

**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)

042-27 – ENGINEERING KNOWLEDGE - GENERAL

MONDAY, 17 OCTOBER 2011

0915- 1215 hrs

Examination paper inserts:

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Notes for the guidance of candidates:

Candidates are required to obtain 50% of the total marks allocated to this paper to gain a pass **AND** also obtain a minimum 40% in Sections A, B and C of the paper.

Materials to be supplied by examination centres:

Candidate's examination workbook

ENGINEERING KNOWLEDGE - GENERAL

Attempt TEN questions only as follows:

SIX questions from Section A

TWO questions from Section B

TWO questions from Section C

Marks for each part question are shown in brackets

All questions carry equal marks

SECTION A

Attempt SIX questions only from this section

1. Describe, with the aid of a sketch, an explosimeter for the detection of combustible gas in cargo tanks and other enclosed spaces. (10)

2. (a) Sketch a cross section of a sludge and garbage incinerator, labelling the main components. (7)
(b) Outline the actions to be undertaken if a sludge incinerator combustion control unit locks out due to flame failure. (3)

3. (a) Describe, with the aid of a sketch, a constant speed, unidirectional, variable delivery pump driving an hydraulic motor. (8)
(b) State TWO applications where the unit described in Q3(a) may be employed. (2)

4. (a) Describe, with the aid of a sketch, the operation of a self contained, mechanical foam, fire fighting fixed installation. (6)
(b) Describe the maintenance and checks of the system in Q4(a) to ensure the system is fit for purpose. (4)

5. Define FIVE material properties, stating the standard test for EACH. (10)

6. Describe, with the aid of a block diagram, a biological sewage system that incorporates membrane technology for the effluent. (10)

7. Sketch an hydraulic circuit of a steering gear system showing the direction control valves and servo valve. (10)

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8. An engine room has suffered a severe fire which has resulted in the depletion of the inert gas and the disablement of the fire detection system and the machinery monitoring alarm panel failure.

Explain the arrangements the Second Engineer Officer must take to continue the voyage. (10)

SECTION B

Attempt TWO questions only from this section

9. With reference to alternating current generators:
- (a) explain the meaning of salient pole construction; (2)
 - (b) explain why the usual arrangement is to have stationary a.c. windings and rotating poles. (8)
10. (a) State FOUR causes by which explosive gas may be ignited by electrical sources. (4)
- (b) Define a *flameproof enclosure*. (2)
 - (c) Sketch TWO types of covers designed for flameproof equipment. (4)
11. (a) Describe, with the aid of a sketch, a preferential trip circuit. (7)
- (b) State typical ancillary items that may be included in a tripping program with approximate times. (3)

SECTION C

Attempt TWO questions only from this section

12. Define EACH of the following terms, stating the purpose of EACH:

- (a) sheer; (2)
- (b) camber; (2)
- (c) bilge keel; (2)
- (d) freeboard; (2)
- (e) flare. (2)

13. (a) Sketch a Pallister type rudder carrier bearing, labelling the main components. (5)

(b) State TWO reasons why the bearing surfaces of a Pallister bearing are contoured. (2)

(c) Explain what actions may be taken if the rudder carrier bearing is overheating. (3)

14. With reference to semi-balanced rudders of single pintle design:

(a) sketch the rudder arrangement; (5)

(b) state the purpose of the pintle; (2)

(c) state THREE methods of checking the pintle wear in drydock. (3)