

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM & ENERGY STUDIES

Mid Semester Examination (Online) – Dec, 2020

Program: MBA (Business Analytics)

Semester: III

Subject/Course: Supply Chain Analytics

Max. Marks: 100

Course Code: DSBA 8006

Duration: 3 Hours

IMPORTANT INSTRUCTIONS

- 1. Use of calculator is allowed.**
- 2. Differentiation in marks will be based on to-the-point answers.**
- 3. Please note Writing sentences that misguide the examiner from the actual answer will lead to deduction of marks. So write less but accurate answers. Stick to the instructions given in the question paper.**
- 4. In case of any confusion, take an assumption and mention the assumption taken.**
- 5. In case of further confusion, feel free to contact the faculty in-charge.**

SECTION A			
Q.No	1. Each Question will carry 5 Marks 2. Instruction: Complete the statement / Select the correct answer(s)	Marks	COs
1.	Multiple Choice question. Components flowing in the supply chain from manufacturer to customer and vice versa are: a) Product b) Information c) Raw materials d) Coupons e) Funds i) a, b, c and e ii) b, c and d iii) a, b and e iv) a, b, d and e	5	CO1

2	<u>Match the following:</u>		5	CO4
	A) Stock out ratio	i) additional product to keep sales active		
	B) Safety Stock	ii) Meet the projected sales		
	C) cycle stock inventory	iii) Complement of % of demand actually satisfied with the defined service		
	D) Capacity Utilization	iv) ideal order quantity a company should purchase to maintain maximum supply chain profit		
	E) Cycle Service Level	v) fraction of the customer demand that will be properly served		
		vi) maximum of an organizations ability to provide demanded goods & service in the amount requested		
	vii) Is % probability of stock availability to meet demands			
3.	<u>True and False: (If false, mention and briefly explain the correct answer with example; If true, explain with example. No marks without explanation)</u> Vertical Keiretsu is an alliance of different companies led by a bank whereas horizontal keiretsu refers to a collaboration between manufacturers, suppliers and distributors.		5	CO3
4.	<u>True and False: (If false, mention and briefly explain the correct answer with example; If true, explain with example. No marks without explanation)</u> Pull processes are initiated by a customer order, whereas push processes are initiated in anticipation of customer orders.		5	CO3
5.	<u>Fill in the blanks:</u> _____ and _____ auctions are open-bid auctions whereas _____ and _____ auctions are sealed-bid auctions. Between auction and negotiation, when the total cost of ownership has multiple components besides the cost of acquisition, then _____ is preferred.		5	CO1

6.	<p>Complete the sentences by choosing words from the given option:</p> <p>The trade-off in transportation is between cost of transporting a product (_____) and speed of transportation (_____). Further, Product availability is the fraction of demand that is served on time from the _____ , _____ , and _____ .</p> <p>(total inventory/ safety inventory / cycle inventory / seasonal inventory / lead-time inventory/ Efficiency / responsiveness / customer service level)</p>	5	CO4
SECTION B 1. Each question will carry 10 marks 2. Instruction: Write short / brief notes			
7.	Draw a diagram and explain the level 1 and level 2 processes of SCOR Model.	10	CO3
8.	Explain any of the five drivers of Supply Chain. Mention their role and exactly 2 correct metrics that help in decision-making.	10	CO1
9.	<p>Topgun Records and movie studios have decided to sign a revenue sharing contract for CDs. Each CD costs the studio \$4 to produce. The CD will be sold to Topgun for \$6. Topgun in turn prices a CD at \$15 and forecasts demand to be normally distributed with a mean of 3,000 and a standard deviation of 1,000. Topgun will share 25 percent of the revenue with the studio keeping 75 percent for itself. Any unsold CD's are discounted to \$2 and all sell at this price. Money made from discounted CDs is kept by Topgun.</p> <p>(a) How many CDs should Topgun order?</p> <p>(b) How many CDs does Topgun expect to sell at a discount?</p> <p>Given: $NORMSINV(0.57)=0.1702$ and $NORMDIST(0.1702,0,1,0)=0.3932$</p> $\text{Cycle service level (CSL)} = \frac{(1-\text{share}\%)p-c}{(1-\text{share}\%)p-\text{discount}}$ $\text{Expected overstock} = (O^*-\text{mean}) * \text{CSL} + s.d. * NORMSDIST(F^{-1}(\text{CSL}),0,1,0)$	10	CO2
10.	A movie studio sells the latest movie on DVD to VidoesRuS at \$10 per DVD. The marginal production cost for the movie studio is \$4 per DVD. VideosRUs prices each DVD at \$20 to its customers. DVD's are kept on the regular rack for one-month period. Their current forecast is that sales will be	10	CO2

