

**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, 26 AUGUST 2020**

**1315 - 1615 hrs**

Materials to be supplied by examination centres

Candidate's examination workbook  
Graph paper

Examination Paper Inserts

DRG - 071  
DRG - 072  
DRG - 073  
DRG - 074  
DRG - 075

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.



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# ENGINEERING, SYSTEMS AND SHIP'S DRAWINGS

Attempt ALL questions

Marks for each part question are shown in brackets

## Section A

### 1. Piping Systems - DRG 071

(a) State what the following item is and describe its function:



(b) State the different types of fuel supplied to the generator engines. (2)

(c) State the maximum rate of fuel supply possible in the system shown. (2)

(d) State the finest filtration process the fuel undergoes. (2)

### 2. Mechanical Assembly - DRG 072

(a) State the part numbers of the three main casing sections that make up the pump assembly. (2)

(b) State the part numbers of the wear rings. (2)

(c) State the part number of the thrust bearing, explaining how this was identified and why it is required. (3)

(d) Describe how the impeller is axially located to ensure the correct running height within the casing. (3)



3. Ship's Construction Drawing - DRG 073

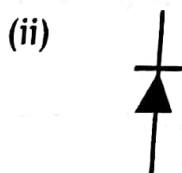
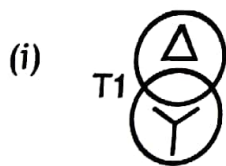
- (a) State the maximum sounding of No. 1 WB Tank (P&S). (2)
- (b) State the frame number of the collision bulkhead. (2)
- (c) Describe the difference in form, between the longitudinals which have three dimensions indicated, and the side frames that have two. (3)
- (d) State the approximate length of the vessel between perpendiculars, showing how this was obtained. (3)

4. Hydraulic and Pneumatic System Drawings - DRG 074

- (a) State the types of pump found in the hydraulic unit. (2)
- (b) Briefly describe the function of the following items in the illustrated system:
  - (i) Transfer valve; (2)
  - (ii) Safety valve; (2)
  - (iii) Boost relief valve; (2)
  - (iv) Servo controller. (2)

i. Electrical Power Systems and Control Drawings - DRG 075

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



- (b) State the source of 24V control supply, during normal operation. (2)
- (c) State the type of neutral system employed by the vessel. (2)

