

BMA Syllabus for Certificate of Competency
Officer of the Watch and Master Near Coastal Waters STCW II/3

085-22 GENERAL SHIP KNOWLEDGE

- (a) General ideas on ship construction and on plans available on-board ship. General pumping arrangements. General definition of main dimensions. The names of the principal parts of a ship.
- (b) General understanding of: Displacement; Deadweight; Buoyancy; Reserve buoyancy; understanding of fundamental actions to be taken in the event of partial loss of intact buoyancy. Use of displacement and tons per centimeter immersion scales to determine weight of cargo or ballast from draughts or freeboard. Load line marks. Effect of density of water on draught and freeboard. Fresh water allowance.
- (c) (i) General understanding of:
- Centre of gravity
 - Centre of buoyancy
 - Metacentric height
 - Righting lever
 - Righting moment
- (ii) The use of stability and hydrostatic data supplied to ships, including stability data in simplified form. The effect of adding and removing weights. The danger of slack tanks.
- (iii) Rigging a ship for loading and discharging cargo, the use of derricks, winches and cranes. "Lining up" pipelines on oil products carriers. The stowage and securing of cargoes including bulk cargoes. A knowledge of the safety precautions to be taken during the loading and discharging of bulk oil, chemicals and other dangerous commodities. Ventilation systems of holds and tanks.

EXAMINATION STRUCTURE

6 QUESTIONS

Total marks: 150

Candidates must attempt ALL questions

To achieve a PASS candidates must obtain at least 75 marks, i.e. 50%

Time allocated: 2 hours

Objective Format Interpretation

- (b) 1. Understand basic principles of hydrostatics and related terms.
 - 1.1. Define weight, density, relative density, buoyancy, displacement, displacement volume.
 - 1.2. Express items of 1.1 in correct units.
 - 1.3. State Archimedes Principle.
 - 1.4. State the Law of Flotation.
 - 1.5. Determine displacement form given volume and density.
 - 1.6. Define draught, light displacement, load displacement and deadweight.
 - 1.7. Solve problems involving light displacement, load displacement and deadweight.
 - 1.8. Define reserve buoyancy.
 - 1.9. Explain the importance of reserve buoyancy and the necessity to maintain its integrity.
 - 1.10. Define waterline length, beam, AP, FP, LBP, draught and freeboard.
 - 1.11. State the relationship between draught and freeboard.

- (b) 2. Understand and applies tons per centimeter immersion.
 - 2.1 Define TPC.
 - 2.2 Explain variation of TPC with draught and density.
 - 2.3 Calculate weight of cargo to load/discharge to obtain given small change in draught or freeboard.
 - 2.4 Obtain TPC and displacement values from Mexna 2 for a given mean draught.
 - 2.5 Solve problems involving change of mean draught for large changes in displacement using Mexna 2.

- (b) 3. Understand the effect of density on draught.
 - 3.1 Explain the change of draught and freeboard with change of density.
 - 3.2 Solve problems involving change of draught with change of density.
 - 3.3 Define FWA and calculates values from density and FWA.
 - 3.4 Solve problems involving FWA for ship shapes with reference to draught and freeboard.
 - 3.5 Define DWA and calculates values from density and FWA.
 - 3.6 Solve problems involving DWA for ship shapes with reference to draught and freeboard.

- (b) 4. Understand the reason for load lines and solves calculations based on them.
 - 4.1 Explain reasons for allocation of load lines.
 - 4.2 Draw load line marks indicating dimensions.
 - 4.3 Solve problems involving loading cargo to a given mark including use of FWA and DWA.

- (c) 5. Understand the concept of initial stability.
 - 5.1 Define C of G, C of B.
 - 5.2 Show the position of C of G and movement of C of B for a vessel at a small angle of heel.
 - 5.3 Show forces through C of G and C of B at small angle of heel.
 - 5.4 Define transverse metacenter, initial metacentric height (GM) and righting lever (GZ).
 - 5.5 Define righting moment.
 - 5.6 Show that vessel will have a restoring moment if G is below M and capsizing moment of G is above M.
 - 5.7 Distinguish between stable, neutral and unstable equilibrium.

- (c) 6. Solve problems involving loading, discharging and shifting weights.
 - 6.1 Show by diagram the movement of a ship's C of G when a weight is loaded, discharged or moved.
 - 6.2 Calculate by moments the new position of a ship's C of G when a weight is either loaded or discharged.
 - 6.3 Solve problems involving several weights either loaded or discharged given Kg's and calculates GM from given KM.
 - 6.4 Use formula $GG1 = \frac{w * d}{W}$ for shifted weights.
 - 6.5 Appreciate that for a suspended weight the effective center of gravity is at the point of suspension.

- (c) 7. Know the principles of Free Surface Effect.
 - 7.1 Describe the apparent movement of C of G due to slack tanks.
 - 7.2 Show by diagram the consequent reduction in righting moment due to FSE.
 - 7.3 Describe the effect on FSE of longitudinal sub-division of tanks.
 - 7.4 Recognize the dangers of slack tanks with tender vessels.

