

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, 14 JULY 2021

1315 - 1615 hrs

Materials to be supplied by examination centres

Candidate's examination workbook
Graph paper

Examination Paper Inserts

DRG - 100
DRG - 101
DRG - 102
DRG - 103
DRG - 104

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.


Maritime &
Coastguard
Agency



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 100

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



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2. Mechanical Assembly - DRG 101

- (a) State the current port configuration of the illustrated assembly and using drawing references describe how this configuration is maintained. (2)
- (b) State the activated port configuration of the illustrated assembly and describe using drawing references the sequence of actions that occurred to change the configuration. (3)
- (c) Describe using drawing references the sequence of actions that occur to return the illustrated assembly to the original indicated configuration. (3)
- (d) Describe the emergency operating procedure for the component. (2)

3. Ship's Construction Drawing - DRG 102

State what the following drawing marks indicate.

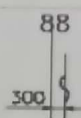
- (a) (2)



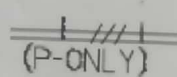
- (b) (2)



- (c) (2)



- (d) (2)



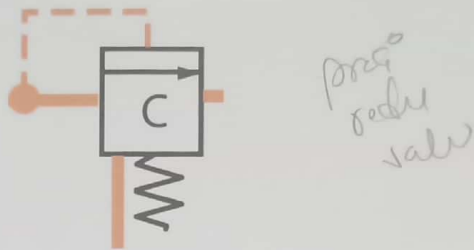
- (e) (2)



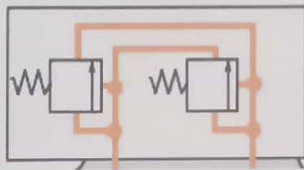
4. Hydraulic and Pneumatic System Drawings - DRG 103

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

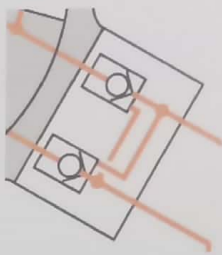
(a) (2)



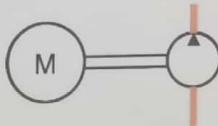
(b) (2)



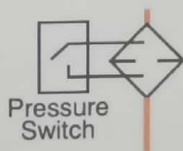
(c) (2)



(d) (2)



(e) (2)

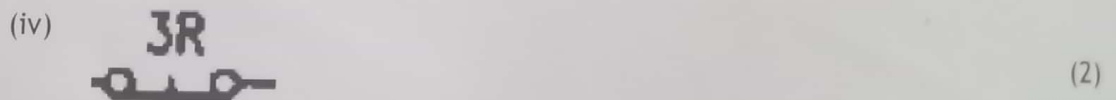


approximate steam welding

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5. Electrical Power Systems and Control Drawings - DRG 104

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



(b) State all the functions the illustrated circuit is designed to achieve. (2)

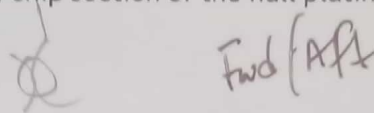
Handwritten notes:
- bottom of ship.
Hopper top
Hopper
Grider
Bulge keel
Cargo tank

Section B

6. Ship's Construction Drawing - DRG 102

The vessel is in dry dock and the following damage to the hull has been found. Identify the 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 96 - 99 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 93-96 and longitudinals 43 - 52. 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.6 S.W.B.T. (5)



7. Electrical Power Systems and Control Drawings - DRG 104

- (a) Using drawing references, describe the sequence of actions that occur, including all auxiliary contact operations and their effect on the system, from when the start button has been pushed, until it is running on load. (15)
- (b) Using drawing references, describe the sequence of actions that occur, including all auxiliary contact operations with their effect, when the illustrated circuit is in continuous operation. (10)

*Other plates
check & inspect
as this is in depth.*

*No 5 stand board
water
Ballast Tank
(P & S)*

*Sold & weld
Built up.*

- High tensile area - high stress
- Certificate for Permit/work
- * Gas free, Safety venting, Emptying,
- * professional welder, cut in, fit up.
- NDT
- watertight integrity Simple - class surveyors
- hydrogen cracking after weld up
- turn of Bulge - hard tensile area.

*ATH A Grab
High tensile
material*