

# **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, 06 November 2020**

**1400-1600 hrs**

Examination paper inserts:

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Notes for the guidance of candidates:

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| <ol style="list-style-type: none"><li>1. Candidates should note that 100 marks are allocated to this paper. To pass candidates must achieve 50 marks.</li><li>2. Non-programmable calculators may be used</li><li>3. All formulae used must be stated and the method of working and ALL intermediate steps must be made clear in the answer.</li></ol> |
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Materials to be supplied by examination centres:

Candidate's examination workbook
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## AUXILIARY EQUIPMENT PART I

Attempt ALL questions

Marks for each part question are shown in brackets

1. With reference to ship's side valves:
  - (a) state why grey cast iron is not a suitable material; (3)
  - (b) state, with reasons, TWO suitable materials; (2)
  - (c) state the regular maintenance that the valves should receive, outlining reasons for this maintenance. (5)
  
2. (a) Describe, with the aid of sketches, the operating principles of a centrifugal pump. (7)
  - (b) State why centrifugal pumps are not self-priming. (3)
  
3. (a) Explain the circumstances under which EACH of the following devices fitted to an air compressor may operate;
  - (i) fusible plug; (4)
  - (ii) bursting disc. (4)
  - (b) State where EACH device in part (a) may be fitted. (2)
  
4. With reference to hydraulic systems:
  - (a) state THREE possible contaminations; (3)
  - (b) state possible causes of the contaminations stated in part (a). (3)
  - (c) explain how the contaminants stated in part (a) are prevented from affecting the system. (4)
  
5. Describe, with the aid of a block diagram, the operation of an automatic steering system, including auto-pilot and valve operated steering gear. (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 intermediate shaft bearings of the roller type, describe, with the aid of a sketch, EACH of the following:
- (a) how some angular misalignment of the shaft is accommodated; (5)
  - (b) how longitudinal movement of the shaft is accommodated. (5)
8. Sketch an arrangement for the aft seal of an oil lubricated stern tube bearing. (10)
9. (a) State FIVE devices fitted to a main distribution switchboard in order to protect a.c. generators that can be operated in single or parallel mode. (5)
- (b) Explain why EACH device stated is needed. (5)
10. (a) Explain the term *single phasing*. (2)
- (b) State the effects on a motor of single phasing. (6)
- (c) State how single phasing may be protected against in the motor starter circuit. (2)