

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, 02 April 2021

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">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. |
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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. The operating hydraulic circuit for a luffing cylinder for a deck crane is shown in the figure. Explain the purpose and describe the operation of EACH item A, B and C. (10)

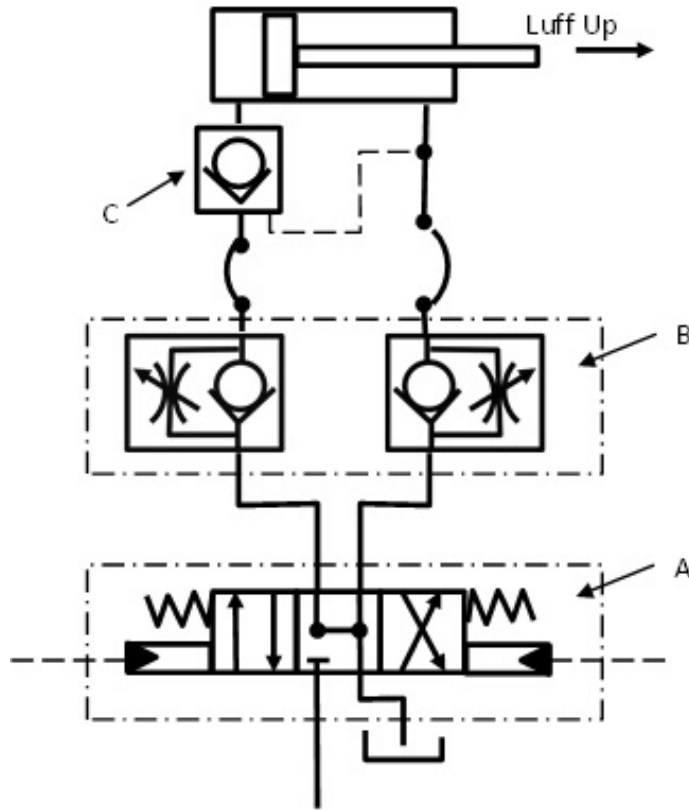


Fig Q1

2. With reference to storage batteries, explain EACH of the following:
- (a) the term UPS; (3)
 - (b) the operation of an inverter, stating why it may be required; (4)
 - (c) the term 150 Ah. (3)
3. (a) Sketch the relationship between *true power (kW)*, *apparent power (kVA)*, *reactive power (kVAr)* and *power factor (cosφ)* in a.c. electrical generation. (4)
- (b) Explain how true power (kW) and reactive power (kVAr) is shared between two generators connected in parallel. (4)
- (c) State how kW and kVAr load sharing stability is achieved. (2)
4. Describe, with the aid of a sketch, the operation of the FOUR main components in a simple vapour compression cycle for a refrigeration system. (10)

5. (a) State THREE types of damper that may be used to control the airflow in an air conditioning system. (3)
- (b) Describe, with the aid of a sketch, an automatic fire damper installed in a vertical air duct or in those that pass through bulkheads designated as fire boundaries. (7)
6. Explain the maintenance and inspection that should be carried out on SCUBA cylinders. (10)
7. (a) A crane is being fitted to deploy and recover a load from a vessel. With reference to the present regulations, state the standards that the crane must comply with before being used on board. (7)
- (b) State the information entered on a Proof Load Test certificate. (3)
8. State the requirements for the stowage of hand portable petrol containers, in small lockers on open deck. (10)
9. With reference to a vessel's hull:
- (a) state the meaning of the term *racking*; (2)
- (b) explain how racking occurs; (4)
- (c) state the structures that resist racking. (4)
10. With reference to a vessel's hull:
- (a) explain the meaning of EACH of the following:
- (i) dynamic stress; (3)
- (ii) static stress; (3)
- (b) state TWO examples of EACH type of stress explained in part (a). (4)