

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, 26 March 2021

1400-1600 hrs

Examination paper inserts:

--

Notes for the guidance of candidates:

- | |
|--|
| <ol style="list-style-type: none">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 used3. 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. State, with reasons, a suitable application for EACH of the following types of valve:
 - (a) butterfly; (2)
 - (b) diaphragm; (2)
 - (c) screw-down, non-return; (2)
 - (d) 3-way; (2)
 - (e) quick closing, screw lift. (2)

2. With reference to centrifugal pumps used for bilge/ballast purposes:
 - (a) explain the specific problems which may arise using the pumps for these purposes; (4)
 - (b) explain TWO methods used to improve pump performance when used for these purposes. (6)

3. With reference to compressed air systems, explain the purpose of EACH of the following:
 - (a) fusible plug on compressor discharge; (4)
 - (b) fusible plug on air receiver; (3)
 - (c) bursting disc on water cooled air compressor. (3)

4. Describe TWO methods of drying compressed air for use in a pneumatic control system. (10)

5. With reference to two ram steering gears which incorporate spherical bearings:
 - (a) sketch an arrangement of rams and tiller, including fittings; (6)
 - (b) explain why spherical bearings are required on the ram ends. (4)

6. With reference to propellers, explain EACH of the following terms:
- (a) skew; (2)
 - (b) rake; (2)
 - (c) pitch; (2)
 - (d) slip. (4)
7. (a) Sketch a flexible coupling that could be used for a main propulsion drive. (7)
- (b) State THREE reasons for using a flexible coupling in propulsion drives. (3)
8. (a) Explain how propeller thrust is transmitted to a vessel's hull. (3)
- (b) Describe the mounting arrangements of a thrust block to the hull. (4)
- (c) Explain why the clearance between the thrust block pads and collar is critical. (3)
9. State FIVE safety features of a battery locker, explaining why EACH feature is required. (10)
10. (a) Describe the construction of a *salient pole* a.c. generator rotor. (6)
- (b) Explain how many poles would be required for a 50Hz supply, rotational speed of 750rpm. (4)