

# **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, 31 August 2018**

**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. Non-programmable calculators may be used.</li><li>2. 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:

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## MARINE DIESEL ENGINEERING

Attempt ALL questions

Marks for each part question are shown in brackets

1. With reference to starting air:
  - (a) describe what is meant by the air admission period; (6)
  - (b) describe how the air admission period is determined and controlled. (4)
  
2. With reference to diesel engine turbochargers:
  - (a) explain the reasons why they are fitted; (4)
  - (b) sketch an air and gas flow diagram of a pulse type, twin turbocharger, six cylinder diesel engine system. (6)
  
3. Describe a procedure for manually testing the set points on diesel generator HT cooling water, high temperature alarm and shut down. (10)
  
4. 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)
  
5.
  - (a) State FOUR purposes of lubricating oil. (4)
  - (b) Explain what is meant by the term *viscosity* of lubricating oil. (2)
  - (c) Describe an onboard method of measuring the viscosity of used lubricating oil. (2)
  - (d) State why the ideal viscosity of lubricating oil must be maintained. (2)
  
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. With reference to air start systems for medium speed diesel engines, explain the purpose and design features of EACH of the following:
- (a) distributor; (5)
  - (b) cylinder air start valve; (3)
  - (c) turning gear interlock. (2)
8. With reference to the removal of a bottom end bearing of a large medium speed diesel engine:
- (a) describe the safety precautions necessary before commencement; (4)
  - (b) describe the removal procedure. (6)
9. With reference to clutches, describe the operation of EACH of the following:
- (a) a friction type; (5)
  - (b) a fluid type. (5)
10. With reference to reduction gears, state the advantages and disadvantages of EACH of the following:
- (a) helical teeth compared with spur teeth; (5)
  - (b) double helix compared to single helix. (5)