



Faculty of Engineering
and Applied Science

Engineering 5003 - Ship Structures I

MID-TERM EXAMINATION

Date: Wed., Feb. 20, 2014

Professor: Dr. C. Daley

Time: 1:00 - 1:50 pm

Answer all questions. Total 20 marks. Each question is worth marks indicated [x].

Short, clear answers are best. If you are having a problem (ie a road block) assume something, write down the assumption, and continue.

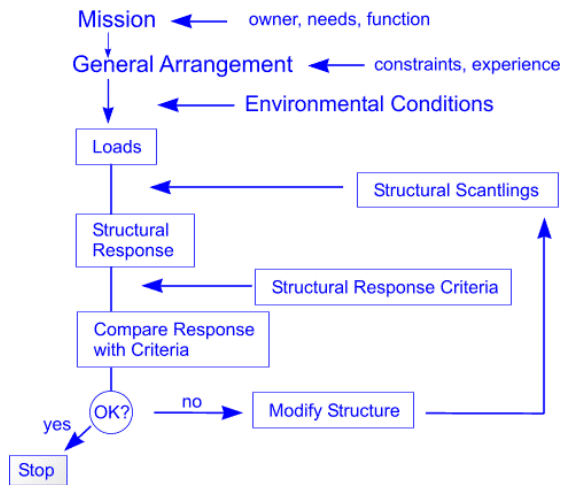
Good luck.

SOLUTIONS

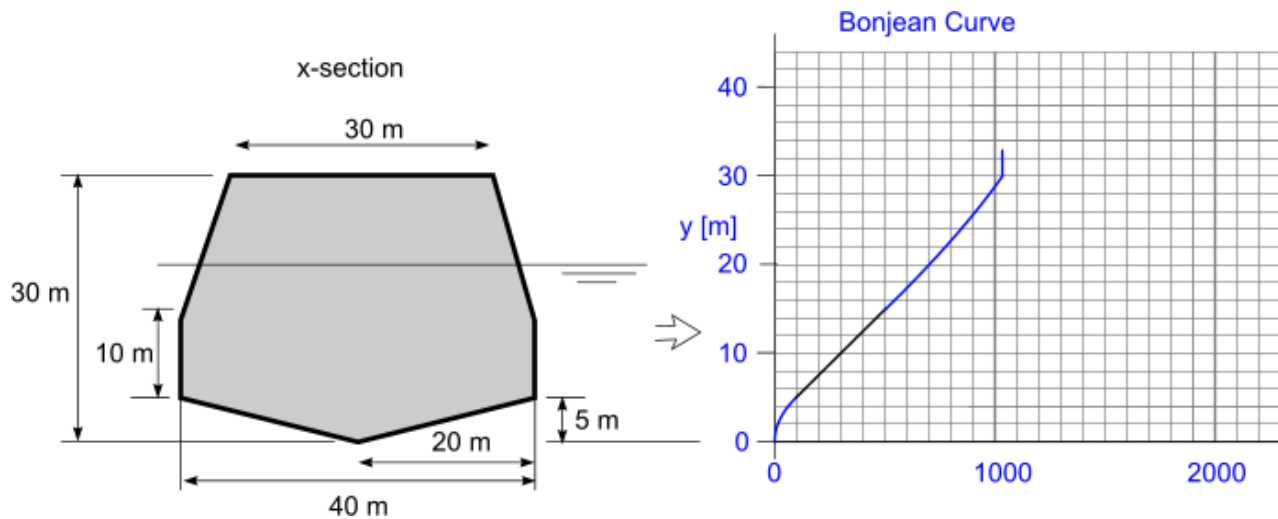
NAME: _____

NUMBER: _____

1. Make a block diagram sketch of the steps involved in the structural design of a ship and write a paragraph explaining the key ideas. [4]



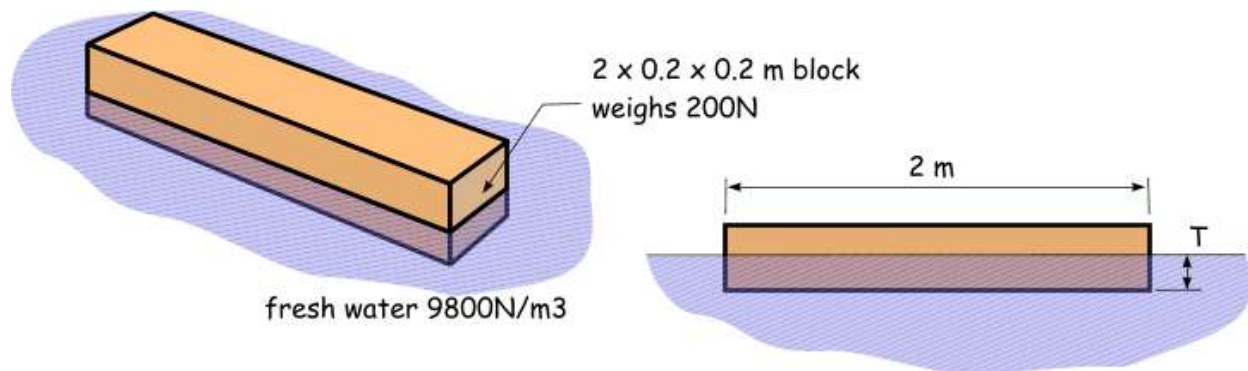
2. For the section shown below (left), sketch the corresponding bonjean curve (on the right). [4]



3. A block of wood is floating water as shown below.

a) what is the draft T of the block?

