ORDRE DES INGÉNIEURS DU QUÉBEC

MAY 2012 SESSION

All documentation allowed
Programmable calculators and computers are forbidden
Duration: 3 hours

98-Ind-B9 Transportation problems in logistics

Question 1 (20 points)

A rapid-growth business would like to choose a warehouse among two possible locations A and B (Figure 1). The processing capacity of warehouse A is 500 000 units per year. The processing capacity of warehouse B is 400 000 units per year. Customers are located at point 1, 2 and 3 on the map. The annual demand of these customers are 200 000 units (customer 1), 125 000 units (customer 2) and 75 000 units (customer 3). We suppose that the two warehouses have similar storage costs.

a) Stating your hypotheses, calculate the transportation costs for each warehouse *(15 points).*
b) Select the best warehouse location based on transportation cost and any other criterion that would be relevant *(5 points).*

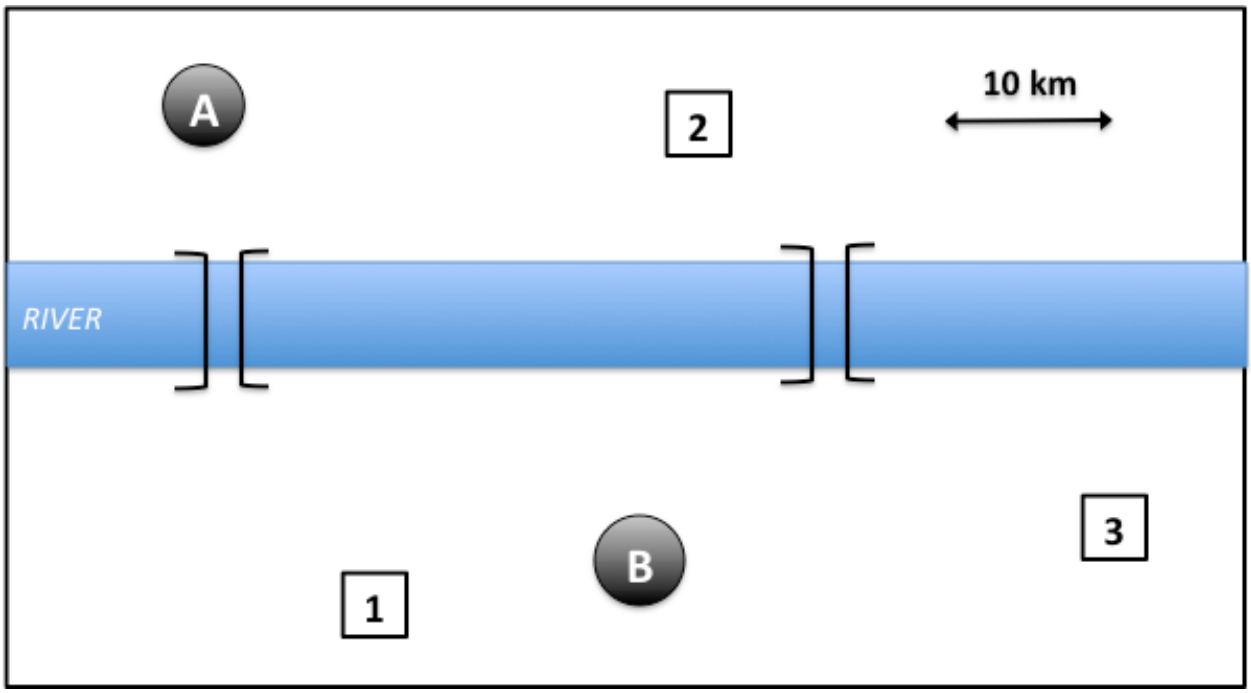

Figure 1

Question 2 (15 points)

A company would like to build a distribution warehouse in a large metropolitan area (Figure 2).

a) State four criteria to take into account in the location choice of a distribution warehouse *(10 points).*
b) Classify the three possible locations on the map (A, B, C) using the criteria stated in a) *(5 points).*

