Seat No. /Enrollment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MBA-SEMESTER-III-EXAMINATION-WINTER-2024

Subject Code: 1539708 **Date: 21/12/2024**

Subject Name: Supply Chain Analytics

Time: 10:30 AM TO 01:30 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use of simple calculators and non-programmable scientific calculators are permitted.**

Q. No.		Question Text and Description	Marks
Q.1		Definitions / terms / explanations / short questions based on concepts of theory/practical (a) List any two core components of Supply Chain Analytics. (b) How does Big Data benefit supply chain management? (c) Define the bias-variance trade-off in predictive analytics. (d) What is the purpose of Lagrange optimization in supply chain analytics? (e) What are additive and multiplicative demand models in uncertainty modelling? (f) How does artificial intelligence contribute to supply chain analytics? (g) What is the role of ANNs (Artificial Neural Networks) in inventory management?	**14**
Q.2	**(a)**	Discuss the core components and types of Supply Chain Analytics. Provide examples to illustrate their applications.	**07**
	(b)	Explain the process and applications of Lagrange optimization in solving supply chain problems.	**07**
		OR	
	(b)	Compare uncertainty modelling with demand forecasting in supply chains. How are additive and multiplicative demand models used?	**07**
Q.3	**(a)**	Discuss the role of activation functions and model training in implementing ANNs (Artificial Neural Networks) for inventory management.	**07**
	(b)	Define benchmarking in the context of supply chain analytics. How does it contribute to achieving strategic goals like profitability and risk management?	**07**
		OR	
Q.3	**(a)**	Explain the shift in supply chain management in the Internet era and discuss challenges faced by modern supply chains.	**07**

	(b)	Discuss the steps involved in Supply Chain Analytics, emphasizing the importance of starting small but thinking big.	**07**
Q.4	**(a)**	How does lead time reduction and multiple sourcing improve supply chain responsiveness? Provide relevant examples.	**07**
	(b)	Discuss the implications of shipment ownership on global trade and how it influences supply chain strategies.	**07**

OR

Q.4	**(a)**	Discuss the Mean-Variance Analytics method for product selection. How does it help in resource allocation and capacity management?	**07**
	(b)	Describe the role of matrix formation and generalized least squares (GLS) in predictive modelling for supply chain analytics.	**07**

Q.5 **Case Context:**

Flipkart, one of India's leading e-commerce platforms, operates in a dynamic and competitive environment where efficient supply chain management is crucial. With millions of products and customers spread across the country, Flipkart faces challenges such as demand uncertainty, lead time variability, and risk management in its logistics operations.

To tackle these challenges, Flipkart implemented advanced Supply Chain Analytics (SCA) powered by Big Data. Using predictive analytics, the company optimized demand forecasting by analyzing past sales, customer preferences, and regional trends. They integrated machine learning models to predict inventory requirements accurately, reducing overstocking and stockouts.

In addition, Flipkart employed prescriptive analytics techniques such as Taylor's expansion and gradient descent to optimize delivery routes and minimize lead times. By leveraging real-time IoT data from its delivery fleet, Flipkart improved responsiveness, managed supply chain risks, and adapted to disruptions like weather or traffic conditions.

The company also invested in cognitive analytics, including Artificial Neural Networks (ANNs), to manage its vast inventory efficiently. This innovation improved decision-making regarding product variety, resource allocation, and capacity management.

Outcomes:

- Flipkart reduced delivery lead times by 20%.
- Inventory costs dropped by 15% while maintaining service

	(a)	Questions: How did Flipkart use predictive and prescriptive analytics to optimize its supply chain? Illustrate with examples from the case.	**07**
	(b)	What are the strategic goals achieved by Flipkart through Supply Chain Analytics, and how do they contribute to operational excellence?	**07**

OR

Q.5	(a)	Compare and contrast Top-Down vs. Bottom-Up approaches in strategic considerations for supply chain management	**07**
	(b)	Explain the bias-variance trade-off in predictive analytics and discuss how it impacts supply chain decision-making.	**07**

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