SHIP STRUCTURE - VISA EXAM 2 02.01.2024

A view of mid-part of a dry cargo ship, whose main particulars are as follows, is shown in Figure 1:

L = 100 + 5×**n** [*m*]; **B** = (**L** / 7.0); **T** = (**B** / 2.5); **D** = **H** = (**L** / 12.0); C_B = 0.72; V_0 = 16 [*knots*]

,where "**n**" is the last digit of your student ID.

QUESTIONS

1. Determine the dimensions of the spotted structural member as "**Q1**", which may be considered as a console beam, using first principles of "Strength of Materials" (that is, $\sigma_{max} \leq \sigma_{SAFE}$ = 150 [*MPa*]). Note that a console beam is fixed at one end and free at the other end. (50 points)

2. Determine the scantlings of the spotted structural member as "**Q2**" using GL Rules. (35 points)

- Frame spacing will be found from the following formula: a = (**L** / 500) + 0,48 [*m*]
- Normal stress at the bottom of the ship due to longitudinal bending: σ_{LB} = 120 [N/mm^2]
- The vertical distance between the neutral axis and the base line (BL) is approximately equal: 0.4×**D**

3. <u>Calculate</u> the midship section modulus (SM) of the dry cargo ship whose view is given in Figure 1. Then compare it with the minimum midship section modulus (W_{min}) required by GL. All the necessary thicknesses needed for the calculation may be found by the following simple formula, where **L** is in [*m*] (35 points):

$t = \sqrt{L}$ [*mm*] (Remember that a standard thickness value should be used!)

Also remember that: $y_{NA} = \sum A_i y_i / \sum A_i$; $I_{NA} = \sum I_i + \sum A_i d_i^2$ and $SM = I_{NA}/y_{max}$

Normal strength steel (R_{eH}=235 [MPa]) is used. Service range is unlimited. The distance between solid (plate) floors is 4a.

Any other assumptions that may be needed for the calculations should be clearly stated. (90 minutes allowed)

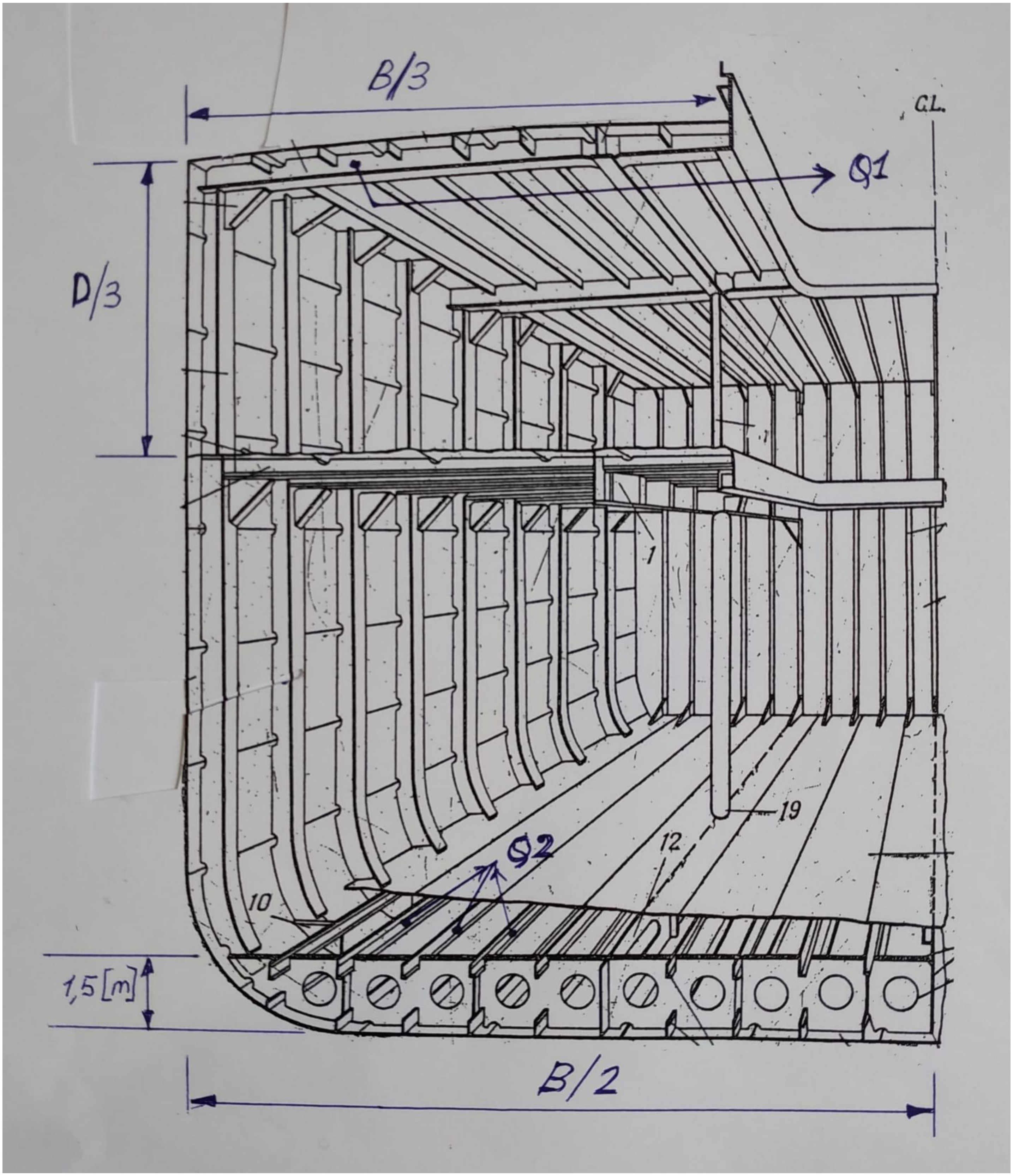

Figure 1