	<p>normally distributed with a mean of 10,000 and a standard deviation of 5,000.</p> <p>Compare the scenarios:</p> <p>Scenario 1: After the one-month, they are of no value</p> <p>Scenario 2: After one month, they are bought back by the movie studio at \$3. The movie studio recycles the DVDs that reduces their cost of production with a buyback price of \$2.</p> <p>(a) How many DVDs should VideosRUs order? (b) What is the profit that the studio makes given VideosRUs' actions?</p> <p><i>Given: NORMSINV(0.5)=0 and NORMSINV(0.5882)=0.22301</i></p> <p><i>NORMDIST(0.22301,0,1,0)=0.389; NORMSDIST(0,0,1,0)=0.3989</i></p> <p><i>Expected overstock = (O*-mean)*CR+s.d.*NORMSDIST(F⁻¹(CR),0,1,0)</i></p> <p><i>Expected manufacturer profit= O*(manufacturer's S.P.- manufacturer's C.P.)-(salvage value-buyback price) X expected overstock</i></p>		
11.	<p>Weekly demand for Motorola cell phones at a Best Buy store is normally distributed with a mean of 300 and a standard deviation of 200. Motorola takes two weeks to supply a Best Buy order. Best Buy is targeting a cycle service level of 95 percent and monitors its inventory continuously. How much safety inventory of cell phones should Best Buy carry? What should their reorder point be?</p> <p>Given: NORMSINV(0.95)=1.6449</p>	10	CO2
	<p>SECTION C</p> <p>1. Each question will carry 20 marks</p> <p>2. Instruction: Write long answer (800 words maximum)</p>		
12.	<p>Toffee.Inc produced a number of candies and toffees, including the most expensive of its products, a chocolate bar branded Seven Star. The retailers sold the product loose but the company packaged it in bags of 20 bars each. These bars were then packaged into cartons of 100 bags each. Seven star had different ingredients. from the normal toffees and candies of Toffee.Inc including dark chocolate (7.8 grams per bar), cocoa butter (6.2 grams per bar), cocoa powder (5.1 grams per bar), nuts (4 grams per bar) along with others such as condensed milk and sugar glucose. Each chocolate bar weighed 30 grams. However, these are perishable goods. Toffee.Inc maintains high quality grade and fresh products and hence wants to optimize their ordering limit to ensure maximum supply chain profit with minimum holding cost. Expected service level is 95%. Data is collected between 2006 and 2010 gives a mean demand of 13,948 cartons per year and a standard deviation of 264 cartons per year. Lead-time is 15</p>	20	CO4

days. Cost per carton is INR 1200/carton. Ordering Cost is INR 8000/order. Carrying cost per carton is 2.5% per month per carton.

Given the mean annual demand of 2011 is 17250 cartons. Further Toffee.Inc has to confront another issue at the level of the vendors, that is, it has to determine the order quantity of various ingredients by the vendors while keeping into consideration various information such as bulk discounts available, cost of orders, cost of holding, etc. for 2011.

Cost data for Cocoa Powder

Holding cost (% of the cost/year)	40%
Ordering Cost (INR/order)	1000
Quantity in KG	Price (INR/KG)
1 to 2000	120.30
2001 to 4000	120.20
4001 to 6000	120.10
Above 6000	120

Cost for Cocoa Butter

Holding cost (% of the cost/year)	30%
Ordering Cost (INR/order)	1200
Quantity in KG	Price (INR/KG)
1 to 1000	72.06
1001 to 2000	72.05
2001 to 3000	72.03
Above 3000	72.02

Cost of Dark Chocolate

Holding cost (% of the cost/year)	35%
Ordering Cost (INR/order)	800

Quantity in KG	Price (INR/KG)
1 to 1250	105.30
1251 to 2500	105.30
2501 to 3570	105.25
Above 3570	105.20

Cost of Fruits and Nuts

Holding cost (% of the cost/year)	25%
Ordering Cost (INR/order)	2100
Quantity in KG	Price (INR/KG)
1 to 2500	90.00
2501 to 5000	90.20
5001 to 7500	90.15
Above 7500	90.10

Questions

- 1) Find the reorder level for Seven Star for the years 2006 to 2010? (5)
- 2) Find the optimized lot size for order of Seven Star for years 2006 to 2010? (5)
- 3) From the vendor's perspective find the following for the ingredients:
 - a) Demand in KG per year (3)
 - b) Best order quantity (3)
 - c) Minimum cost of inventory (4)

Formulae.

$$ROL = DL + SS$$

$$Safety\ inventory\ (SS) = NORMSINV(CSL) * \sigma_L$$

$$NORMSINV(0.95)=1.645$$

$$EOQ = \sqrt{\frac{2AD}{ic}}$$

Purchase Cost = Demand (D) X Unit cost (U)

$$\text{Holding Cost} = \sqrt{\frac{Qic}{2}}$$

$$\text{Ordering Cost} = \frac{AD}{Q}$$

Total Cost = Holding Cost + Ordering Cost + Purchasing Cost