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, 26 April 2019

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:

MARINE DIESEL ENGINEERING

Attempt ALL questions
Marks for each part question are shown in brackets

1. Describe the combustion process of EACH of the following:

   (a) petrol engine; (5)

   (b) diesel engine. (5)

2. With reference to main engine turbo chargers, explain the purpose of EACH of the following:

   (a) the volute casing; (3)

   (b) the diffuser; (4)

   (c) the nozzle ring. (3)

3. Describe, with the aid of a sketch, a valve actuating mechanism for a 4-stroke engine from cam to valve, labelling the MAIN components and showing where the tappet clearance may be measured. (10)

4. (a) Explain the actions which must be taken when the engine crankcase oil mist detector alarm is set-off and accumulation of oil mist is ascertained. (5)

   (b) Sketch a crankcase explosion relief door, labelling the MAIN components. (5)

5. With reference to distillate fuel oil, explain EACH of the following:

   (a) why it often needs treatment before the engine; (6)

   (b) why it sometimes needs cooling after the engine. (4)

6. With reference to the viscosity of diesel engine lubricating oil:

   (a) explain the meaning of the term viscosity, stating why it is important to the operation of a diesel engine: (3)

   (b) describe an on board viscosity test to determine if engine lubricating oil is fit for further use; (3)

   (c) list the factors which will influence the viscosity of oil in service. (4)

7. With reference to the main engine cooling water systems:

(a) explain the purpose of the header tank; (4)

(b) explain why both heaters and coolers may be fitted; (4)

(c) state, with reasons, the type of pumps used. (2)

8. With reference to plate type heat exchangers:

(a) sketch the assembly, labelling the main components and indicating the direction of flow; (5)

(b) state the materials used for the plates and seals; (2)

(c) state the purpose of the plates being corrugated; (2)

(d) state the purpose of *tell tales*. (1)

9. Describe the procedure to be adopted prior to removing a diesel engine cylinder head, including safety precautions. (10)

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)