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, 17 January 2020

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. 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. (a) Outline the actions which must be taken, by the on-watch engineer when the engine crankcase oil mist detector activates. (5)

   (b) Sketch a crankcase explosion relief door, labelling the MAIN components. (5)

3. List the causes of FIVE possible defects with barrel and plunger HP type diesel engine fuel pumps, stating the effect the defect will have on engine operation. (10)

4. 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)

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. With reference to diesel engine cooling water:

   (a) explain why the water requires treatment; (6)

   (b) describe the type of treatment that should be used. (4)

7. (a) Describe the possible causes of heat exchanger performance reduction. (6)

   (b) Describe how the performance of heat exchangers may be determined. (4)

8. With reference to the operation of an air starting system of a large medium speed marine diesel engine fitted with individual air starting valves:

   (a) state the checks to be carried out if the engine will not start when initiating the start sequence; (6)

   (b) list FOUR safety devices fitted to the air start system. (4)

9. Describe the inspection of a diesel engine piston that has already been removed from the engine. (10)

10. Describe, with the aid of a sketch, the operation of an epicyclic planetary reduction gear with a fixed annular ring and clock-wise input of the sun wheel. (10)