## Section B

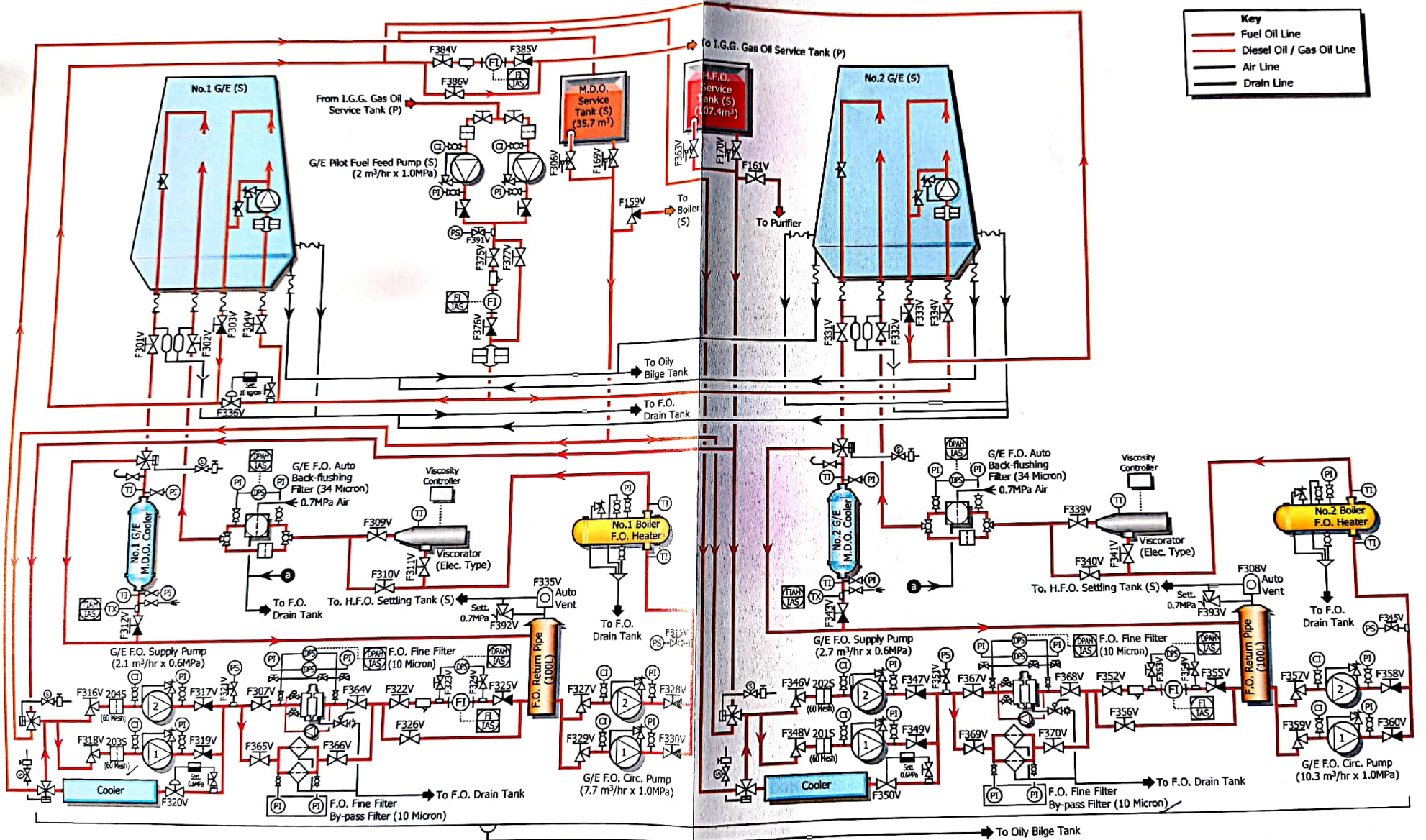
### 6. Ship's Construction Drawing - DRG 073

