

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, 20 JULY 2022

1315 - 1615 hrs

Materials to be supplied by examination centres

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| Candidate's examination workbook Graph paper |
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Examination Paper Inserts

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| DRG - 115 DRG - 116 DRG - 117 DRG - 118 DRG - 119 |
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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

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Section A

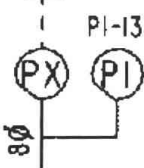
1. Piping Systems - DRG 115

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

(i)  (2)



(ii)  (2)



(iii)  (2)

(b) State on what side of the vessel the distillate plant SW feed pump suction is located and describe how this was ascertained. (2)

(c) State, with reasons, what type of vessel the illustrated system may come from. (2)

2. Mechanical Assembly - DRG 116

- (a) State how many casing sections make up the pump assembly. (2)
- (b) State what item 31 is and describe its function in the illustrated assembly. (2)
- (c) State the type of shaft seal used for the system fluid. (2)
- (d) State the function of item '7' in the illustrated assembly. (2)
- (e) Describe how the pump impeller is axially located within the pump casing. (2)

3. Ship's Construction Drawing - DRG 117

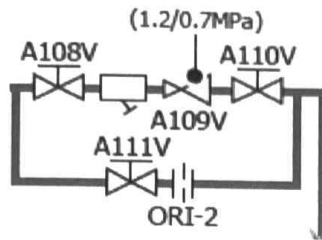
- (a) State the extent of the camber on the main deck and at what distance from the centre line it starts. (2)
- (b) State why the illustrated port and starboard mid ship sections appear different. (2)
- (c) State the type of floor evident on the illustrated section. (2)
- (d) List the ballast tanks evident in the illustrated section. (2)
- (e) State what the below image denotes on the illustrated drawing, including where they are located. (2)



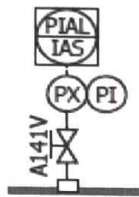
4. Hydraulic and Pneumatic System Drawings - DRG 118

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

(i) (2)



(ii) (2)



(b) The low pressure alarm has been activated on the working air system. State what machinery would be the immediate concern, outlining what swift action could be take to ensure continued safe operation. (3)

(c) The working air pressure continues to drop and a burst distribution line in the steering flat has been identified as the cause. State what action can be taken to ensure continued safe operation of the machinery that requires working air, outlining what safety implications might this action have. (3)

5. Electrical Power Systems and Control Drawings - DRG 119.

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



(b) State the voltage used in the control circuit and how this is supplied. (2)

(c) State what functions the illustrated circuit is designed to fulfil. (2)

Section B

6. Mechanical Assembly - DRG 116.

Describe the procedure to dismantle the assembly for internal inspection, including replacing bearings in the illustrated assembly. Include what areas require close inspection for wear and what preparation and care should be observed during reassembly.

(25)

7. Electrical Power Systems and Control Drawings - DRG 119.

(a) Using drawing references describe the sequence of actions that occur in the illustrated circuit after the 'BS1 Start' button is pushed, assuming the correct supply is available through a closed '89' breaker. Include all auxiliary contact operations, stating their effect on the circuit. (15)

(b) Using drawing references describe the sequence of actions that occur in the illustrated circuit after the 'BS2 Stop' button is pushed. Include all auxiliary contact operations, stating their effect on the circuit. (10)

