

**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, 17 JULY 2012

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 liners:
 - (a) sketch the typical wear pattern of a cylinder liner; (2)
 - (b) describe, with the aid of a sketch, EACH of the following:
 - (i) scuffing; (3)
 - (ii) cloverleafing; (3)
 - (c) list the consequences of under lubricating and over lubricating; (6)
 - (d) state how cylinder liner wear can have an effect on the compliance of international legislation. (2)

2.
 - (a) Describe the procedure to take main engine crankshaft deflections. (10)
 - (b) List the occasions when they should be taken. (2)
 - (c) List the occasions with reasons when they should NOT be taken. (4)

3.
 - (a) Describe the lubricating oil flow within a two-stroke crosshead engine. (8)
 - (b) Describe the difference in properties between the lubricating oils used in crosshead and trunk type engines. (8)

4.
 - (a) Describe THREE methods of positioning the camshaft to allow a main engine to run in the reverse direction. (6)
 - (b) Describe, with the aid of a block diagram, the operation of the air starting system of a two-stroke crosshead engine, explaining how reversing is achieved. (10)

5. With reference to turbocharging:
- (a) explain the term *surging*; (2)
 - (b) state the causes of surging; (6)
 - (c) describe the methods of cleaning a turbocharger; (7)
 - (d) state the danger associated with leaving a long period of time between cleanings. (1)
6. With reference to fuel oil in machinery space:
- (a) state the precautions which must be incorporated in high pressure fuel pipes; (6)
 - (b) define the following terms and how they affect the storage of fuel:
 - (i) viscosity; (2)
 - (ii) flash point; (2)
 - (iii) pour point; (2)
 - (iv) specific gravity; (2)
 - (v) compatibility. (2)
7. (a) Sketch a power card stating why they are taken. (4)
- (b) Explain how power balancing across all cylinders of an engine is achieved. (8)
- (c) Explain what is meant by the term *draw card*, stating what information can be taken from it. (4)
8. With reference to main engine scavenge fires:
- (a) state with reasons the causes; (4)
 - (b) state the symptoms of a scavenge fire; (4)
 - (c) describe the actions taken to fight a scavenge fire, stating reasons for the actions. (8)

9. With reference to boiler water:

- (a) explain the process of scale formation; (6)
- (b) list the different effects of using hard and soft water; (4)
- (c) explain the danger of scale formation; (4)
- (d) explain the reason for taking two alkalinity tests. (2)