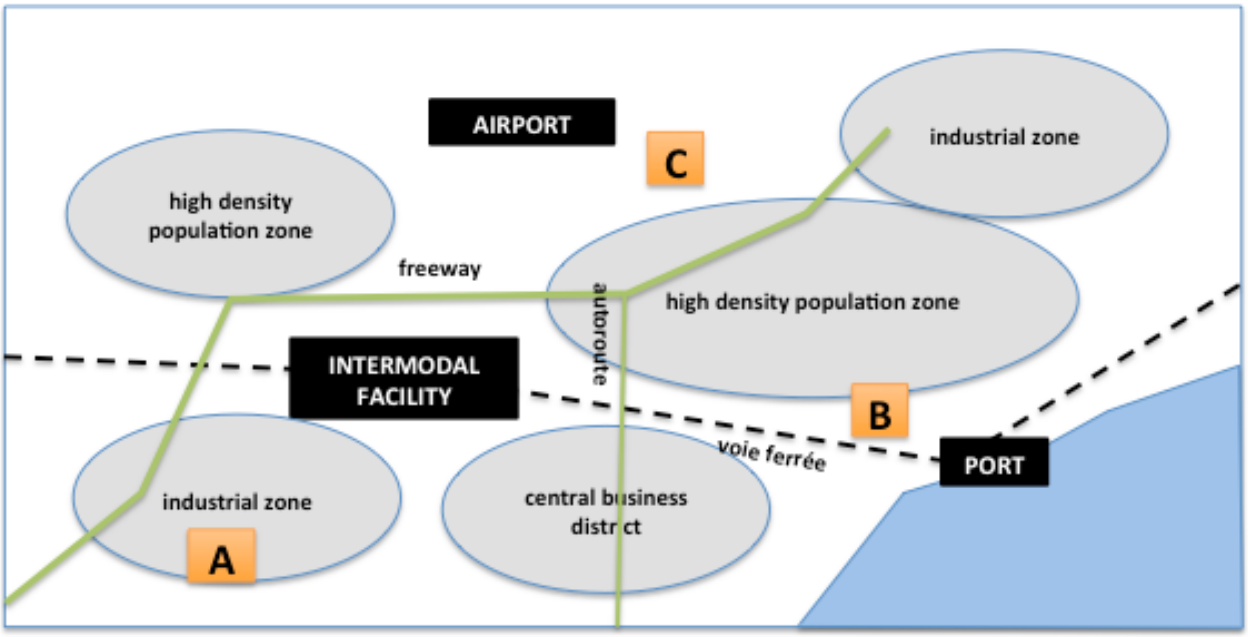

Figure 2

Question 3 (25 points)

You must service the customers A, B and C from the warehouse Z (Figure 3). A truck costs 50$/hour. The truck capacity is 6000 units.

a) Calculate the origin-destination of costs between A, B, C, Z *(10 points)* ;
b) Find the least expensive tour to deliver to customers A, B and C from the warehouse. Do not consider the truck capacity *(7 points).*
c) Find the least expensive tour(s) to deliver to customers A, B and C from the warehouse. Consider the truck capacity *(8 points)* .

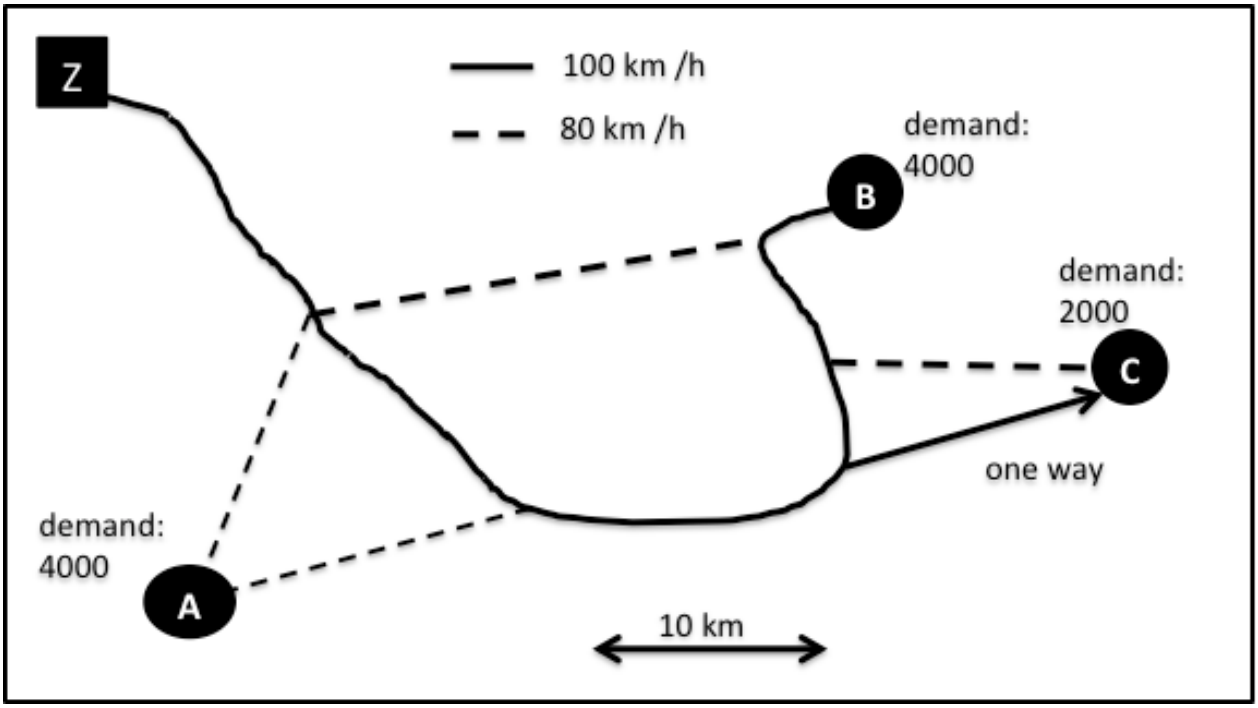

Figure 3

Question 4 (15 points)

Explain and define the following: *(3 points per element)*

a) pallet
b) container
c) order picking
d) automated storage and retrieval systems
e) temperature-controlled warehouse

Question 5 (5 points)

Give and explain 5 services which can be expected from a public *(1 point per service)*

Question 6 (5 points)

How is storage in transit an alternative to conventional warehousing?

Question 7 (15 points)

Give 3 examples of impacts that the warehousing systems has on the design of those five logistics functions: *(15 examples, 1 point per example)*

a) material requirements planning
b) material handling
c) transport
d) order picking
e) packaging