



CHALMERS

School of Technology Management and Economics
Master's Programme Management of Logistics and
Transportation

Written exam in

TEK121 Freight Transport Systems

Wednesday, xxx, 14.00-18.00, in the V building, Architecture, Sven Hultins g. 6

- Permitted aids: Non-programmable calculator and dictionary.
- Presentation: Write your name, id-number, the number of the question, and the page number on all sheets. Fill out the cover sheet.
- ONLY ONE QUESTION PER SHEET AND DO NOT USE THE BACK SIDES!**
- Grades: Maximum score of the written exam is 90 points.
- 40 points = passed
- The requirements to pass the course are passing grades on each of the following parts: AIT, ATS, and the exam.
- The grade for the course is based on the sum of the score from the exam + the score of the AIT assignment
- A total score of 40 to 60 points = 3
A total score above 60 to 80 points = 4
A total score above 80 points = 5
- Results: The results will be posted at the notice board outside the department on January 7th earliest.
- Examiner: Dan Andersson, phone: 772 1339, dan.andersson@chalmers.se.
- Exam review: Just on following two occasions: 14th and 19th of January 2009, 12.00-13.00, at the department.

Dan and Violeta will be present during the exam at two occasions, 15.00 and 17.00.

QUESTION 1 Terminology (6 points)

Define the following terms by explaining the operational similarities and differences between:

- Cross docking and merge in transit
- A straddle carrier and a gantry crane
- A container and a swap body

QUESTION 2 Road transports (12 points)

Explain the main positive characteristics of road transports that have resulted in this mode now having a dominating role for most types of transports. (4p)

What are the main negative effects from the massive expansion of road transports? (4p)

Explain how you could optimise the number of trucks/lorries and tractors by taking advantage of the different rules and regulations regarding the maximum length for various combinations of trucks, tractors and semitrailers. This should be done considering goods transported from continental Europe to Stockholm. (4p)

QUESTION 3 Railway transports (10 points)

Among other things it has been argued that rail freight transports have lost market shares due to uncertain and long lead times. What may this perception be based on? (5p)

What is a virtual node in a railway context? Describe and explain the effect on the railway traffic if a virtual node is established on a single track railway. (5p)

QUESTION 4 Sea transports (5 points)

Based on the basic characteristics of a RoRo ship what is your recommendation regarding what type of transport missions this type of ship should be used for. Discuss suitable types of goods, transport distances and conditions and requirements for loading/unloading. (5p)

QUESTION 5 Warehouses and terminals (12 points)

What basic cost trade off has to be considered when designing warehouses and warehouse operations. (2p)

Which are the basic design parameters when designing a warehouse and its operations? (4p)

Explain when and why you would recommend either a fixed placement strategy or a floating/moving placement strategy for storing goods in a warehouse. (4p) When may it be motivated not to use a terminal in a transport system? (2p)

QUESTION 6 Supply of logistics services (10 points)

When buying complex logistics services (which may be called third party logistics, TPL) why is it important to spend considerable efforts on defining the services? (2p)

When buying complex logistics services (TPL) explain how the service can be defined and who should define what? (5p)

Describe three fundamental differences in the purchasing process for simple transport services versus complex logistics services (exclude the service definition aspect) (3p)

QUESTION 7 Environment (5 points)

Define (define and list) regional environmental effects as well as measures that might be applied to lower the same (5 p).

QUESTION 8 Transport systems (6 points)

Discuss and explain how, during the last decades, conceptual changes in the material supply and/or distribution systems (i.e. changes in the material flow system, for instance changed production methods) have influenced the transport system.

QUESTION 9 Transport allocation (12 points)

The French cheese producer Baby Bell has three production facilities supplying four large wholesalers. The transportation cost (FF/ton), the production facilities capacities (tonnes) and the wholesalers demands (tonnes) are shown in the table below:

Wholesalers ⇒ Production↓	Reims	Marseilles	Toulon	St Michele	Capacity (tonnes)
Paris	14	20	18	22	10 000
Nice	16	22	17	21	25 000
Lyon	19	21	22	20	8 000
Demand (tonnes)	15 000	10 000	14 000	8 000	

- Using transport algorithm distribute the shipments so that the transport costs are minimized (8p).
- Explain the final result (1p) and calculate the total transport cost in the final matrix (2p).
- Explain in *words* how one is to solve the problem if, for example, the relation Paris – Toulon was forbidden due to lousy transportation possibilities (1p).

QUESTION 10 Route planning (12 points)

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	150
B	8	90

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

Customer:	C1	C2	C3	C4	C5
Quantity (tonnes):	2	14	3	3	4

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

	T	C1	C2	C3	C4	C5	Savings values:	
T	0						C1-C3	C1-C5 16
C1	28	0					C3-C4	C1-C2
C2	18	32	0				C1-C4 30	C4-C5 12
C3	34	16	24	0			C2-C3	C2-C4
C4	24	22	38	14	0		C2-C5 19	C3-C5 0
C5	14	26	13	48	26	0		

- Show graphically the geographical difference between a customer pair with a high savings value and a customer pair with a low savings value (2p).
- What does the savings value represent (formula and definition!) (2p)?
- 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).

Good luck!