

Code No: **24BA4T1****II MBA - II Semester - Regular Examinations – JUNE 2026****LOGISTIC AND SUPPLY CHAIN ANALYTICS**

Duration: 3 Hours

Max. Marks: 70

Note: 1. This question paper contains two Parts: Part-A and Part-B.

2. Part-A contains 5 essay questions with an internal choice from each unit.

Each Question carries 12 marks.

3. Part-B contains one Case Study for 10 Marks.

4. All parts of Question paper must be answered in one place

BL – Blooms Level

CO – Course Outcome

PART - A

			BL	CO	Max. Marks
<u>UNIT – I</u>					
1.	a)	Discuss how information technology (IT) and electronic data interchange (EDI) contribute to building a responsive, integrated supply chain.	L2	CO1	4 M
	b)	Compare and contrast traditional logistics with integrated supply chain management. What are the key benefits of integration?	L3	CO1	8 M
OR					
2.	a)	Describe the concept of an "Integrated Supply Chain" and discuss two key benefits of integrating logistics with other business functions.	L2	CO1	7 M
	b)	Explain the "Mission of Logistics Management" and how it contributes to organizational efficiency.	L2	CO1	5 M

<u>UNIT – II</u>					
3.	a)	Explain the concept of customer service in logistics and discuss its role in customer retention.	L2	CO2	6 M
	b)	Discuss the reasons for increasing customer expectations in logistics and supply chain services.	L2	CO2	6 M
OR					
4.		What is customer profitability analysis? Explain its importance in logistics decision-making with suitable examples.	L2	CO2	12 M
<u>UNIT-III</u>					
5.		Explain the role of supply chain process mapping and performance indicators in improving logistics efficiency.	L2	CO3	12 M
OR					
6.	a)	Demonstrate the significance of benchmarking of the logistic process.	L2	CO3	4 M
	b)	Analyze the nature of channel relationships in supply chains. How do strong channel relationships improve logistics efficiency?	L4	CO3	8 M
<u>UNIT – IV</u>					
7.	a)	Demonstrate the importance of coordination in the supply chain. What problems arise due to lack of coordination?	L3	CO4	7 M
	b)	Discuss the basic economics of transportation and its impact on logistics cost.	L2	CO4	5 M

OR					
8.	Illustrate about the sourcing, transportation and pricing decisions in supply chain management and explain how they influence overall supply chain performance.		L3	CO4	12 M
<u>UNIT – V</u>					
9.	Analyze the techniques used in Aggregate Production Planning, such as level strategy, chase strategy and mixed strategy with relevant real world examples.		L4	CO5	12 M
OR					
10.	a)	What is Multi-Attribute Decision Making (MADM)? Explain its significance in decision-making problems.	L2	CO5	5 M
	b)	Discuss the objectives and importance of Aggregate Production Planning (APP) in operations management.	L2	CO5	7 M

PART – B

	CASE STUDY	L4	CO4	10 M
11.	Eco-Fruits, a premium organic fruit retailer based in Chennai, India, specializes in high-quality, pesticide-free mangoes, procuring them directly from farmers in Salem (300 km away) and distributing them to 50 retail outlets across Chennai. The company has built a reputation for superior quality, but recently, they are facing major supply chain challenges. Currently, Eco-Fruits sources from over 100 small farmers. While this supports local farming, it has resulted in inconsistent quality, delayed shipments and high administrative costs in managing individual relationships. Some farmers offer better prices but lower quality, while others provide premium quality at higher costs.			

Eco-Fruits rely on third-party refrigerated trucks to move mangoes from Salem to Chennai. Due to fluctuating fuel prices, transportation costs have risen by 25%. Furthermore, poor road conditions lead to 15% wastage of the fruit during transit. The current carrier has an erratic transit time, leading to stock outs in Chennai.

Eco-Fruits sell the mangoes at a premium price. However, due to high sourcing costs and rising transportation expenses, their profit margins have compressed by 10%. They are considering raising the final price to consumers (risking volume drop) or sourcing from cheaper, lower-quality farms closer to Chennai to reduce transport costs.

