ORDRE DES INGÉNIEURS DU QUÉBEC

MAY 2013 SESSION

All documentation allowed
Calculators : only authorized models
Duration: 3 hours

98-Ind-B9 Logistics: Transportation aspects

Question 1 (10 points)

A company now plans to export its products internationally and wonders what impact this may have on its current logistic system. Name and explain five (5) differences between the two situations.

Question 2 (6 points)

Give examples of strategic, tactical and operational level decisions (1 point each) in regards with the following decision elements:

a) Warehousing
b) Order processing

Question 3 (8 points)

Identify and explain four (4) potential measures to evaluate the performance of a logistic system.

Question 4 (6 points)

Name and explain with an example three (3) decision criteria for the choice of location.

Question 5 (10 points)

A catering business (lunch box type) located in Quebec and serving customers in the region wants to reduce its total logistic cost. The company has three small delivery vehicles that are seldom used (early morning, late morning and late afternoon). Propose two (2) solutions and list the advantages and disadvantages of each to the owner.

Question 6 (15 points)

Name and explain five (5) considerations regarding the selection of material handling equipment.

Question 7 (20 points)

A large company needs to decide where to locate its central warehouse from which it will supply all its satellite sites. The central warehouse will be located at one of the existing sites. The distances between the sites are given in table 1.

a) Calculate the matrix of costs, if the cost of transportation is $ 5 per kilometer. (8 points)
b) Determine the best location for the central warehouse and show your calculations. (12 points)

Table 1 – Distance matrix (km)

Origin-Destination	A	B	C	D	E	F	G	H
A	0	54	56	84	105	184	300	503
B	54	0	48	82	84	182	279	482
C	56	48	0	72	56	172	251	454
D	84	82	72	0	121	158	244	448
E	105	84	56	121	0	223	215	419
F	184	182	172	158	223	0	232	436
G	300	279	251	244	215	232	0	208
H	503	482	455	447	419	437	208	0

Question 8 (25 points)

A state corporation is responsible for reverse logistics to collect from several deposits in Québec and to deliver to a central deposit. Travel times between sites are given in Table 2. In addition, 15 minutes are required to enter and exit a site. Moreover, the load time of a pallet is 2 minutes. Weekly needs of return transport sites are given in Table 3. The capacity of a delivery truck is 26 pallets and its operating cost is $ 65 per hour. When the duration of a route exceed 8.5 hours, the rate increases by $ 25, but it cannot exceed 10 hours in duration.

a) Calculate the origin-destination cost matrix. (10 points)
b) Propose and estimate the cost of vehicle routes for the week to meet the demand of each site and other constraints. (15 points)

Table 2 – Travel times (hours)

Origin-Destination	Central deposit	1	2	3	4	5
Central deposit	0	1,33	3,00	1,50	0,75	3,25
1	1,33	0	2,75	0,88	1,42	4,43
2	3,00	2,75	0	2,00	2,90	6,10
3	1,50	0,88	2,00	0	1,47	4,63
4	0,75	1,42	2,90	1,47	0	3,55
5	3,25	4,43	6,10	4,63	3,55	0

Table 3 – Weekly return demand (Pallets)

Sites	Weekly return
1	10
2	20
3	16
4	32
5	5