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, 19 January 2024

1400-1600 hrs

Examination paper inserts:

Notes for the guidance of candidates:

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 used
3. 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. Describe the combustion process of EACH of the following:

   (a) petrol engine; (5)

   (b) diesel engine. (5)

2. With reference to engine timing belts or chains:

   (a) state the cause of loss of timing drive tension; (2)

   (b) state how this will affect the engine; (6)

   (c) explain how slight loss of tension can be corrected. (2)

3. (a) Describe the events leading to a crankcase explosion. (4)

   (b) State the methods of detecting the events of part (a) (2)

   (c) State how the severity of a crankcase explosion may be limited. (4)

4. With reference to fuel injector needle valves siezing in their bodies during engine operation:

   (a) explain the effects if the needle has jammed partially open; (3)

   (b) state the possible causes; (2)

   (c) state, with reasons, how to minimise this problem. (5)

5. With reference to the properties of fuel oils, explain EACH of the following terms, stating their significance to engine/shipboard operations:

   (a) specific energy; (2)

   (b) cetane number; (2)

   (c) residual carbon; (2)

   (d) sulphur content; (2)

   (e) relative density (specific gravity). (2)

6. (a) Describe, with the aid of a sketch, a central cooling water system. (8)

(b) State the advantage of the system described in part (a). (2)

7. Describe, with the aid of a sketch, the operation of a pre-engage diesel engine electric starting system, labelling the main components. (10)

8. With reference to turbochargers:

(a) explain the term *surging*; (5)

(b) describe the indications of *surging*; (2)

(c) describe the causes of *surging*. (3)

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 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)