

CHIEF ENGINEER REG III/2 ENGINEERING KNOWLEDGE

Candidates for a Steam Certificate will not be examined in items 13(a), (b), (c) and (d) and candidates for a motor Certificate will not be examined in items 10 (a) and (b)

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 chief engineering officer. A candidate will also be required to understand the legal and management responsibilities of that rank.
- (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. Properties and characteristics of metals, materials, liquids, gases and vapours used in marine engineering.
2. Processes to which component parts of machinery and equipment are subjected which are relevant to their manufacture and safe use.
3. Principles and constructional details of sensing, monitoring and measuring devices associated with marine equipment.
4. Principles involved with the operation, testing and maintenance of propulsion transmission systems, including thrust and shaft bearings, stern tubes and propellers.
5. Principles involved with the operation, testing and maintenance of bilge and ballast pumps, pumping and priming systems including pollution prevention equipment and systems.
6. Principles involved with the operation, testing and maintenance of steering and stabilising systems, including bow thrusters.
7. Principles involved with the operation, testing and maintenance of refrigeration and air conditioning systems.
8. Principles involved with the operation, testing and maintenance of fresh water production and conditioning systems.

9. Principles involved with the operation, testing and maintenance of deck machinery and cargo handling systems.
10. Principles involved with the operation, testing and maintenance of:-
 - (a) Steam boilers, mountings and feed water systems.
 - (b) Steam turbines, gearing and lubrication systems, steam distribution systems and associated equipment.
 - (c) Auxiliary steam boilers and associated equipment.
 - (d) Control and alarm systems associated with automatic operation of marine steam plant.
11. Methods of assessment of power, output and efficiency of steam plant and action to be taken to maintain safe and efficient operation of steam plant.
12. Methods of boiler water testing and conditioning and action to be taken to maintain safe conditions.
13. Principles involved with the operation, testing and maintenance of:-
 - (a) Marine diesel engines (trunk and crosshead types), gearing systems and clutches.
 - (b) Starting and reversing systems.
 - (c) Cooling and lubrication systems.
 - (d) Fuel oil preparation systems.
 - (e) Air compressors, receivers and associated equipment.
 - (f) Auxiliary diesel engines and associated equipment.
 - (g) Control and alarm systems associated with automatic operation of a diesel plant.
14. Methods of assessment of power output and diesel plant efficiency, and action to be taken to maintain safe and efficient operation of plant.
15. Methods of testing fuel oil, lubricating oil and cooling water and action to be taken to maintain safe conditions-
16. Codes of Safe Working Practices as published and amended.
17. Types of information issued by the Department of Transport with respect to Safety at Sea.
18. Codes of Safe Working Practices associated with the carriage of dangerous substances.
19. Principles involved with the operation, testing and maintenance of plant and equipment specifically for use with dangerous substances.
20. Legal powers and responsibilities of a Chief Engineer.
21.
 - (a) Precautions against fires or explosions, explosive mixtures and sources of ignition.

- (b) Principles and methods of fire prevention, detection and extinction in all areas of a ship.
 - (c) Principles of the operation, testing and maintenance of fire detection and extinguishing systems.
 - (d) Principles of the operation, testing and maintenance of fire pumps and associated pumping systems.
 - (e) Control and organisation of fire and damage control parties.
22. Principles of the operation, testing and maintenance of automatic control systems and alarm panels.
23. Organisation and control procedures necessary for the safe and efficient operation in the UMS mode.
24. Principles of the operation, testing and maintenance of
- (a) Alternators, generators, motors, switch gear and batteries.
 - (b) AC and DC distribution systems.
25. Fault finding and rectification of faults in electrical systems.
26. Administration duties of a Chief Engineer associated with
- (a) Organisation and training of staff for normal and emergency duties.
 - (b) Organisation of temporary and permanent repairs and surveys.
 - (c) Ensuring ship is in seaworthy condition prior to sailing taking into account nature of voyage.
27. Constructional details of ships.
28. Dry docking, hull surveys and repairs.