

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, 07 February 2020

1400-1600 hrs

Examination paper inserts:

| |
|--|
| |
|--|

Notes for the guidance of candidates:

- | |
|--|
| <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. |
|--|

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 poor turbocharger performance:
 - (a) state FOUR possible causes; (4)
 - (b) describe the possible indications. (6)

3. 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)

4. (a) Sketch an overspeed trip of the centrifugal type. (6)
- (b) Describe the operation of the overspeed trip sketched in part (a). (4)

5. (a) List FIVE products directly obtained from the distillation of Crude Oil, stating a typical use for EACH on board a vessel. (5)
- (b) With reference to ISO 8217, aluminium & silicon oxides in fuel, state EACH of the following:
 - (i) how they get there; (2)
 - (ii) what effect they will have on engine performance; (2)
 - (iii) how they are removed from the fuel. (1)

6. Describe the engine and system problems created by EACH of the following common contaminants in distillate fuel oil:
- (a) water; (3)
 - (b) solids; (3)
 - (c) microbes. (4)
7. Describe, with the aid of a sketch, the operation of a centrifugal type lubricating oil filter, labelling the MAIN components. (10)
8. Describe possible reasons for variations in the oil level of a main engine sump. (10)
9. With reference to pneumatic clutches used for medium speed main propulsion purposes:
- (a) describe the operating principle of the clutch; (5)
 - (b) explain how this clutch may be engaged in the event of failure of the control system; (3)
 - (c) state TWO interlocks necessary for clutch operation. (2)
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)