

# **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, 04 February 2022**

**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"><li>1. Candidates should note that 100 marks are allocated to this paper. To pass candidates must achieve 50 marks.</li><li>2. Non-programmable calculators may be used</li><li>3. All formulae used must be stated and the method of working and ALL intermediate steps must be made clear in the answer.</li></ol> |
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Materials to be supplied by examination centres:

Candidate's examination workbook
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## MARINE DIESEL ENGINEERING

Attempt ALL questions

Marks for each part question are shown in brackets

1. (a) Sketch a four stroke timing diagram, showing the position of fuel valve, exhaust valve and inlet valve operation. (8)
- (b) Explain the meaning of the term *valve overlap*, stating its purpose. (2)
  
2. With reference to a turbocharged engine fitted with charge air cooler, It is noticed that boost pressure at the inlet manifold is reducing over a period of time:
  - (a) list FOUR possible causes; stating a simple and economical in service maintenance routine that would rectify EACH (8)
  - (b) state the effect reduced inlet pressure at full load will have on the engine. (2)
  
3. (a) Describe the procedure for setting tappet clearance on diesel engine inlet/exhaust valves. (6)
- (b) Explain the importance of tappet clearances. (4)
  
4. (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)
  
5. Explain, with the aid of labelled sketches, how a scroll type fuel pump meters the fuel for high and low loads. (10)
  
6. 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)

7. 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)
8. Describe the procedure to be adopted prior to removing a diesel engine cylinder head, including safety precautions. (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. (a) State how gearbox oil may become contaminated with water. (1)
- (b) Explain the effects of water contamination of gearbox oil. (5)
  - (c) Describe the actions to be taken should a gearbox become contaminated with water. (4)