplied to a ship. Alteration of stability during a voyage. Effect of shifting cargo. Change of trim.

49. Paper 5. (Written.)

SHIP MAINTENANCE, ROUTINE AND CARGO WORK. (3 hours.)

- (a) Keeping a ship's log. (Mate's log.)
- (b) Ship maintenance and organization. Indents and stores. Repair lists. Properties and uses of paints. Painting. Chipping, scraping. Cement work. Treatment of wood work. Inspection and maintenance of bulkheads, double bottoms, deep tanks, rudders. Bottom painting. Drainage of holds and double bottom tanks. Inspection and maintenance of anchors and cables. Maintenance of holds with reference to cargo carrying. Spar ceilings, &c. Inspection and maintenance of pumps, strums, roseboxes, and bilges.
- (c) Simple calculation of stresses in spans, derricks, topping lifts, &c. Strength of ropes, chains, slings, two slings at an angle, &c. Purchases and power gained by purchases.
- (d) *Cargo work.*—(The candidate should, where possible, illustrate his answers from his own experience.)
- Stowage of cargo. General—stowage of bag cargoes, bales, casks, &c.
- Bulk stowage. Partition and shifting boards. Ceilings and dunnage. Deck stowage. Possible damage and its avoidance.
- Good and bad stowage. Special cargoes—explosives, grain, timber, oil in bulk, steel rails, &c.
- Given a cargo list, to stow a hold or holds, making a rough cargo plan, with a view to stability of tender and stiff ships, damage and contamination, easy handling and possible optional ports of discharge.
- Methods of ventilation of cargoes. Drainage of holds.
- Closing of hatches. Cargo working gear—derricks and winches. Organization of cargo work.