

**CERTIFICATES OF COMPETENCY IN THE MERCHANT NAVY –
MARINE ENGINEER OFFICER**

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

STCW 95 SECOND ENGINEER REG. III/2 (UNLIMITED)

042-28 – ENGINEERING KNOWLEDGE - MOTOR

TUESDAY 13 DECEMBER 2011

0915- 1215 hrs

Examination paper inserts:

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Notes for the guidance of candidates:

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Materials to be supplied by examination centres:

Candidate's examination workbook

ENGINEERING KNOWLEDGE – MOTOR

Attempt SIX questions only

All questions carry equal marks

Marks for each part question are shown in brackets

1. With reference to cylinder liner calibration:
 - (a) describe the procedure for calibrating a cylinder liner, stating the purpose of the procedure; (10)
 - (b) explain how the accuracy of the readings is ensured; (3)
 - (c) state the types of liner damage. (3)

2. Describe, with the aid of sketches, the procedure for dismantling and inspection of the bottom end bearing of a crosshead engine, stating the precautions taken during the procedure. (16)

3. With reference to exhaust valves:
 - (a) explain, with the aid of a sketch, how a hydraulically operated exhaust valve operates; (8)
 - (b) explain the effect of EACH of the following on the operation of an engine:
 - (i) tappet clearance too small; (4)
 - (ii) tappet clearance too large. (4)

4. With reference to starting air compressors:
 - (a) state the reasons for multi-staging; (4)
 - (b) explain why compressor lubricating oil consumption should be carefully monitored; (4)
 - (c) describe, with the aid of a sketch, a relief valve fitted to the water side of an air compressor; (6)
 - (d) explain the term dump clearance and its purpose. (2)

5. (a) Explain what is meant by supercharging. (2)
- (b) Explain the differences between the two basic types of turbocharging. (6)
- (c) Explain, with the aid of a sketch, the operation of sequential turbocharging. (8)
6. (a) State the advantages of using a common rail fuel injection system. (6)
- (b) Describe, with the aid of a sketch, a common rail fuel injection system. (10)
7. With reference to indicator diagrams:
- (a) sketch the standard power card for two stroke crosshead engine and indicator cards showing the following faults: (8)
- (i) early ignition;
- (ii) late ignition;
- (iii) afterburning;
- (b) sketch an out-of-phase card, and describe the salient points of the diagram; (5)
- (c) list other information that is used to assess engine performance. (3)
8. (a) Describe, with the aid of a sketch, a crankcase explosion relief valve. (6)
- (b) Describe the procedure to be followed after the activation of the crankcase oil mist alarm. (10)
9. (a) Explain what is meant by the term *accumulation of pressure*, stating its limit. (2)
- (b) Sketch the lower end of a high-lift safety valve. (8)
- (c) Describe the operation of the valve sketched in Q9(b). (6)