PGDM/IB, 18-20

Supply Chain Management (DM-441/IB-421)

Trimester-IV, End Term Examination, September 2019

Time allowed: 2 hr 30 min

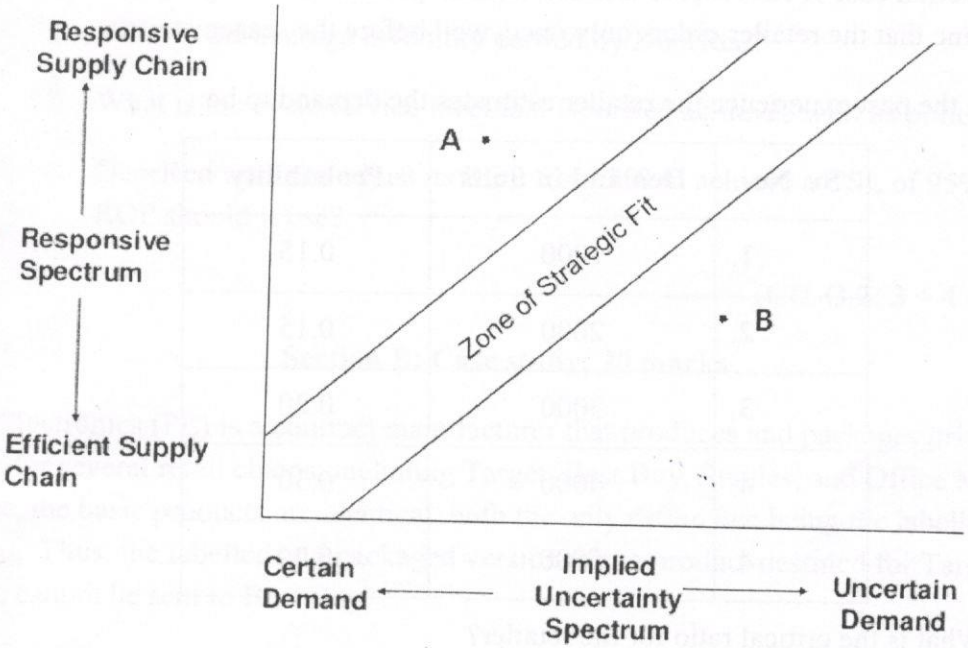
Max Marks: 50

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: Please attempt all questions. Internal choices are given in some questions. (Total marks 30)

A1. The figure below shows two supply chains, A and B in terms of their chosen position around the zone of strategic fit. What would be the implication of its position for each? Please be very brief.



(CILO 1; 5 marks)

OR

A product firm faces very high demand uncertainty. According to published empirical data, its products should enjoy high margins. But the firm's product margins are poor. What could be the possible reasons? Please be brief (bullet points would be preferred).

(CILO 1; 5 marks)

A2. Supply chain strategy involves a trade-off between cost and responsiveness. Consider a geographically dispersed market with multiple retail outlets. These are being served from a single distribution centre. How do cost and responsiveness change as you increase the number of distribution centres? Why? Please be brief and to the point.

(CILO 1; 5 marks)

OR

McMaster-Carr sells maintenance, repair, and operations (MROs) equipment directly from five warehouses in the United States. Customer orders are received via the web. Its competitor WW Grainger also sells MRO products, but from more than 350 retail locations, supported by several warehouses. Discuss the merits and demerits of the two distribution strategies.

(CILO 1; 5 marks)

A3. A retailer is contemplating to place order for woolen garments for children for the next winter season, which lasts for barely three months. The average retail selling price of a garment is Rs.500 per unit. The wholesale price paid by the retailer to the concerned manufacturer is Rs.300 per unit. Unsold stock can be disposed off at the end of the season at a discount store for Rs.80 per unit. The manufacturer incurs fixed production cost of Rs.100,000 and the variable production cost per unit is Rs.100. Assume that the retailer orders only once, well before the season starts.

From the past experience the retailer estimates the demand to be:

Sr. No.	Demand in units	Probability
1.	1000	0.15
2.	2000	0.15
3.	3000	0.20
4.	4000	0.30
4.	5000	0.20

a. What is the critical ratio for the retailer?
b. Given the data in this question, how much quantity should the retailer order to maximize its expected profitability?
c. What is the critical ratio for the entire channel? Assume that the channel consists of the manufacturer and the retailer.
d. How much should the retailer order to maximize the channel profit?
e. What should be the wholesale price offered to the retailer so that it makes sense for him/her to order the quantity you estimated in part d?

