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, 25 October 2019

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 working principle of the four stroke cycle. (10)

2. With reference to large medium speed diesel engine turbo chargers:

   (a) explain why a thrust bearing is needed; (4)

   (b) state where the thrust bearing is fitted; (2)

   (c) describe how the thrust bearing is lubricated. (4)

3. (a) Show, using sketches, the THREE clearances necessary for efficient piston ring functioning. (3)

   (b) Explain why piston rings are necessary. (2)

   (c) Explain why the clearances sketched in part (a) are necessary. (5)

4. (a) Describe the operation and purpose of a diesel engine fuel nozzle. (6)

   (b) State the defects diesel engine fuel nozzles may encounter during service. (4)

5. With reference to distillate fuel, explain the potential problem for EACH of the following, stating how they may be avoided:

   (a) flash point; (3)

   (b) wax; (3)

   (c) microbes. (4)

6. (a) Describe possible reasons for fluctuations in the oil level of a main engine sump. (8)

(b) State how spurious sump level alarms can be avoided. (2)

7. Sketch a typical diesel engine cooling water system, describing the purpose of EACH component. (10)

8. Describe the checks and maintenance required for a main engine starting system that uses an air motor. (10)

9. (a) State TWO possible causes for EACH of the following exhaust emissions:

(i) black smoke; (2)

(ii) blue smoke; (2)

(iii) white smoke. (2)

(b) State ONE remedy for EACH of the emissions in part (a). (3)

(c) State how combustion defects may be diagnosed. (1)

10. (a) Describe a gearbox inspection. (6)

(b) State, with reasons, TWO gear tooth faults. (4)