

CERTIFICATE OF COMPETENCY EXAMINATION

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

SMALL VESSEL EOOW

060-01 - MARINE DIESEL ENGINEERING

FRIDAY, 20 October 2023

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. (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. With reference to main engine turbo chargers, explain the purpose of EACH of the following:
 - (a) the volute casing; (3)
 - (b) the diffuser; (4)
 - (c) the nozzle ring. (3)

3. (a) Explain the difference between *in line* and *vee* type engines. (2)
- (b) State the advantages of *vee* type engines. (2)
- (c) Sketch TWO *vee* engine bottom end arrangement types. (6)

4. With reference to diesel engine crankcases:
 - (a) explain why crankcases may have relief valves fitted; (3)
 - (b) outline the circumstances which may cause the relief valves to operate; (5)
 - (c) state a safety detection system which may be fitted. (2)

5. With reference to microbial infestation of distillate fuel:
 - (a) describe what is meant by the term *microbe*; (1)
 - (b) state what microbes need to survive; (2)
 - (c) describe the possible diesel engine problems; (5)
 - (d) describe how it can be identified. (2)

6. Sketch a distillate fuel oil centrifugal purifier, showing the direction of all fluid flows labelling the MAIN components. (10)
7. (a) Explain how the lubricating oil of a diesel engine may become contaminated with water. (6)
- (b) Outline the problems that water in an engine oil may cause. (4)
8. With reference to diesel engine high bearing temperatures:
- (a) describe the possible causes; (5)
- (b) explain the procedure to be adopted if detected. (5)
9. With reference to pneumatically operated friction clutches, explain the effects of EACH of the following:
- (a) oil contamination of friction pads; (3)
- (b) reduced air pressure; (2)
- (c) distorted friction pads; (2)
- (d) angular misalignment. (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)