



034-84 – MCA/SQA Officer of the Watch Unlimited **Stability and Operations Syllabus**

(Used from March 2025 exams onwards)

1. Flotation, buoyancy and loadlines

- a) Defines displacement, mass, volume, density, and relative density
- b) Explains Archimedes' principle and the law of flotation
- c) Defines fresh water allowance (FWA), dock water allowance (DWA) and tonnes per centimetre immersion (TPC)
- d) Uses hydrostatic data to determine displacement and TPC for varying draughts and water densities
- e) Uses hydrostatic data to calculate small and large changes in displacement and draught, making appropriate use of either TPC or displacement values
- f) Defines forward perpendicular (FP), aft perpendicular (AP), length between perpendiculars (LBP), amidships, length overall (LOA), waterline length (LWL), draught and freeboard
- g) Defines waterplane area, coefficient of fineness of the waterplane area (C_w) and block coefficient (C_B)
- h) Calculates the weight to load or discharge to obtain given small changes in draught or freeboard
- i) Calculates the weight loaded or discharged given small changes in draught or freeboard
- j) Explains the reasons for loadlines and loadline zones
- k) Calculates weight to load or discharge in relation to loadline dimensions and appropriate marks using FWA, DWA and TPC

2. Transverse stability

- a) Defines centre of gravity (G), centre of buoyancy (B), initial transverse metacentre (M), height of the initial transverse metacentre (KM), initial transverse metacentric height (GM) and righting lever (GZ)
- b) Calculates moment of statical stability (MSS) using displacement and GZ
- c) Explains stable, neutral, unstable and listed conditions
- d) Explains the relationship between equilibrium and the angle of loll
- e) Identifies from a given curve of statical stability; condition of stability, range of stability, initial GM, maximum GZ, angle of maximum GZ, angle of vanishing stability, angle of deck edge immersion, angle of loll or angle of list
- f) Explains stiff and tender conditions of loading making reference to the vessel roll period and hazards associated with each condition
- g) Sketches typical curves of statical stability for stiff/tender vessels

- h) Sketches typical curves of statical stability indicating the items in 2e)
- i) Calculates the shift of G vertically and horizontally after loading/discharging/shifting weight, including the use of ship's gear
- j) Explains the shift of G vertically and horizontally after loading/discharging/shifting weight, including the use of ship's gear
- k) Calculates the final effective KG or GM after loading/discharging/shifting weight, including the use of ship's gear
- l) Explains the change in effective KG or GM after loading/discharging/shifting weight, including the use of ship's gear
- m) Calculates the angle of list resulting from 3i) and 3k)
- n) Calculates weights to load/discharge/shift to sail upright
- o) Explains the difference between the angle of list and the angle of loll, and the methods of correction
- p) Explains that free surface effect can be expressed as a virtual rise of G or as a free surface moment
- q) Explains the consequences and dangers of a free surface
- r) Describes the effects of density and/or longitudinal subdivision on free surface effects

3. Longitudinal stability

- a) Defines arithmetic mean draught (AMD), true mean draught (TMD), longitudinal centre of flotation (LCF), longitudinal centre of gravity (LCG), longitudinal centre of buoyancy (LCB), trim, trimming moment, and moment to change trim a centimetre (MCTC)
- b) Calculates TMD
- c) Calculates final draughts after loading/discharging/shifting weight, for a vessel initially on an even keel
- d) Calculates final draughts after loading/discharging/shifting weight, for a vessel initially trimmed
- e) Calculates weight to transfer for a vessel to sail with a required trim and/or under keel clearance.

4. Maintaining a Deck Watch in port, at anchor and at sea

- a) Explains the duties of the officer of the watch on deck with respect to security, safety, moorings, cargo operations, ballast water operations and hull stress monitoring
- b) Explains the procedures for entry to enclosed spaces and permit to work systems
- c) Describes the emergency procedures and contingency plans in the event of marine casualties (fire, accident and pollution)

- d) Describes the preparation of a vessel for sea and adverse weather with respect to watertight and weathertight integrity
- e) Describes how safe means of access to a vessel is achieved (including for pilots)
- f) Describes the methods available to ensure safe movement onboard ship

5. Pollution prevention

- a) Describes the precautions and procedures required to ensure vessel operations (including bunkering and garbage disposal) do not pollute the environment
- b) Explains the procedures for handling dangerous, hazardous and harmful substances onboard ship

6. Legislation

- a) Outlines the operational requirements of the annexes to MARPOL and liability for non-conformance
- b) Outlines the principles and purpose of the ISM Code
- c) Describes the legal status and purpose of COSWP, MGNs, MINs, MSNs and Merchant Navy Code of Conduct
- d) Identifies the requirements of the MLC (hours of work and rest, working and living conditions, and onboard complaint procedures)

Notes

1. Formula sheets will be provided to candidates for the examination
2. Use hydrostatic data for fresh and saltwater densities only, with the exception of TPC which may be corrected for other densities