



CHALMERS

School of Technology Management and Economics
Master's Programme in Supply Chain Management

Written re-exam in

TEK122 Freight Transport Systems

Monday, April 10th 2017, 8.30-12.30, Samhällsbyggnad

Permitted aids: Non-programmable calculator and dictionary.

Presentation: Write your personal code, the number of the question, and the page number on all sheets. Fill out the cover sheet.

ONLY ONE QUESTION PER SHEET AND DON'T WRITE ON THE BACK!

The requirements to pass the course are passing grades on each of the following parts: AIT, ADP and the exam.

Grades: Maximum score of the written exam is 85 points; passed ≥ 40 points

A total course score of up to 59 points = 3

A total course score of 60 to 79 points = 4

A total course score of 80 to 100 points = 5

Examiner: Violeta Roso, ph: 0739-196775, violeta.roso@chalmers.se

Violeta will be available on the phone.

The results will be available after April 29th.

The exam review will be available at the division of Service Management and Logistics ONLY on the following date May 2nd at 12.30.

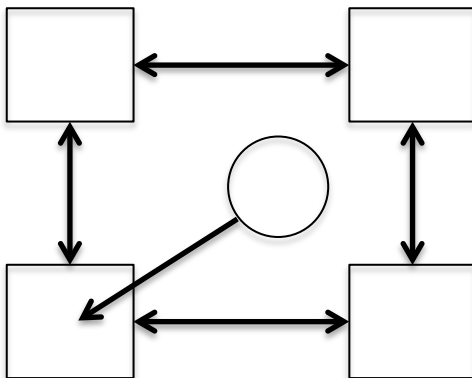
QUESTION 1 (14 points)

Explain the following transport related terms (14 x 1p):

- a) Transport definition
- b) Traffic definition
- c) Cycle time
- d) LCV
- e) LOLO
- f) Unit of measurement for capacity of RORO vessels
- g) Straddle-carrier
- h) Design dependent separation in rail transport
- i) Beluga (air transport)
- j) Kitting (terminal function)
- k) Land-bridge (intermodal transport)
- l) TEU
- m) Local environmental impact
- n) Structural imbalance in resource utilization

QUESTION 2 Freight transport (5 points)

Sjöstedt's model - Define all terms in the model (all frames and arrow-links) (5p)

**QUESTION 3 Road transport (6 points)**

- a) LCV or Duo Trailer concept – explain the advantages (4p)
- b) What are the road transport market characteristics? (2p)

QUESTION 4 Rail transport (12 points)

- a) In a single channel flow, a single-tracked line, traffic can only be driven in one direction at a time. Explain how to increase of the capacity of the single channel with 2 different methods, show graphs. (6p)
- b) What are the main obstacles for integrated rail transport in Europe? Name and explain 3 obstacles/problems. (6p)

QUESTION 5 Sea transport (8 points)

Explain reasons and potential consequences of the Hanjin crisis (8p)

QUESTION 6 Air transport and pipelines (8 points)

- Explain relation between payload and transport distance for airfreight and illustrate with a graph (4p)
- What kinds of goods are transported by pipelines, where and why? Example! (4p)

QUESTION 7 Intermodal transport (5 points)

Name different types of intermodal loading units and describe the advantages and disadvantages when using them in intermodal transportation. (5p)

QUESTION 8 Sustainability (12 points)

- During the lecture on “Energy Efficiency in Freight Transportation” different causes of over-capacity were mentioned. Name different causes of over-capacity in regard to the categories *actor*, *performance* and *logistics system*? Name at least two causes per category. (6p)
- Explain two models of directional development of dry ports and eventual benefits each of the models creates for the actors of the transport system involved. (6p)

QUESTION 9 Transport allocation (8 points)

Viki AB company produces electrical instruments in three factories in Sweden: Luleå, Mariestad and Alingsås. The instruments are delivered to four shops in Stockholm, Ystad, Göteborg and Malmö. The transport costs (SEK/unit), the shops demand (unit) and the factories production (unit) are:

	Stockholm	Ystad	Göteborg	Malmö	Supply
Luleå	15	22	38	40	20
Mariestad	29	27	33	35	75
Alingsås	39	41	16	19	15
Demand	22	31	37	30	

- Using transport algorithm, allocate the products from the factories to the shops so that the transport cost is minimized (7p)
- Calculate the final transport cost (1p).

QUESTION 10 Route planning (7p)

Use the Clark-Wright method to determine a routing schedule.

The trucks have the following capacities and maximum available operating time:

Lorry	Max. payload (tons)	Max. operating time (minutes/day)
A	10	120
B	11	120

On one day the customers are to receive the following quantity:

Customer:	C1	C2	C3	C4	C5
Quantity (tonnes):	4	14	5	4	3

Transport time, one way in minutes, from the terminal (T) to each customer, (C1 ... C5), and between each customer are given in the following table:

	T	C1	C2	C3	C4	C5
T	0					
C1	24	0				
C2	20	36	0			
C3	38	18	22	0		
C4	20	24	34	12	0	
C5	12	28	17	50	29	0

Savings-values:

C3-C4 46	C1-C5 8
C1-C3 ----	C1-C2 ----
C2-C3 ----	C2-C4 6
C1-C4 20	C4-C5 3
C2-C5 15	C3-C5 ----

- Calculate the saving values for the case (1p).
- Determine the routing schedule for each truck, i.e. determine which vehicle shall visit what customers and in which order, and specify how long time each truck is in operation (6p).