

# **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, 23 April 2021**

**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. Explain the meaning of EACH of the following diesel engine terms:
  - (a) overlap; (2)
  - (b) scavenging; (2)
  - (c) afterburning; (2)
  - (d) compression; (2)
  - (e) expansion. (2)
  
2.
  - (a) Sketch an overspeed trip of the centrifugal type. (6)
  - (b) Describe the operation of the overspeed trip sketched in part (a). (4)
  
3. With reference to distillate fuel oil material safety datasheets, describe with examples the information that would be included for EACH of the following:
  - (a) hazards; (4)
  - (b) first aid; (3)
  - (c) fire fighting measures. (3)
  
4. With reference to diesel engine lubricating oil:
  - (a) state the main functions; (6)
  - (b) list FOUR contaminants that may be identified from laboratory analysis of a lubricating oil sample, stating their effects on the engine. (4)
  
5. With reference to diesel engine lubricating oil:
  - (a) explain how the oil may become contaminated during service; (5)
  - (b) describe how to keep the oil in a satisfactory condition. (5)

6. (a) State FOUR conditions for the fresh water cooling system treatment program to be effective. (4)
- (b) State the function of the inhibitor used in fresh water cooling treatment. (3)
- (c) Explain the safety considerations needed when handling the inhibitors. (3)
7. Describe, with the aid of a sketch, the operation of a diesel engine hydraulic oil start system, labelling the MAIN components, including all interlocks. (10)
8. (a) State the safety precautions necessary before removing a four stroke diesel engine cylinder head. (4)
- (b) Explain the procedure for removing a four stroke diesel engine cylinder head. (6)
9. With reference to fluid couplings for the main propulsion shaft:
- (a) explain the principle of operation; (5)
- (b) state how the transmitted torque may be varied; (2)
- (c) state THREE advantages. (3)
10. With reference to a reduction gearing and pneumatic clutch arrangement of a propulsion system:
- (a) state FIVE protection devices fitted; (5)
- (b) explain the need for EACH device stated in part (a). (5)