- (c) 8. Know the use of certain Stability Information to be carried on ships.
 - 8.1 Use curve or tables to extract displacement, draught, TPC and KM.
 - 8.2 Use simplified stability information in conjunction with simple loading/discharging problems including allowance for free surface effect.

- (a) 9. Understand ship construction terminology and knows the principal parts of a Ship.
 - 9.1 Define the terms: length overall, beam, depth, camber, rise of floor, rake, sheer.
 - 9.2 Identify principal parts of a ship – bow, collision bulkhead, forepeak, chain locker, forecastle, cargo holds and tanks, wing tanks, deep tanks, cofferdams, bilges and wells, hatches, masts, mast houses, Sampson posts, Centre castle, accommodation and bridge decks, machinery spaces including boiler room, engine room, control room, pump room, steering flat, emergency room and shaft tunnel. Stern, after peak, tunnel escape, rudder, propeller.
 - 9.3 Identify structural components on ships plans and can produce proportioned sketches of: frames, floors, tank tops, double bottoms, beams, stringers, longitudinal girders, knees, brackets, pillars, coamings and bulwarks. Show familiarity with shell plating terminology.
 - 9.4 Explain the use of:
 - 9.4.1 general arrangements and safety equipment plans;
 - 9.4.2 capacity plans for cargo, fuel, water and ballast;
 - 9.4.3 piping arrangement plans.

- (c) 10. Understand the use of cargo handling equipment.
 - 10.1 Explain the use of derricks.
 - 10.2 Name the parts of derricks and associated gear. (NB – specialized derricks will not be required)
 - 10.3 Explain the meaning and use of SWL.
 - 10.4 Describe a Union Purchase rig.
 - 10.5 Describe the use of shipboard cranes including an understanding of safety factors.

- (c) 11. Understand the function and layout of pumping arrangements.
 - 11.1 Describe the use of bilge, ballast, general purpose and cargo pump.
 - 11.2 Draw a typical bilge/ballast line system for a dry cargo ship.
 - 11.3 Describe a comparable system for a liquid cargo ship.

- (c) 12. Demonstrate a knowledge of deck machinery.
 - 12.1 Explain the operational features of winches, windlass and capstans.

- (c) 13. Recognize general safety practice in cargo work.
 - 13.1 Outline the “Code of Safe Practice for Merchant Seaman” with respect to the working of cargo.

- (c) 14. Demonstrate a knowledge of stowage methods.
 - 14.1 Identify the reasons for using dunnage, types of separation methods and reasons for not stowing non-compatible cargoes adjacent to each other.
 - 14.2 Identify general methods of slinging and stowing different commodities such as crates, drums, bags, cartons, pallets, bales.
 - 14.3 Explain the need for securing part cargoes and describes methods of securing, e.g. wire rope and chain lashings, uses of bins, shores, tomms.
 - 14.4 Describe methods of securing deck cargoes with particular reference to vehicles, containers, timber.
 - 14.5 Outline the contents of the current “M” notices relating to cargoes.

- (c) 15. Recognize that there are special considerations concerned with Dangerous Cargoes.
 - 15.1 Identify the special symbols used to classify dangerous goods.
 - 15.2 Describe briefly the sort of information contained in:
 - 15.2.1 Report of the Standing Advisory Committee 1978 (Blue Book);
 - 15.2.2 IMO International Maritime Dangerous Goods Code.

- (c) 16. Recognize the special nature of Bulk Cargoes.
 - 16.1 Outlines the general requirements of the current edition of the IMO “Code of Safe Practice for the Carriage of Solid Bulk Cargoes”.
 - 16.2 Describe the preparation of cargo holds prior to the carriage of bulk cargoes.
 - 16.3 Describe the main hazards associated with the carriage of bulk cargoes.
 - 16.4 Describe the precautions to be taken prior to, during and after loading bulk cargoes.

- (c) 17. Demonstrate ability to deal with Tanker Operations.
 - 17.1 Describe a cargo pipeline system for a products carrier.
 - 17.2 Describe how to operate an oxygen analyzer.
 - 17.3 Describe tank washing.
 - 17.4 Describe the procedure for loading/discharging an oil tanker.
 - 17.5 Explain the use of an explosimeter.
 - 17.6 Describe the precautions to be taken before entering ANY enclosed space.

- (c) 18. Recognize special nature of liquid chemical cargoes.
 - 18.1 Outline general precautions to be taken with chemical cargoes.
 - 18.2 Outline the main hazards, i.e. health, reactivity, corrosivity, pollution, flammability.
 - 18.3 State that the Tanker Safety Guide (Chemicals) Vols 1-4 contains general and detailed precautions.

- (c) 19. Understand the reasons for ventilation.
 - 19.1 Describe the reasons for ventilating cargo spaces and cargoes.
 - 19.2 Describe a system of natural ventilation.
 - 19.3 Describes a system of forced ventilation.

- (c) 20. Demonstrate a knowledge of safety information carried on board ship.
 - 20.1 Describe the precautions to be taken on entry to tanks and other enclosed spaces.