

SECOND ENGINEER REG III/2 ENGINEERING KNOWLEDGE

Candidates for a Steam Certificate will not be examined in items 10 (a), (b), (c), (d) and (h) and candidates for a Motor Certificate will not be examined in items 9 (a), (b), (c), (f) and (g).

Notes:

- (i) The engineering knowledge to be shown by candidates is that which is required for operation and maintenance of the machinery, equipment and ship structure usually in charge of the engineering officer. A candidate will also be required to understand the legal and management responsibilities of a certificated officer.
- (ii) Candidates should be well acquainted with machinery and boiler casualties which may occur at sea and be able to state how these can be prevented or remedied.
- (iii) The oral examination syllabus is given in MGN 69
- (iv) Naturally there is a similarity between the Chief Engineer and Second Engineer Reg II/2 Engineering Knowledge syllabi, but as a general guide it is expected that the Chief Engineer candidate should be able to show a deeper knowledge of all aspects and a sounder understanding of the principles involved.

The candidate to have knowledge of the following:

1. Manufacturing methods for various machinery components and the physical properties of the materials commonly used.
2. Working principles and constructional details of:
 - (a) Boiler water gauges.
 - (b) Sensing and monitoring devices associated with marine equipment.
3. Bilge and ballast pumps, pumping and priming systems, including pollution prevention equipment and systems.
4.
 - (a) Propulsion transmission systems, including thrust and shaft bearings, stern tubes and propellers.
 - (b) Hull inspection and dry-docking.
5. Steering and stabilising systems, including bow thrusters.
6. Refrigeration machinery and air conditioning systems.

7. Fresh water production and conditioning systems.
8. Deck machinery and cargo handling systems.
9.
 - (a) Steam boilers, mountings and feed water systems. Assessment of plant efficiency.
 - (b) Steam turbines, gearing and lubrication systems, steam distribution systems, and associated equipment
 - (c) Astern running.
 - (d) Auxiliary steam boilers and associated equipment.
 - (e) Boiler water testing and conditioning.
 - (f) Control and alarm system associated with automatic operation of steam plant.
 - (g) Safe and efficient operation and maintenance of marine steam plant.
10.
 - (a) Marine diesel engines, (trunk and crosshead types) gearing systems and clutches.
 - (b) Starting and reversing systems.
 - (c) Cooling and lubricating systems.
 - (d) Fuel oil preparation systems.
 - (e) Air compressors, receivers and association equipment.
 - (f) Auxiliary diesel engines and association equipment.
 - (g) Control and alarm system associated with automatic operation of a diesel plant.
 - (h) Assessment of engine power, the running adjustments to maintain performance.
 - (i) Safe and efficient operation and maintenance of marine diesel engines.
11.
 - (a) Knowledge of Codes of Safe Working Practices as published and amended.
 - (b) Knowledge of the types of information issued by the MCA with regard to Safety at Sea.
12.
 - (a) Knowledge of Codes of Safe Working Practices associated with the carriage of dangerous substances.
 - (b) Constructional details and maintenance of plant and equipment specifically used with dangerous substances.
13.
 - (a) Precaution against fire or explosions, explosive mixtures, sources of ignition.
 - (b) Principles of fire prevention, detection and extinction in all parts of a ship.
 - (c) Testing and maintenance of fire detection and extinguishing systems.
 - (d) Testing of firemans outfits including BA sets.
 - (e) Operation, maintenance and testing of fire pumps and associated pumping systems.

- (f) Control and organisation of fire and damage control parties.
- 14.
- (a) Operation, testing and fault rectification of automatic control systems and alarm panels.
 - (b) Safe and efficient operation in the UMS mode.
15. Procedures to be adopted for operating main machinery under emergency conditions.
- 16.
- (a) Constructional details of alternators, generators, motors, switchgear and batteries.
 - (b) Electrical Distribution Systems, AC and DC.
 - (c) Operational practice and fault finding associated with electrical systems.
17. Constructional details of ships.