# 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 October 2018**

**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. (a) With reference to the combustion of fuel, explain EACH of the following terms:

   (i) atomisation; (3)

   (ii) penetration; (2)

   (iii) compression ratio. (1)

   (b) State the factors which influence the terms explained in part (a). (4)

2. (a) Describe the function of a main engine turbocharger. (5)

   (b) Describe how the turbocharger is cooled. (2)

   (c) Describe how the turbocharger is lubricated. (3)

3. (a) Sketch a cross section through a four stroke diesel engine piston, labelling the MAIN components. (6)

   (b) Describe the transfer of gas force from piston crown through to the crankshaft. (4)

4. The daily engine log shows the engine crankcase pressure gauge is indicating a much higher value than the normal reading.

   (a) State the implications of this and the immediate actions that should be taken. (2)

   (b) Outline the checks and investigations that should be undertaken to ascertain the cause of this increased crankcase pressure. (8)

5. Describe, with the aid of a sketch, a typical distillate fuel supply system for a diesel engine, including ALL the safety devices. (10)

6. With reference to diesel engine water coolers:

   (a) describe how performance is measured; (5)

   (b) describe the possible causes of the performance falling off. (5)

7. The air start pipework on a diesel engine attached to the cylinder head is becoming extremely hot.

Explain EACH of the following:

(a) the probable cause; (3)

(b) the consequences of this situation and the immediate action to be taken; (4)

(c) how this problem can be minimised. (3)

8. (a) Describe the procedure for renewing a bottom end bearing of a diesel engine. (8)

(b) Describe the precautions necessary on initial startup of the engine. (2)

9. Describe, with the aid of a sketch, the operation of a diesel engine propulsion system air operated radial tyre type clutch. (10)

10. With reference to a gearbox:

(a) explain why large quantities of lubricating oil are used; (2)

(b) state FOUR possible causes of excessive lubricating oil temperature when at normal operating speeds; (4)

(c) state how EACH cause stated in part (b) may be remedied. (4)