

# **CERTIFICATES OF COMPETENCY FOR ENGINEERS (YACHT)**

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

**SMALL VESSEL SECOND ENGINEER**

**060-03 - AUXILIARY EQUIPMENT PART I**

**FRIDAY, 03 September 2021**

**1400-1600 hrs**

Examination paper inserts:

Worksheet Q3  
Worksheet Q5

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 I

Attempt ALL questions

Marks for each part question are shown in brackets

1. With reference to tank quick closing valves:
  - (a) describe, with the aid of sketches, TWO methods for remote operation; (6)
  - (b) state where they would be fitted; (2)
  - (c) explain why they are fitted. (2)
  
2.
  - (a) Sketch a vane type pump, labelling ALL components. (6)
  - (b) Explain the operation of the pump sketched in part (a). (4)
  
3.
  - (a) State THREE requirements for compressed air to be utilised for control instrumentation. (3)
  - (b) Using the Worksheet Q3, identify ALL the components shown for a system suitable for the production of compressed air for control instrumentation. (7)
  
4. With reference to hydraulic systems:
  - (a) state FOUR applications for a hydraulic system on board a vessel; (4)
  - (b) state the effects and possible causes of EACH of the following:
    - (i) air in the system; (2)
    - (ii) dirt and foreign particles in the system; (2)
    - (iii) separated water in the system. (2)
  
5. Using the Worksheet Q5, sketch the hydraulic system for the two ram steering gear shown. The system should be capable of ensuring that steerage may be maintained should hydraulic pipe failure occur at any point. (10)
  
6. With reference to controllable pitch propellers:
  - (a) describe a mechanism that changes the pitch of the blades; (7)
  - (b) explain how the pitch of the blades is indicated. (3)

7. With reference to comparing modern water lubricated stern tube bearings with those that are oil lubricated:
- (a) state THREE advantages; (3)
  - (b) state THREE disadvantages, explaining how EACH may be overcome. (7)
8. With reference to main propulsion shaft hydraulic sleeve type couplings:
- (a) describe, with the aid of a sketch, the removal procedure; (7)
  - (b) state how it is determined, during reassembly, that the push fit is complete. (3)
9. With reference to electrical maintenance:
- (a) explain the procedure for proving a motor circuit is dead using a multimeter; (5)
  - (b) explain the procedure for testing the insulation resistance and earth bonding of the motor, giving examples of acceptable readings. (5)
10. (a) Sketch a block diagram of the layout of a vessel electrical distribution system, including the main and emergency generators and detailing the main consumers supplied by the emergency board. (7)
- (b) Describe the MCA recommended procedure for testing the Emergency Alternator. (3)