

CERTIFICATES OF COMPETENCY IN THE MERCHANT NAVY  
MARINE ENGINEER OFFICER

STCW 78 as amended MANAGEMENT ENGINEER REG. III/2 (UNLIMITED)

040-36 - ENGINEERING, SYSTEMS AND SHIP'S DRAWINGS

WEDNESDAY, 15 DECEMBER 2021

1315 - 1615 hrs

Materials to be supplied by examination centres

Candidate's examination workbook  
Graph paper

Examination Paper Inserts

DRG - 110  
DRG - 111  
DRG - 112  
DRG - 113  
DRG - 114

Notes for the guidance of candidates:

1. Examinations administered by SQA on behalf of the Maritime & Coastguard Agency
2. 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 and B of the paper.
3. Non-programmable calculators may be used.
4. All formulae used must be stated and the method of working and ALL intermediate steps must be made clear in the answer.



## ENGINEERING, SYSTEMS AND SHIP'S DRAWINGS

Attempt ALL questions

Marks for each part question are shown in brackets

All formulae used must be stated and the method of working and ALL intermediate steps must be made clear in the answer

### Section A

#### 1. Piping Systems - DRG 110.

- (a) State what the following items are and describe their function in the illustrated systems:



- (b) State what temperature the generator HT system operates at and explain how this was ascertained. (2)
- (c) Using drawing references, describe the flow path of cooling water used to keep the generators warm and ready for service when they are stopped. (4)

#### 2. Mechanical Assembly - DRG 111.

- (a) Using drawing references, identify the suction and discharge flanges of the assembly. (2)
- (b) Using drawing references, describe the bearing securing arrangement. (3)
- (c) State how the relief valve assembly is adjusted and describe how the components function to achieve the desired adjustment. (5)

3. Ship's Construction Drawing - DRG 112

State what the following drawing marks indicate:

(a)  (2)

(b)  (2)

(c)  (2)

(d) **430x20 BP** (2)

(e) Side Stringer (7300 A.B.) (2)

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4. Hydraulic and Pneumatic System Drawings - DRG 113.

(a) State what the following items are and describe their function in the illustrated system:



(b) State the alternative supply for deck and service air in the event the service air compressor is unavailable, including what other system this alternate supply can be used for. (3)

(c) State the function of bottle valves N1, N2, N3, N4 and N7. (3)

5. Electrical Power Systems and Control Drawings - 114.

(a) State what the following items are and describe their function in the illustrated system.



(b) Using drawing references, describe the sequence of operation of the attached circuit, including auxiliary contact operations. (6)

## Section B

### 6. Mechanical Assembly - DRG 111.

- (a) Describe how the illustrated pump operates, including how the screw shafts are located within the casing and how thrust is accommodated. (10)
- (b) Using drawing references, describe how to disassemble the pump for maintenance/inspection, including reassembly ensuring that the axial location of the shafts are correct and the relief valve is set correctly. (15)

### 7. Ship's Construction Drawing - DRG 112

The vessel is in dry dock and the following damage to the hull has been found. Identify the size of the damaged area and visible complications from the drawing, which may influence the duration and cost of the repair.

- (a) An indentation whose location has been identified as being between frames 173 - 180 and longitudinals 12-36. The depth of the indentation has been assessed as being approximately 1.0 metre. (10)
- (b) An indentation whose location has been identified as being between frames 173-180 and longitudinals 05 - 09. The depth of the indentation has been assessed as being approximately 500 mm. (10)
- (c) Sketch a simple mid-ship section of the hull plating and insert No.5 S.W.B.T. (5)













