

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, 26 October 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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Materials to be supplied by examination centres:

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MARINE DIESEL ENGINEERING

Attempt ALL questions

Marks for each part question are shown in brackets

1. (a) With reference to the combustion of fuel, explain EACH of the following terms:
 - (i) atomisation; (3)
 - (ii) penetration; (2)
 - (iii) compression ratio. (1)
- (b) State the factors which influence the terms explained in part (a). (4)

2. (a) Describe the function of a main engine turbocharger. (5)
- (b) Describe how the turbocharger is cooled. (2)
- (c) Describe how the turbocharger is lubricated. (3)

3. (a) Sketch a cross section through a four stroke diesel engine piston, labelling the MAIN components. (6)
- (b) Describe the transfer of gas force from piston crown through to the crankshaft. (4)

4. The daily engine log shows the engine crankcase pressure gauge is indicating a much higher value than the normal reading.
 - (a) State the implications of this and the immediate actions that should be taken. (2)
 - (b) Outline the checks and investigations that should be undertaken to ascertain the cause of this increased crankcase pressure. (8)

5. Describe, with the aid of a sketch, a typical distillate fuel supply system for a diesel engine, including ALL the safety devices. (10)

6. With reference to diesel engine water coolers:
 - (a) describe how performance is measured; (5)
 - (b) describe the possible causes of the performance falling off. (5)

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. Describe, with the aid of a sketch, the operation of a diesel engine propulsion system air operated radial tyre type clutch. (10)

10. With reference to a gearbox:

(a) explain why large quantities of lubricating oil are used; (2)

(b) state FOUR possible causes of excessive lubricating oil temperature when at normal operating speeds; (4)

(c) state how EACH cause stated in part (b) may be remedied. (4)