

**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, 29 MARCH 2011**

**0915- 1215 hrs**

Examination paper inserts:

Worksheet Q4

Notes for the guidance of candidates:

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. (a) Describe, with the aid of sketches, the procedure for checking the guide clearances on a crosshead main engine. (10)  
(b) Explain how the guide clearances are adjusted. (6)
  
2. With reference to V-type medium speed engines:
  - (a) sketch an arrangement for attaching two connecting rods to the same crank pin; (5)
  - (b) describe, with the aid of sketches, how a cylinder cover is removed from the engine; (6)
  - (c) describe how a piston is removed from the engine. (5)
  
3. (a) Sketch a section through a main engine fuel injector, labelling the main parts. (6)  
(b) State, with reasons, the factors which influence fuel atomisation in a fuel injector. (5)  
(c) State how atomisation of fuel deteriorates after prolonged injector operation. (5)
  
4. (a) On Worksheet Q4 complete a risk assessment for removing a crosshead diesel engine cylinder cover. (8)  
(b) Describe, with the aid of sketches, the procedure for removing a crosshead engine cylinder cover and landing it on the engine room plates. (8)

**[OVER**

5. (a) Explain why approximate power balance between cylinders is necessary. (4)
- (b) State why exact power balance between cylinders is not possible with an operating engine. (4)
- (c) Describe how cylinder power and performance can be assessed for a medium speed engine. (4)
- (d) Describe how individual cylinder power can be adjusted. (4)
6. (a) State what clearances are required between the piston rings and the piston and cylinder liner indicating why such clearances are required. (6)
- (b) Describe how each of the piston ring clearances stated in Q6(a) are measured. (5)
- (c) Explain why the values of piston ring clearances are limited. (5)
7. (a) Describe, with the aid of sketches, the procedure for removing turbocharger bearings for inspection. (10)
- (b) State the clearances to be checked when overhauling a turbocharger bearing system, explaining why these clearances are required. (6)
8. (a) Explain why main engine starting air compressors are of the multi-stage type. (4)
- (b) Explain why intercooling of air is employed between stages. (4)
- (c) Explain why automatic drain traps are fitted at air compressor coolers. (4)
- (d) Explain why it is necessary to remove oil and water from the air leaving the starting air compressor. (4)
9. (a) Describe, with the aid of a sketch, a boiler burner fuel system, explaining how the main flame is ignited. (8)
- (b) Explain how the combination air and fuel supply to the burner are regulated together in the system described in Q9(a). (4)
- (c) Explain how the boiler burner system described in Q9(a) may be regulated manually, in the event of the remote control system failing. (4)