[1]

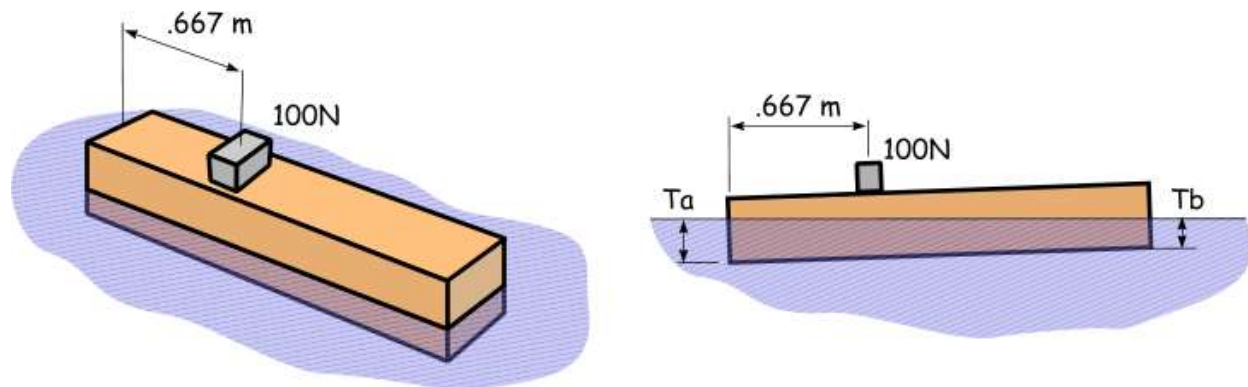


To solve :

$$T \times 2 \times 0.2 \times 9800 = 200 \Rightarrow T = 200 / (2 \times 0.2 \times 9800) = 0.051 \text{ m} \Leftarrow \text{ANS}$$

b) A 100 N small steel block is placed on the wood as shown below. What are the new drafts (Ta and Tb) ?

[2]



Tb is unchanged (center of changed buoyancy is as 1/3 from end so it's a triangle so there is no change at b)

Ta orig. draft + 2x mean change in draft. Mean draft changes by 1/2 original draft (as 100 is half of 200). So:

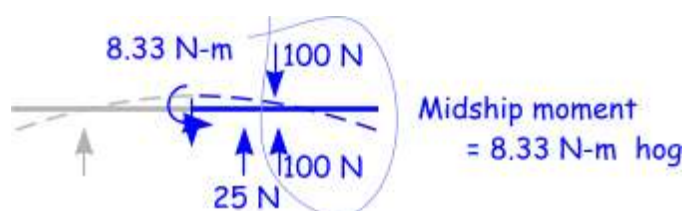
$$T_a = 2 \times 0.051 = 0.102 \Leftarrow \text{ANS}$$

c) for the block with the weight, what is the midship bending moment? (if you don't know how to solve part b, just assume reasonable values and continue)

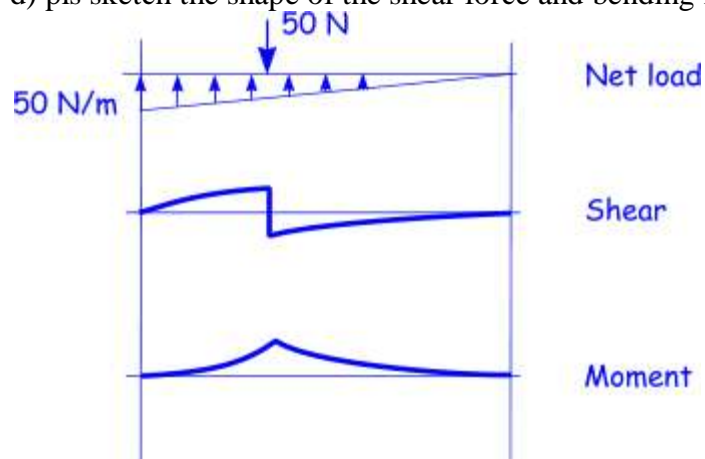
[2]

unbalanced load fwd of midships is 25 N. FBD of fwd half of vessel is shown.

Moment required at midships must balance 25 N x 2/6 m = 8.33 N-m



- d) pls sketch the shape of the shear force and bending moment diagrams (no numbers) [2]



4. For the fixed-pinned shown below;

- a) pls sketch the shape of the shear, moment, slope and deflection diagrams (no numbers) [3]
 b) write the equations for the shear and bending as you would if solving the system by direct integration. You do not have to solve the equations, so you can leave any unknowns unsolved.

$$Q = Q_0 - p \cdot x$$

$$M(x) = M_0 + Q_0 \cdot x - \frac{p}{2} x^2$$

