CHALMERS

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

Written re-exam in

TEK122 Freight Transport Systems

Tuesday, April 14th, 2015; 08.30-12.30, M building

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, AHCEP and the exam.

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

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

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Violeta will be available by the phone.

The exam results will be available after April 28th.

The exam review will be available ONLY on following two occasions 30th of April and 5th of May 12:00-13:00 at the department of Logistics and Transportation.

QUESTION 1 (12 points)

Explain the following transport related terms (12 x 1 p):

a) Cycle time
b) Part load
c) Forwarder
d) Cabotage
e) Short coupling
f) ILU
g) Barge
h) Dry port
i) Regional effect
j) Chain imbalance (in resource utilization)
k) SECA
l) North-East Passage

QUESTION 2 Freight transportation (8p)

a) In transportation system there is both transport and traffic. Define and characterise these terms and clarify what is the difference between them. You should also explain how traffic and transport are interlinked. (Use three tiered model of a transport system to illustrate) (8p)

QUESTION 3 Road (9 points)

a) What are the main advantages of road transport (2p) and what characterises road transport market (2p)?
b) Accurate truck-km data is important for policy makers (McKinnon, 2010) since it influences which important calculations, name 2 (5p)?

QUESTION 4 Rail (10 points)

a)   Loop train principle design – explain and show in picture. (4p)

b)   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)

QUESTION 5 Sea & Air transport (8 points)

a) Explain RORO and LOLO vessels and their advantages and disadvantages (2x3p).
b) Explain relation between pay load and transport distance for airfreight (3p) (show graph).

QUESTION 6 Terminals (6 points)

a) Explain principal design of a terminal based on a penetration flow, illustration appreciated, and give an example (4p)
b) Explain crossdocking as a terminal function (2p)

QUESTION 7 Sustainability (12 points)

a) Explain the main reasons behind the success of close dry ports for Port of Sydney (Australia) and Port of Tauranga (New Zealand) despite the short haul rail. Not general benefits of dry port concept but of those two examples that were presented during the lecture. (6p)

b) What is the name of the terminal you had to describe in your ADP assignment; does it fit into the concept of dry port and why? (6p)

QUESTION 8 Route planning (10p)

A terminal manager is trying to plan how his two trucks are to drive each day to 5 customers that are located in his distribution area. You are to help by suggesting a vehicle routing that gives the best solution if the *Clark & Wright method* is applied.

The trucks have the following capacities and maximum available operation time for these assignments:

Lorry	**Max. payload (tons)**	**Max. operating time (minutes/day)**
A	12	120
B	8	90

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 ----	C1-C5 8
C1-C3 ----	C1-C2 ----
C2-C3 36	C2-C4 6
C1-C4 ----	C4-C5 3
C2-C5 15	C3-C5 ----

a) What does the savings value represent (formula and definition, not your own description!) (3p)?
b) Calculate the saving values for the case (1p).
c) 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. Show all steps of route creation (6p).

QUESTION 9 Transport allocation (10p)

Chocolate Inc. delivers its products from three factories in Lerum, Alingsås and Kungsbacka to three shops in Göteborg, Uddevalla and Malmö. Transport costs (SEK/ton), the shops demand (ton) and the factories production (ton) are:

	Uddevalla	Göteborg	Malmö	supply
Lerum	7	5	10	12
Alingsås	8	6	10	18
Kungsbacka	6	8	5	15
Demand	15	20	10	

a) Using transport algorithm allocate the products from the factories to the shops so that the transport cost is minimized (show all the steps not just the final one) (5p) and calculate the transport cost (1p).
b) How to approach the problem if the supply and the demand are not balanced (1p) explain in words?
c) If some of the relations in matrix are prohibited, for example: it is not allowed to send the products from Lerum to Malmö, how to approach that problem (1p)?
d) What does "0" as a potential for saving in the final matrix mean? (2p).

Good luck!