Logistics and Warehousing Management (DM-441) | IB-414

Trimester-IV, End Term Examination, September 2015

Time allowed: 2 hr 30 min   Max Marks: 50

Roll No: _____

Instruction: Students are required to write Roll No on every page of the question paper, writing anything except the Roll No will be treated as **Unfair Means**. In case of rough work, please use answer sheet.

Section A: Short answer questions (Five marks each. Attempt three; total marks 15)

1. Given below are some specifications of two different sizes of international containers.

 | | TEU | FEU |
    |---------|-----------|-----------|
    | Length | 20 ft | 40 ft |
    | Volume | 33 cu. mt. | 67 cu. mt. |
    | Payload | 24.8 kkg | 28.8 kkg |

    IKEA sources wooden flat boards and steel panels from Asia to Europe. These items are shipped through the sea route. Which container would you recommend for each of these items and why?

2. What are the three levels of packaging? What purpose does each level serve?

3. For its Dreamliner aircraft, Boeing sourced large aircraft wings and fuselage parts from its suppliers in Japan and Italy. These were regularly delivered to the Boeing USA plants on special cargo aircrafts to be assembled with other parts. How would you justify Boeing using such an expensive transportation mode for such bulky and heavy items?

4. What are the three different layers of transportation network? How is each different from the others?

5. Let us consider two different measures of transit time consistency.
    - In one measure, transit time consistency is measured as 'Contract transit time (CTT) + 2 days'.
    - In the second measure, transit time consistency is measured as 'Mode of actual transit times +/- two days'.

    Keeping in mind the empirical data on transit time variability discussed in class, which measure will you prefer and why?

B1. You are trying to understand what the lead time is for some product that you are managing. Unfortunately, there are no records or data. The only person who has experience with ordering this item is the inventory clerk. You ask her about the lead time and she says. "Well, the lead time does vary a lot, but I have no idea what the average or standard deviation is. I can tell you that the fastest time they ever filled an order is 10 days but it typically takes 18 days. And the longest time it took was like 4 weeks!" You thank her and go away.

   a. Using her estimates, what is the expected lead time? Assume there are 7 days in a week. **(2 marks)**
   b. Using her estimates, what is the standard deviation of the lead time? **(2 marks)**
   c. Using her estimates, what is the probability that the lead time will be greater than 20 days? **(3 marks)**
   d. Using her estimates, what lead time would ensure that you are stocking out only 10% of the time? **(3 marks)**

B2. Consider the Shenzhen Shoes problem discussed in class. Suppose the transit time on the APL ocean shipment from Hong Kong to New York changed from a mean of 29 days and a standard deviation of 3 days to a mean of 30 days and a standard deviation of 1 day.
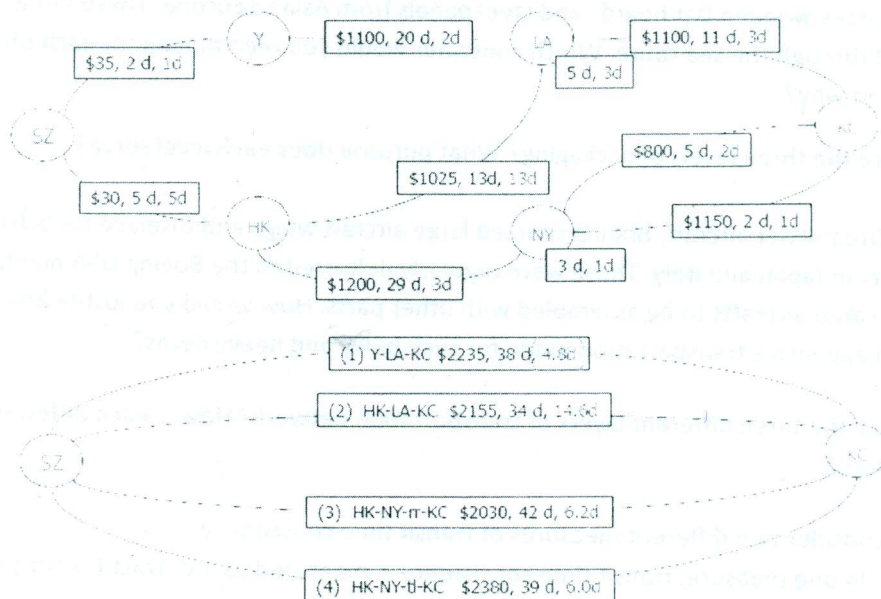
   i. What would the new expected transit time be for path (4) from Hong Kong to New York to Kansas City via truck in days? **(2 marks)**
   ii. What would the new standard deviation of transit time be for path (4) from Hong Kong to New York to Kansas City via truck in days? **(3 marks)**
   iii. By how much will the pipeline inventory cost change (in percent)? **(2 marks)**
   iv. By how much will safety inventory cost change (in percent)? **(3 marks)**

B3. Suppose you are managing the inbound lane from one of your major suppliers. You want to set your inventory policies but first need to determine the expected and standard deviation of demand over lead time. The details are as follows:

    i. Demand, μ_D = 594 units/day

    ii. Standard Deviation of Demand, σ_D = 89.1

    iii. Expected transit time, μ_L = 30 days

    iv. Standard deviation of transit time, σ_L = 9.0

  a. What is the expected demand (in items) over lead time? **(4 marks)**

  b. What is the standard deviation of demand (in items) over lead time? **(6 marks)**

Section C: Case study; 15 marks

You work for the Daily Donut Company that distributes donuts, on a daily basis - of course, from a central bakery to several small kiosks near subway and bus stations throughout your city of Gotham. You want to get a rough idea of your daily costs. You have gathered the following information:

- The donuts are distributed on specially equipped bicycles that can fit 8 cartons of donuts each.
- There are 60 kiosks located in Gotham.
- On average, each kiosk sells 2 cartons of donuts per day. They eat any leftover donuts at the end of each day - so only fresh donuts are sold each day. No donuts are held over.
- The cost to load a bike at the bakery is $5.
- The cost to stop at a kiosk to deliver is $1 per stop.
- The cost to unload and deliver a single carton of donuts at a kiosk is $0.20 per carton.
- The cost for pedaling the delivery bikes is $6 per mile.
- Downtown Gotham is a rectangular city of 4 by 6 miles with the bakery located in the upper North West corner.

    C1. What is the daily cost for loading the bikes with cartons of donuts at the bakery? **(2 marks)**

    C2. What is the daily cost for delivering the cartons of donuts to the kiosks? Only include the per stop charges and the per carton charges, NOT ANY DRIVING DISTANCES. **(2 marks)**

    C3. What is the daily cost for biking from the bakery to the kiosks? Include both the line haul and the local delivery costs. Assume a line haul circuity factor of 1.15 and a travelling salesman factor of 0.98 for your estimates. **(4 marks)**

    C4. What is the total daily transportation cost per carton of donuts for Daily Donuts in Gotham? Include all costs from leaving the bakery to delivery to the kiosks. **(1 mark)**

C5. You think that this total cost of delivery is too high and want to explore ways to reduce it. Which of the following options would lead to a lower total cost of delivery per carton of donuts? Consider them separately and show your working for each. **(2 marks each)**

i. Increase the number of cartons sold at a kiosk from 2 to 3. Assume that the total number of kiosks stays at 60.

ii. Increase the capacity of the delivery bikes from 8 cartons to 10.

iii. Relocate the bakery from the North West corner of Gotham, to the South East corner.