

## **Kul-24.3100 Ship Conceptual Design – 1<sup>st</sup> Mid-term Exam**

**21.10.2015 14:00-17:00**

*Use clear writing and short answers. Re-read your text in the end, after you got some distance, and clarify what is not clear.*

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### **1. Ship Categorization Principles and Definitions**

- A. Tell how different ships can be categorized. **2p**
  - B. What is a volume limited ship? What other limitations are there? **2p**
  - C. What does it mean, in terms of ship technology, that the ship is designed for unlimited operational area– give a holistic view. **2p**
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### **2. Ship Main Dimensions and Their Selection**

- A. Sketch and explain ship's linear main dimensions. **2p**
  - B. What do the hull form coefficients say about a ship? **2p**
  - C. How do hull form coefficients affect the ship performance? **2p**
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### **3. Ship Performance and Lines Drawing**

- A. What does the scale effect mean in ship design and where does the effect originate from? **2p**
  - B. On the lines drawing of an existing ship you decide to add a bulbous bow. How will the lines change in all three projections? Use sketches and explain. **2p**
  - C. When you start drawing a lines of a new ship, what factors should you take in consideration? Describe the process to the point that initial draft of all the lines is made and you can proceed to the following steps in the design spiral. **2p**
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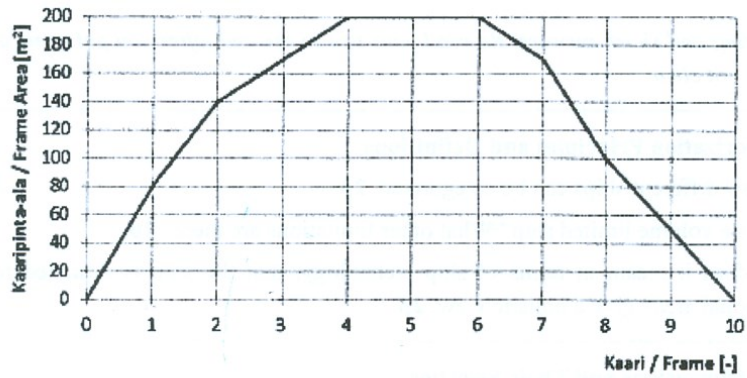
### **4. Numerical Integration and Hull Shape**

- A. Calculate the displacement from the area curve given below **using Simpson I rule**.  $L=250m$ . **2p**
- B. Derive Simpson I-rule for the case where we have also intermediate frames at 0.5 and 9.5. **2p**
- C. What is the influence of the hydrodynamic factors on the optimal volume distribution of the hull. **2p**

**SEE OTHER SIDE**

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5. General Arrangement

- A. Describe the most important factors affecting the general arrangement of a Ro-Pax ferry. **2p.**
  - B. Describe the various possibilities to locate the cargo space on container vessels with respect to superstructure and what are the benefits and drawbacks for each possibility. **2p**
  - C. What kind of compartments will be used in ships to restrict the danger of flooding and fire? **2p**
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Equations:

$$\Delta = \rho g \lambda \nabla = \rho g \lambda C_B L B T$$

$$\Delta = W_{LS} + W_{DW}$$

$$A = A_1 + A_2 = \int_0^{2s} y dx = \frac{s}{3} (y_0 + 4y_1 + y_2)$$

$$A = \frac{s}{3} (y_0 + 4y_1 + 2y_2 + 4y_3 + 2y_4 + \dots + 2y_{n-2} + 4y_{n-1} + y_n)$$