

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, 22 October 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

MARINE DIESEL ENGINEERING

Attempt ALL questions

Marks for each part question are shown in brackets

1. With reference to four stroke diesel engine exhaust valves:
 - (a) explain the effects of EACH of the following:
 - (i) too large a tappet clearance; (4)
 - (ii) too small a tappet clearance; (4)
 - (b) explain why double (nested) valve springs may be fitted. (2)

2. With reference to air coolers, explain the purpose of EACH of the following:
 - (a) zinc anodes; (3)
 - (b) vent cocks; (3)
 - (c) tube fins. (4)

3. Describe a procedure for manually testing the set points on diesel generator HT cooling water, high temperature alarm and shut down. (10)

4. With reference to Bosch or jerk type fuel injection pumps:
 - (a) describe how the delivered quantity of fuel oil may be controlled; (6)
 - (b) explain the purpose of the delivery valve. (4)

5. (a) Describe TWO methods of cylinder liner lubrication in medium speed diesel engines. (6)
(b) Describe the possible effects of EACH of the following:
 - (i) insufficient lubrication; (2)
 - (ii) excessive lubrication. (2)

6. (a) Describe, with the aid of a sketch, the construction of a plate type heat exchanger. (7)
(b) State THREE advantages of the plate types, compared with the tube type heat exchanger. (3)

7. (a) List FOUR safety interlocks that may be fitted to a direct air start medium speed diesel engine to prevent inadvertent starting during maintenance. (4)
- (b) Explain, with the aid of a diagram, the opening period of an air start valve on a four stroke diesel engine in relation to the crank angle, inlet and exhaust valves. (6)
8. (a) Describe the inspection of a cylinder liner and piston assembly, when the piston has been removed from the engine. (6)
- (b) State possible faults which may be found. (4)
9. With reference to an engine connected to a gearbox via a friction clutch, explain EACH of the following:
- (a) why vibration from the engine should be damped; (7)
- (b) how vibration damping is achieved. (3)
10. With reference to reduction gears, state the advantages and disadvantages of EACH of the following:
- (a) helical teeth compared with spur teeth; (5)
- (b) double helix compared to single helix. (5)