

CERTIFICATES OF COMPETENCY FOR ENGINEERS (YACHT)

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

SMALL VESSEL SECOND ENGINEER

060-02 - OPERATIONAL PROCEDURES, BASIC HOTEL SERVICES AND SHIP CONSTRUCTION

FRIDAY, 26 October 2018

1400-1600 hrs

Examination paper inserts:

Notes for the guidance of candidates:

1. Non-programmable calculators may be used.
2. 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

OPERATIONAL PROCEDURES, BASIC HOTEL SERVICES AND SHIP CONSTRUCTION

Attempt ALL questions

Marks for each part question are shown in brackets

1. With reference to noise levels in ships:
 - (a) describe the recommended maximum periods of time for personnel employed on watchkeeping duties within enclosed machinery spaces; (6)
 - (b) explain why these recommendations have been made; (2)
 - (c) state the permitted noise level at which hearing protection is:
 - (i) recommended; (1)
 - (ii) mandatory. (1)

2. Describe the responsibilities of the off-going duty engineer with respect to EACH of the following:
 - (a) fuel service tanks; (2)
 - (b) oily water separator; (2)
 - (c) potable water tanks; (2)
 - (d) machinery space defect book; (2)
 - (e) main engine sump level. (2)

3.
 - (a) Explain what is meant by the term *Machinery Abstract*. (4)
 - (b) List SIX items which would be recorded in a typical Machinery Abstract. (6)

4. With reference to Oily Water Separators and the pumping of bilges, explain the purpose of EACH of the following:
 - (a) a bilge holding tank; (2)
 - (b) an oil drain tank; (2)
 - (c) an oil content discharge monitor; (2)
 - (d) a vacuum breaker; (2)
 - (e) an oil detection probe. (2)

5. Describe the operation of a Biological Sewage Treatment Plant. (10)
6. With reference to Marine Air Conditioning Systems, explain EACH of the following expressions:
- (a) wet bulb temperature (2)
 - (b) dry bulb temperature; (2)
 - (c) comfort zone; (2)
 - (d) psychrometric chart; (2)
 - (e) relative humidity. (2)
7. (a) Describe, with the aid of a sketch, a reverse osmosis plant, from feed water inlet, to product tank, labelling ALL components and showing the position in the system of the monitoring instruments. (7)
- (b) Describe the feed water pre-treatment process before the water enters the spirally wound membrane modules. (3)
8. Explain, with the aid of a sketch, the hydrodynamic operation of an *Active Fin Stabilizer*. (10)
9. Describe, with the aid of a sketch, a multiple bottle CO₂ gas system suitable for the protection of machinery spaces. (10)
10. (a) With reference to ship construction, define a bulkhead. (2)
- (b) State the functions of bulkheads. (8)

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SMALL VESSEL SECOND ENGINEER

060-03 - AUXILIARY EQUIPMENT PART I

FRIDAY, 02 November 2018

1400-1600 hrs

Examination paper inserts:

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Notes for the guidance of candidates:

1. Non-programmable calculators may be used. 2. 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:

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AUXILIARY EQUIPMENT PART I

Attempt ALL questions

Marks for each part question are shown in brackets

1.
 - (a) State the purpose of fitting isolating valves in a ring fire main. (2)
 - (b) State the type of valve that should be fitted for isolating sections of a ring fire main. (2)
 - (c) Explain why the type of valve stated in part (b) is used. (3)
 - (d) State how it is ensured that the isolating valve will operate when required. (1)
 - (e) State the position of the machinery space isolating valve. (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. With reference to compressed air systems used for starting air and control purposes:
 - (a) state the pressure used for starting air; (1)
 - (b) explain why the pressure stated in part (a) is necessary; (3)
 - (c) state the pressure used for control air; (1)
 - (d) explain why the pressure stated in part (c) is different to that stated in part (a); (3)
 - (e) explain why the pressure stated in part (c) is greater than that necessary to operate the control equipment. (2)

4. With reference to pneumatic control systems, explain EACH of the following:
 - (a) why moisture is undesirable; (4)
 - (b) why oil is generally undesirable; (3)
 - (c) why oil may be intentionally introduced into parts of the system. (3)

5. Describe, with the aid of a sketch, the operation of a Hydraulic Telemotor system. (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 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)
8. 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)
9. (a) Compare the effects of earth leakage occurring in an earthed distribution system and in an insulated distribution system. (6)
- (b) State the reasons why an instrument type earth leakage detector will be fitted in preference to simple earth lamps. (4)
10. Describe the routine maintenance that should be carried out on the electrical side of an a.c. generator set. (10)

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SMALL VESSEL SECOND ENGINEER**

060-03 - AUXILIARY EQUIPMENT PART I

FRIDAY, 09 November 2018

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. Non-programmable calculators may be used.2. 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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AUXILIARY EQUIPMENT PART I

Attempt ALL questions

Marks for each part question are shown in brackets

1. With reference to remotely operated quick closing valves:
 - (a) state their purpose; (2)
 - (b) state where they would be fitted; (3)
 - (c) describe how they are tested. (5)

2. With reference to a centrifugal pump used for ballast/emergency bilge purposes, explain EACH of the following:
 - (a) the purpose of the volute; (3)
 - (b) the purpose of the wear rings and why the clearance is critical; (5)
 - (c) the need for a priming device. (2)

3. Describe the internal and external inspection of an air receiver, outlining the safety precautions necessary. (10)

4. With reference to a windlass that is hydraulically operated by a variable displacement motor, explain the effect of changing EACH of the following:
 - (a) the flow rate of hydraulic oil; (4)
 - (b) the displacement of the motor. (6)

5.
 - (a) State the rudder movement required by SOLAS II-I, Reg 29. (5)
 - (b) Explain how it is ensured that the maximum movement stated in part (a) is not exceeded in an electro-hydraulic, ram type steering gear. (2)
 - (c) Explain how the steering gear system is protected from damage should the maximum movement be exceeded. (3)