QUESTIONS:

i. Analyze the sourcing situation. Suggest whether Eco-Fruits should continue with the current sourcing strategy or adopt a more concentrated vendor base. Justify your answer.

[3 Marks]

ii. Identify the major problems in the current transportation model. Propose two alternative transport strategies to reduce wastage and cost.

[4 Marks]

iii. Evaluate the pricing dilemma. Suggest a pricing model that maintains premium quality without losing customer volume, considering the cost-to-serve analysis.

[3 Marks]

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II MBA-II Semester- Regular Examinations June, 2026**LOGISTICS AND SUPPLY CHAIN ANALYTICS****Duration: 3 Hours****Max. Marks: 70****Note:**

1. this question paper contains three Parts-A, and Part-B
2. Part-A contains 5 short answer questions. Answer any Five Questions. Each Question carries 12 Marks.
3. Part-C contains one Case Study for 10 Marks.
4. All parts of Question paper must be answered in one place

SCHEME OF VALUATION**PART – B (5 x 12 = 60)**

PART – B (5 x 12 = 60)				
UNIT-I				
1.	(a)	Introduction to Information Technology	1 M	4M
		Introduction to Electronic Data Interchange	1 M	
		Integrated Supply Chain	2 M	
	(b)	Comparison of Traditional Logistics with Integrated Supply Chain Management	4 M	8M
		Benefits of Integration	4M	
2.	(a)	Concept of Integrated Supply Chain	4 M	7M
		Benefits of Integration of Supply Chain	3 M	
	(b)	Mission of Logistics Management	3 M	5M
		Mission of Logistics Management and Organizational Efficiency	2 M	
UNIT – II				
3.	(a)	Customer Service in Logistics	3 M	6M
		Customer Retention	3 M	
	(b)	Concept of Customer Expectation	3 M	6M
Reasons for increasing the Customer Expectation		3 M		
4.		Customer Profitability Analysis	6 M	12M
		Customer Profitability Analysis and Logistics Decisions	6 M	
UNIT – III				
5.		Supply Chain Process Mapping	6 M	12M
		Key Performance Indicators	6 M	
6.	(a)	Concept of Benchmarking	2 M	4M
		Significance of Benchmarking of the logistics process	2 M	
	(b)	Channel Relationship in Supply Chains	4 M	8M
		Strengthening the channel relationship to improve logistics efficiency	4 M	
UNIT – IV				
7.	(a)	Importance of Coordination in Supply Chains	3 M	

		Problems in lack of Coordination	4M	7M
	(b)	Basics of Transportation Economics	3 M	
		Transportation Economics and Logistics Costs	2 M	5M
UNIT – V				
8.		Sourcing Decisions	4 M	
		Transportation Decisions	4 M	12M
		Pricing Decisions	4 M	
9.		Techniques of Aggregate Planning	8 M	
		Real world Examples	4 M	12M
10.	(a)	MADM Model	3 M	
		Significance	2 M	5M
	(b)	Objectives of Aggregate Production Planning	4 M	
		Importance of Aggregate Production Planning	3 M	7M
PART – C				
11.	(a)	Sourcing situation and Eco-friendly products *	3 M	
	(b)	Problems in Current Transportation Model*	4 M	10M
	(c)	Pricing Dilemma*	3 M	

* As per the discretion of Examiner

PART – B (5 x 12 = 60)				
UNIT-I				
1.	(a)	Introduction to Information Technology Information Technology (IT) forms the backbone of modern Supply Chain Management (SCM). By linking suppliers, manufacturers, and retailers, IT enables real-time data tracking, process automation, and improved decision-making. This drives faster fulfillment, lower holding costs, and seamless coordination across global logistics networks. Key IT systems and innovations that empower supply chains include: • Enterprise Resource Planning (ERP): Centralized software systems that automate inventory tracking, procurement, and manpower planning to ensure optimal resource allocation. • Electronic Data Interchange (EDI): Standardized computer-to-computer communication that allows businesses to rapidly process orders, minimizing typing and typographical errors. • RFID and Barcoding: Automated identification systems that use electromagnetic fields or optical patterns to track multiple items simultaneously through warehouses and retail points. • Warehouse and Transportation Management Systems (WMS/TMS): Specialized software suites designed to automate and intelligently manage inventory fulfillment, order routing, and logistical dispatch. • Emerging Technologies: The integration of the Internet of Things (IoT), Artificial Intelligence (AI), and Blockchain to improve supply chain visibility, predictive forecasting, and transaction security.		1M

