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, 20 August 2021

1400-1600 hrs

Examination paper inserts:

Notes for the guidance of candidates:

1. Candidates should note that 100 marks are allocated to this paper. To pass candidates must achieve 50 marks.
2. Non-programmable calculators may be used
3. 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. Describe the combustion process of EACH of the following:

   (a) petrol engine; (5)

   (b) diesel engine. (5)

2. (a) Sketch a cross section through a resilient/flexible mounting for a diesel engine, labelling the MAIN components. (8)

   (b) State the special considerations necessary with respect to the engine attachments and pipework when using the type of mounting in part (a). (2)

3. Describe a procedure for manually testing the set points on a diesel engine lubricating oil low pressure alarm and shut down using a pressure calibrator. (10)

4. With reference to microbial infestation of distillate fuel:

   (a) describe what is meant by the term *microbe;* (1)

   (b) state what microbes need to survive; (2)

   (c) describe the possible diesel engine problems; (5)

   (d) describe how it can be identified. (2)

5. (a) Describe how contamination of fuel oil by EACH of the following can occur:

      (i) microbes; (2)

      (ii) sodium chloride. (2)

   (b) Describe how to avoid fuel system and engine related problems with reference to the TWO contaminants in part (a). (6)

6. 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)

7. Describe, with the aid of a sketch, the operation of a diesel engine air start motor system, labelling the main parts, including all interlocks. (10)

8. With reference to main diesel propulsion engines, state the engineering actions and checks to be taken in the event of EACH of the following:

   (a) high oil mist alarm; (5)

   (b) exhaust temperature variation across the engine. (5)

9. With reference to an engine connected to a gearbox via a friction clutch, explain EACH of the following:

   (a) why vibration from the engine should be damped; (7)

   (b) how vibration damping is achieved. (3)

10. Describe the routine inspection of the reduction gearing and associated systems for a medium or high-speed propulsion diesel engine that has already been made safe to work on. (10)