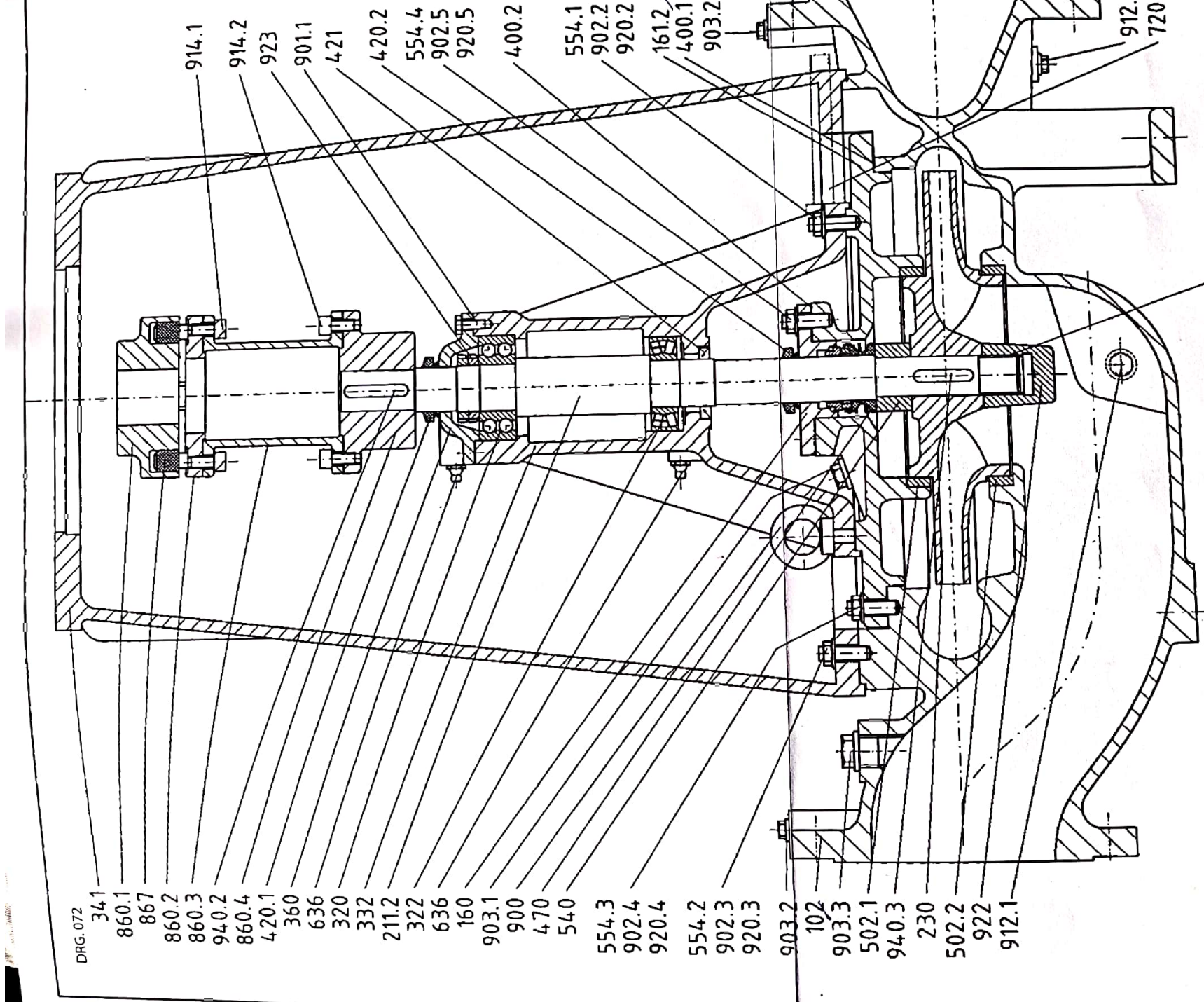
- (a) State what S.C. indicates at frame number 147, next to the bow thrust tunnel. (2)
- (b) An indentation has been identified, starting just forward of frame number 143 and running to frame number 147. It is located between longitudinal 25 and 30. The indentation is approximately 1000 mm deep at the extreme. (5)
- (i) State the approximate dimensions of the damage. (5)
- (ii) Describe the complexities of the repair that are evident from the drawing, and what concerns are evident that would prompt closer internal inspection of critical areas. (15)
- (c) State the frame numbers of the water tight bulkheads visible on the supplied drawing. (3)

### Hydraulic and Pneumatic System Drawings - DRG 074

- (a) Using drawing references, describe the oil flow paths and solenoid positions, when No.1 Pump Unit is operational with no rudder movements, and the sequence of actions and flow paths that are instigated, when a rudder command is received. (15)
- (b) Using drawing references, describe the actions that occur should the sump level in the running pump unit begin to fall. (10)







DRG. 072

341

860.1

867

860.2

860.3

940.2

860.4

420.1

360

636

320

332

211.2

322

636

160

903.1

900

470

540

554.3

902.4

920.4

554.2

902.3

920.3

903.2

102

903.3

502.1

940.3

230

502.2

922

912.1

914.1

914.2

923

901.1

421

420.2

554.4

902.5

920.5

400.2

554.1

902.2

920.2

161.2

400.1

903.2

912.2

720

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W. T. BHD.

F. P. BHD.

• FREEING PORT OPENINGS SEE DWG. FRAMING IN HOLD(3H-4400-002) & BOW BULWARK CONST.(3H-6500-001)

