CERTIFICATES OF COMPETENCY FOR ENGINEERS (YACHT)

EXAMINATIONS ADMINISTERED BY THE
SCOTTISH QUALIFICATIONS AUTHORITY
ON BEHALF OF
MARITIME AND COASTGUARD AGENCY

SMALL VESSEL CHIEF ENGINEER UNLIMITED
SMALL VESSEL CHIEF ENGINEER LIMITED

059-02 - AUXILIARY EQUIPMENT PART II

FRIDAY, 09 July 2021

1400-1600 hrs

Examination paper inserts:

Notes for the guidance of candidates:

1. Candidates should note that 100 marks are allocated to this paper. To pass candidates must achieve 50 marks.
2. Non-programmable calculators may be used
3. All formulae used must be stated and the method of working and ALL intermediate steps must be made clear in the answer.

Materials to be supplied by examination centres:

Candidate's examination workbook

AUXILIARY EQUIPMENT PART II

Attempt ALL questions
Marks for each part question are shown in brackets

1. With reference to hydraulic control systems:

   (a) explain the functions of the reservoir; (5)

   (b) describe, with the aid of a sketch, meter out speed control for a cylinder in a constant pressure system. (5)

2. With reference to a 3-phase motor supplied with a six terminal connection without links, describe, with the aid of sketches, how the phase ends can be identified and the motor connected to run in permanent delta mode. (10)

3. With reference to paralleling and load sharing of generators, explain EACH of the following:

   (a) the possible causes of no voltage indication on start up of a stand-by generator; (2)

   (b) the purpose of the check synchroniser; (2)

   (c) the reason for the incoming machine to be running slightly faster than the busbar frequency at the instant of closing the incoming breaker; (2)

   (d) how equal kW load sharing is maintained; (2)

   (e) why the power factors may be different even though the kW loads are equal. (2)

4. (a) State FOUR properties of refrigeration oil. (4)

   (b) Describe the operation of an Oil Separator in a refrigeration system. (4)

   (c) State reasons for the employment of an oil separator in refrigeration vapour compression units. (2)

5. State THREE different methods used to detect a refrigerant gas leak, explaining EACH method. (10)

6. (a) Sketch a Chemical Filter tower supplying air suitable for breathing and diving, labelling ALL elements. (6)

   (b) Explain the purpose of TWO of the filter elements sketched in part(a). (4)

7. With reference to hydraulic systems and machinery:

   (a) state the meaning of the letters SWL, explaining why it should not be exceeded; (3)

   (b) state the safety device fitted to ensure that the SWL cannot be exceeded; (1)

   (c) outline how the operation of the device stated in part(b)(i) does not cause a hazard; (2)

   (d) state the anti tamper arrangement fitted to the device described in part(b); (1)

   (e) explain the circumstances under which the device described in part(b) may be gagged. (3)

8. Explain the requirements for the stowage and operation of LPG cylinders. (10)

9. Explain, with the aid of sketches, the dynamic stresses encountered by a vessel meeting waves of the same length as the vessel. (10)

10. With reference to stresses and strain in vessels, describe, with the aid of a sketch, EACH of the following:

   (a) panting; (2)

   (b) pounding; (2)

   (c) racking; (2)

   (d) hogging; (2)

   (e) sagging; (2)