CERTIFICATES OF COMPETENCY FOR ENGINEERS (YACHT)

EXAMINATIONS ADMINISTERED BY THE
SCOTTISH QUALIFICATIONS AUTHORITY
ON BEHALF OF
MARITIME AND COASTGUARD AGENCY

YACHT 4 ENGINEER OFFICER

055-02 - MARINE DIESEL ENGINEERING

FRIDAY, 13 October 2017

1400-1600 hrs

Examination paper inserts:

Notes for the guidance of candidates:

1. Non-programmable calculators may be used.
2. 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) Sketch a timing diagram of a four stroke pressure charged diesel engine, showing typical start and finish points for fuel, inlet and exhaust. (8)

   (b) Explain the difference between naturally aspirated and pressure charged engines. (2)

2. (a) Explain the need for a marine diesel engine governor. (5)

   (b) Describe the principle of operation of a simple hydraulic governor. (5)

3. With reference to scroll type fuel injection pumps:

   (a) describe how the delivered quantity of fuel may be varied; (5)

   (b) explain the purpose of the delivery valve; (3)

   (c) describe how fuel oil is prevented from spraying out if the high pressure pipe fails in service. (2)

4. (a) Explain what is meant by the term *flash point* of fuel. (3)

   (b) Describe the importance of knowing the flash point of the bunker fuel stored onboard. (3)

   (c) State the international regulation for minimum flash point of the bunker fuel stored onboard and the method of testing. (4)

5. (a) Describe the preparation of fuel oil from its point of storage to its point of injection in a diesel engine. (6)

   (b) State TWO reasons for fuel preparation. (2)

   (c) State the possible effects of mixing fuels of different grades. (2)

6. (a) State FOUR purposes of lubricating oil. (4)

   (b) Explain what is meant by the term *viscosity* of lubricating oil. (2)

   (c) State 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)

7. Explain the principle of operation of EACH of the following types of lubricating oil filter:

   (a) magnetic; (2)

   (b) centrifugal; (2)

   (c) coalescer; (3)

   (d) plate edge (eg auto-klean). (3)

8. With reference to diesel engine cooling water treatment, explain EACH of the following:

   (a) why the treatment is necessary; (4)

   (b) how the treatment is achieved; (3)

   (c) how the effectiveness of the treatment can be determined. (3)

9. With reference to heat exchangers, explain the purpose of EACH of the following:

   (a) the zinc anodes; (3)

   (b) the vent cocks; (3)

   (c) the tube fins. (4)

10. With reference to main diesel engines:

   (a) describe the procedure prior to starting; (7)

   (b) describe the checks carried out immediately after starting. (3)