PGDM, 14-16

Supply Chain Management (DM-404)

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)

A1. In the context of Beer Game played in the class, discuss results on bullwhip effect if D1 and D2 are 'zero', instead of one week each in all the facilities.

A2. Americano (name disguised), the largest manufacturer of biscuits in India follows Efficient supply chain. The company proposes to introduce a select variety of the product through Responsive supply chain. The company has sought your advice to design the supply chain. Modelling your proposal on Fisher's 'What is your right supply chain', please prepare a one page blue-print covering incoming and outgoing areas of the supply chain.

A3. You are appointed Supply Chain Manager at Eastern Appliances, a medium sized company engaged in production and distribution of home appliances such as mixer-grinders, juicers, ovens, toasters, electric irons etc. The top management desires and has asked you to design 5 supply chain quantitative performance metrics in the domain of inventory management.

A4. Ludhiana is home to the largest share of woollen hosiery industry of India. The industrial town is also the finest example of practicing postponement strategy through push-pull supply chain management. Discuss the salient features of the supply chain as followed by the industry.

A5. The CPFR reference model provides a general framework for the collaborative aspects. Discuss various collaborative tasks under Collaborative Activity of Demand and Supply Management as applicable to a Retailer Tasks.

Section B: 10 marks each. Attempt any 2; total marks 20

B1. Suppose a distributor of TV sets is trying to set the inventory policy at the warehouse for one of the TV models. Assume that whenever the distributor places an order for TV sets, there is a fixed ordering cost of Rs.22,500, which is independent of the order size. The cost of TV set to the distributor is Rs.12,500 and the annual inventory holding cost is about 18 percent of the product cost. Replenishment time is about two weeks. The annual demand for the TV set is normally distributed with a mean of 20,000 sets and a standard deviation of 6000 sets. Given that the distributor would like to ensure 95 percent service level for a continuous review policy, what is the reorder level and the order quantity that the distributor should use? Assume a year comprises 50 weeks. **(6 marks)**

If the distributor places an order every three weeks, what will be the order-up-to-level will? **(4 marks)**

B2. Assume that National Bicycle is to manufacture 256 different models of cycles with four different components: Seat, Frame, Handle and Pedals. In the disaggregated option, National Bicycle designs specific component for each cycle, resulting in 4 x 256 = 1024 distinct components. In the common component option, National Bicycle designs four distinct seats, four different frames, four distinct handles and four different pedals, that can be combined to create 256 different cycle models. Each component is used in 64 different models. Monthly demand for each of the 256 models is independent and normally distributed with a mean of 600 and a standard deviation of 20. The replenishment lead time for each component is one month. National Bicycle is targeting a CSL of 95 percent for component inventory.

(a) Evaluate the safety inventory requirements with and without the use of component commonality. **(6 marks)**

(b) Now suppose that the demand of 4 of the 256 models are correlated with the correlation coefficient between any two models equal to 0.2. Demand for the remaining models are independent. What is the total safety inventory with component commonality? **(4 marks)**

B3.

a. Total logistics cost is the sum of inventory, transportation, and facility costs for a supply chain network. How does the total logistics cost vary as the number of facilities increases? Explain. **(5 marks)**

b. Higher implied demand uncertainty requires greater supply chain responsiveness. What are the different ways in which supply chain responsiveness can be increased? **(5 marks)**

Section C: Case study; 15 marks

Summer is high season for tourism in Jaipur: tens of thousands of tourists visit the city's historical landmarks. Many visitors take guided tours around these locations. Many of these guided tours make a stop at the Amer Palace. The thousands of tourists that stop here every summer, usually thirsty, are a great market for cold bottled water. A local store based next to the Palace takes advantage of this opportunity by placing dozens of water bottles in huge blue buckets with ice in the shade, within sight of the tourists. The colder the water bottles are, the better they sell. It takes usually several hours to chill the bottles, so the decision of how many bottles to prepare for sale is taken the previous day.

1. You have been asked by the store to help them calculate the number of water bottles they should chill and stock in the ice buckets, ready to sell to tourists each day. Based on historical data, you have determined the daily demand for bottled water during the summer is – on average – normally distributed with a mean of 400 bottles, and a standard deviation of 100 bottles. The store buys the water bottles at Rs.5.50 a piece, and spends an additional Rs.1.00 in electricity and ice to chill it and keep it that way. A chilled bottle is sold to the tourists at Rs.10.00 a piece. Since the labels of the bottles deteriorate under water, the bottles that do not

sell at the end of the day have to be discarded at a loss. What are the values of the shortage cost, excess cost, and the critical ratio? **(3 marks)**

2. Based on the data given in the previous question, how many water bottles should the store prepare for sale every day? Round to the closest multiple of 10. **(2 marks)**

3. The store runs short of chilled bottles if the demand on any day exceeds the quantity stored. What is the expected number of units short on any day? **(2 marks)**

4. The store's owner is concerned that your recommendation calls for stocking much less water than he is used to. He is convinced that for every person that doesn't get to buy water (because of shortage), the store loses an additional amount of Rs.5.00 worth of profit from sales in snacks and other things these people would have bought. Using Rs.5.00 as an additional penalty per lost sale, what is the new critical ratio? **(2 marks)**

5. Based on the value calculated in the previous question, how many water bottles should the store prepare for sale every day? Round to the closest multiple of 10. **(2 marks)**

6. The store owner's daughter is not happy with the wasteful policy of throwing away the bottles of water at the end of the day due to the damaged labels. "We should buy bottles with plastic labels, so that they can survive being in the water. That way we won't have to throw them away." The bottles with plastic labels cost Rs.1.00 more a piece, but can be sold the next day (this is the equivalent of having a salvage value of Rs.6.50.) Using this new salvage value and the additional penalty mentioned in Q4, how many bottles should the store stock now? **(4 marks)**