

CERTIFICATES OF COMPETENCY FOR ENGINEERS (YACHT)

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

SMALL VESSEL SECOND ENGINEER**

060-01 - MARINE DIESEL ENGINEERING

FRIDAY, 23 October 2020

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

MARINE DIESEL ENGINEERING

Attempt ALL questions

Marks for each part question are shown in brackets

1. With reference to four stroke engines, explain the effects of EACH of the following:
 - (a) advanced fuel injection; (3)
 - (b) retarded fuel injection; (4)
 - (c) low compression pressure. (3)

2.
 - (a) Explain why air coolers are fitted after main engine turbo chargers. (6)
 - (b) Explain the effects of undercooling the charge air on the engine. (4)

3. Describe a procedure for manually testing the set points on a diesel generator lubricating oil, low pressure alarm and shut down. (10)

4. With reference to scroll type fuel injection pumps:
 - (a) describe how the delivered quantity of fuel may be varied; (5)
 - (b) explain the purpose of the delivery valve; (3)
 - (c) describe how fuel oil is prevented from spraying out if the high pressure pipe fails in service. (2)

5.
 - (a) Explain what is meant by microbial degradation of a lubricating oil. (4)
 - (b) State FOUR indications that could be observed if a lubricating oil was suffering from microbial degradation. (4)
 - (c) Describe TWO actions that should be taken on detecting the early start of microbial degradation of the main engine lubricating oil. (2)

6.
 - (a) Describe, with the aid of a sketch, a keel type cooling water system, labelling the MAIN components. (6)
 - (b) Explain the purpose of EACH of the following in the cooling system:
 - (i) header tanks; (3)
 - (ii) vent lines. (1)

7. The air start pipework on a diesel engine attached to the cylinder head is becoming extremely hot.

Explain EACH of the following:

- (a) the probable cause; (3)
 - (b) the consequences of this situation and the immediate action to be taken; (4)
 - (c) how this problem can be minimised. (3)
8. (a) Describe the procedure for renewing a bottom end bearing of a diesel engine. (8)
- (b) Describe the precautions necessary on initial startup of the engine. (2)
9. Sketch a fluid coupling, suitable for connecting an engine to a gearbox, labelling the main components. (10)
10. With reference to main reduction gearing:
- (a) explain why lubricating oil should be supplied before the gearing rotates; (4)
 - (b) state the condition monitoring techniques that may be employed to assess the condition of the gearing. (6)