(CILO 3; 5x2 marks)

A4. Weekly demand for gaming consoles at Liverpool, a Mexican department store chain, is normally distributed with a mean of 1,000 and a standard deviation of 400. The replenishment lead time from the supplier is four weeks. Liverpool is targeting a CSL of 95 percent and uses a periodic review policy under which it reorders consoles every eight weeks.

a. How much safety inventory of consoles should Liverpool carry?
b. What should its order up to level be?

c. By how much does the average inventory carried change if Liverpool switched to a continuous review policy?

(CILO 2; 3 + 4 + 3 marks)

OR

DoorRed Pharmacy replenishes one of its best-selling drugs using a continuous review policy. Daily demand for the drug is normally distributed, with a mean of 300 and a standard deviation of 100. The wholesaler can process a replenishment request in two days. The current replenishment policy is to order 1,500 units when there are 750 units on hand.

a. What is the average inventory carried by DoorRed?

b. What is the cycle service level that DoorRed achieves with its policy?

c. DoorRed wants to adjust its ROP from 750 to achieve a CSL of 95%. What ROP should it use?

(CILO 2; 3 + 4 + 3 marks)

Section B: Case study; 20 marks

Penang Electronics (PE) is a contract manufacturer that produces and packages private-label products for several retail chains, including Target, Best Buy, Staples, and Office Max. In each case, the basic products are identical, with the only difference being the labelling and packaging. Thus, the labelled and packaged version of the product destined for Target, for example, cannot be sent to Best Buy.

Currently all products are manufactured, labelled, and packed at a production facility in Penang (Malaysia). This facility replenishes a DC in St. Louis (in the USA), from which all customer orders are filled. The manufacturing and transportation lead time from Penang to St. Louis is nine weeks. PE uses a continuous review policy to manage inventories at its St. Louis DC and aims to provide a cycle service level of 95 percent for each product.

The previous month had been very challenging because Best Buy requested 5000 additional units beyond what was available at the DC, whereas Target ordered 3500 fewer units and Staples ordered 4000 fewer units. Thus, even though there was sufficient product availability (since the basic product was the same), PE could not meet the Best Buy request because the

excess inventory available was labelled and packed for other customers. PE had faced shortage as well as excess stock of a single unit at the same time.

The vice president of supply chain at PE proposed postponing the final labelling and packing operations to the DC at St. Louis. Her logic was that this would allow PE to use all available inventories to serve any customer. In particular, the situation that arose last month could have been avoided through postponement. If labelling and packaging was shifted to St. Louis, the lead time of acquiring the basic product from Penang would continue to be nine weeks.

The DC management, however, was opposed to this idea because it would add additional work that was very different from what they had done so far. A detailed study had shown that labelling and packing at St. Louis would cost $1.50 per unit more than what it cost at Penang. The DC management believed that this move would unnecessarily complicate the DC operations and could adversely affect customer service.

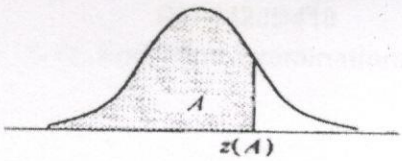
To evaluate the two options, a team from both manufacturing and the DC was set up. The team decided to focus its analysis on two major product categories – computers, and printers; and three major customers – Target, Best Buy, and Office Max. The weekly demand data for each product and customer are shown in the table below. All demands are normally distributed. PE incurred a total cost of $1000 per computer, and $300 per printer. Given the short life cycles of these products, PE used an annual holding cost of 30 percent when making its inventory decisions. The team analysed the impact of postponement on safety inventories before making a final recommendation.

	Computers		Printers	
	Mean	SD	Mean	SD
Target	1000	700	2000	1000
Best Buy	700	600	1500	800
Office Max	800	600	1200	600

Answer the following questions. Wherever possible, please be brief. Each part carries three marks.

1. What do you think is/are the problem(s) faced by PE's supply chain at present? You may wish to consider the concept of supply chain surplus (or that of responsiveness vs. efficiency) in answering this question. **(CILO 1; 3 marks)**
2. In what way will the proposed postponement address the problem(s) identified by you? Give your reason. **(CILO 2; 4 marks)**
3. What is the annual cost of holding safety inventory at the St. Louis DC at present? **(CILO 2; 5 marks)**
4. What is the comparable annual cost if the proposed postponement is carried out? Should PE go ahead with the proposal? **(CILO 2; 8 marks)**

Entry is area A under the standard normal curve from $-\infty$ to $z(A)$



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998