National Institute Of Technology, Hamirpur (HP)

Name of the Examination: End SemesterB.Tech
Branch :Mechanical Engineering   **Semester** :8th
Course Name : **Supply Chain Management Course Code:** ME 451

Maximum Marks: 50

Time: Three hours

Note: (i) Assume any missing data suitably. (ii) Supplement your answers with figures/tables, wherever possible. (iii) Q1 to Q6 carries 07 Marks each; Q7 is of 08 marks each.

Q 1. What are various distribution network design options in a supply chain management? Identify the key factors to be considered when designing a distribution network. Discuss the strengths and weaknesses of various distribution options (use Tabular format) on the basis of following performance dimensions *response time, product variety, product availability, customer experience time to market, order visibility and returnability* on 1-5 point scale, with 1 as strong performance and 5 weak performance

Q2. "A typical approach for risk identification is to map out and assess the value chains nodes to identify the key risks". Each node of the supply chain—suppliers, plants, warehouses, and transport routes—is then assessed in detail.
(i) Provide a supply chain network of a company to be assessed for risk.
(ii) Map out various risk sources in the network using a value chain.
(iii) Suggest some tailored mitigation strategies which can help the company to achieve balance between amount of risk mitigated and the increase in cost.

Q.3 State the importance of Supply Chain simulation. What are different simulation models available?. Provide a step –wise conceptual framework for Supply Chain simulation with the help of example.

OR

The following paragraph explains two dramatically different outcomes from one event that demonstrates the importance of proactively managing supply-chain risk and disruptions.

On March 17, 2000, lightning hit a power line in Albuquerque, New Mexico. The strike caused a massive surge in the surrounding electrical grid, which in turn started a fire at a local plant owned by Royal Philips Electronics, N.V., damaging millions of microchips. Scandinavian mobile-phone manufacturer Nokia Corp., a major customer of the plant, almost immediately began switching its chip orders to other Philips plants, as well as to other Japanese and American suppliers. Thanks to its multiple-supplier strategy and responsiveness, Nokia's production suffered little during the crisis.

In contrast, Telefon AB L.M. Ericsson, another mobile-phone customer of the Philips plant, employed a single-sourcing policy. As a result, when the Philips plant shut down after the fire, Ericsson had no other source of microchips, which disrupted production for months. Ultimately, Ericsson lost $400 million in sales.

- Identify various supply chain risk categories and their potential drivers and suggest various mitigation strategies with respect to identified categories.
- Write a general procedure for performing risk management in supply chain

Q4.Explain the different models of inventory used by warehouses to effectively stock the goods. It is said that *sourcing* decisions are always an important factor affecting the supply chain performance for all industries. Is there any exception to this? Explain by citing examples.
The following data is related to Paroma Ltd. Categorize the items according to ABC analysis

Item No	A001	B001	C001	D001	E001	F001	G001
Unit Cost	5	10	14	7	6	15	20
Annual Demand	47000	1500	200	700	4700	1100	17000

Q 5. Weekly demand figures at Hot and Spicy Pizza are as shown in Table 2. Estimate demand for the next 4 weeks using a 4-week moving average as well as simple exponential smoothing with a = 0.1. Evaluate the MAD, MAPE, MSE, bias, in each case. Which of the two methods do you prefer? Why?

Table 2: Demand data of Hot and Spicy Pizza

Week	1	2	3	4	5	6	7	8	9	10	11	12
Demand($)	110	118	119	134	92	115	90	106	118	106	95	93

Q6. An excellent example of a successful reverse logistics system is Apple. Apple manufactures iPhones and other electronic products, which are sold in various stores around the world. Consumers purchase the iPhone and accessories, enjoying their personal devices until they cease functioning or are replaced by an upgrade. Customers who return to the store for a new device are offered discounts on new products in exchange for recycling their old devices with Apple. These old models are brought back to the factories, stripped, and their parts which are still in good condition are used in newer products. This recycling approach helps Apple be more environmentally friendly, and also save money on production costs.Apple Inc has a life cycle assessment process that evaluates the effect a product has on the environment throughout its life cycle and the objective of the assessment does is to improve resource efficiency while trying at the same time to reduce the impact the product has on the environment during the activities of recycling, manufacturing, re-manufacturing, distribution, usage and disposal.

(i).What is Reverse Logistics? How it differs from forward logistics? What Are the 5Rs of Reverse Logistics?

(ii). Mention some terms used to manage cross border or global shipments in international logistics

(iii).Suggest some potential strategies to optimize reverse logistics process in above case.

(iv).If you are looking to optimize your reverse logistics processes, having a reliable 3PL logistics service provider is a great way to do so. How?

(v).Returns are an integral part of E-commerce. State some some ways to reduce the cost of reverse logistics while keeping your customers happy.

Q7. Provide an optimization model that can be used by Supply chain managers to allocate demand to existing production facilities.

A food sector company is planning to open new factories and is considering five possibilities of cities in Brazil: Manaus, Fortaleza, Vitoria, Barueri, and Curitiba. From the new facilities, the products will be delivered to five final customers: Sao Luis, Brasilia, Belo Horizonte, Rio de Janeiro, and Sao Paulo.Each factory has a fixed cost for maintenance and a maximum capacity, as shown in Table 3. The transportation costs per unit transported from each factory to each final consumer, besides the demand from consumers, are also detailed in Table 3. The company wishes to determine which factory(ies) to open, so as to minimize the sum of the fixed costs for installation and the transportation costs, ensuring that the demand of the final customers will be met.

Develop a mathematical model for the facility location problem

TABLE 3 Costs for Transportation, Fixed Cost, Capacity, and Demand

	Unit transportation costs					Fixed cost	Capacity
	Sao Luis	Brasilia	Belo Horizonte	Rio de Janeiro	Sao Paulo		
Manaus	0.82	0.95	1.10	1.33	1.22	111,000	35,000
Fortaleza	0.74	1.12	1.06	1.13	1.24	124,000	30,000
Vitoria	1.34	1.24	0.72	0.72	0.88	120,000	25,000
Barueri	1.48	1.26	0.98	0.95	0.70	135,000	30,000
Curitiba	1.52	1.45	1.33	1.22	1.15	140,000	20,000
Demand	16,000	18,000	12,000	17,000	20,000		