	Introduction to Electronic Data Interchange Electronic Data Interchange (EDI) is the computer-to-computer exchange of structured business documents (such as purchase orders, invoices, and shipping notices) between companies with zero human intervention. In supply chain management, it replaces slow, error-prone paper or email processes, allowing businesses to transact instantly and securely	1 M																		
	Integrated Supply Chain • Internal integration: function to function • Inter-company integration: a manual approach • Electronic integration Integration was measured across eight variables as follows: 1. Access to planning systems. 2. Sharing production plans. 3. Joint EDI access/networks. 4. Knowledge of inventory mix/levels. 5. Packaging customisation. 6. Delivery frequencies. 7. Common logistical equipment/containers. 8. Common use of third party logistics	2 M																		
(b)	Comparison of Traditional Logistics with Integrated Supply Chain Management <table><tr><th>Feature</th><th>Traditional Logistics</th><th>Integrated Supply Chain Management</th></tr><tr><td>Primary Focus</td><td>Cost-effective physical movement, storage, and distribution.</td><td>End-to-end coordination, procurement, production planning, and strategic agility.</td></tr><tr><td>Information Flow</td><td>Fragmented; relies heavily on manual communication like emails, phones, and paper.</td><td>Synchronized; utilizes advanced tech like AI, RFID/IoT, and cloud platforms for real-time visibility.</td></tr><tr><td>Inventory Strategy</td><td>Often relies on stockpiling to prevent shortages, leading to overstocking and higher carrying costs.</td><td>Leverages demand-sensing and just-in-time (JIT) methodologies to minimize waste and excess stock.</td></tr><tr><td>Relationship with Partners</td><td>Transactional; focuses on individual contracts with carriers and vendors.</td><td>Collaborative; builds strategic, long-term partnerships with shared goals and forecasting.</td></tr><tr><td>Customer Focus</td><td>Secondary; less emphasis on personalized individual needs or rapid feedback loops.</td><td>Primary; heavily focused on personalized offerings, agility, and dynamic customer experiences.</td></tr></table>	Feature	Traditional Logistics	Integrated Supply Chain Management	Primary Focus	Cost-effective physical movement, storage, and distribution.	End-to-end coordination, procurement, production planning, and strategic agility.	Information Flow	Fragmented; relies heavily on manual communication like emails, phones, and paper.	Synchronized; utilizes advanced tech like AI, RFID/IoT, and cloud platforms for real-time visibility.	Inventory Strategy	Often relies on stockpiling to prevent shortages, leading to overstocking and higher carrying costs.	Leverages demand-sensing and just-in-time (JIT) methodologies to minimize waste and excess stock.	Relationship with Partners	Transactional; focuses on individual contracts with carriers and vendors.	Collaborative; builds strategic, long-term partnerships with shared goals and forecasting.	Customer Focus	Secondary; less emphasis on personalized individual needs or rapid feedback loops.	Primary; heavily focused on personalized offerings, agility, and dynamic customer experiences.	4 M
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Benefits of Integration • Improved End-to-End Visibility: Centralized data platforms—such as modern Enterprise Resource Planning (ERP) systems—allow stakeholders to monitor inventory, orders, and supplier performance in real-time. • Controlled Costs & Reduced Waste: By synchronizing demand planning	4 M																			

		and logistics, businesses eliminate excess inventory, lower transactional costs, and prevent overproduction. • Enhanced Supplier Collaboration: Transforming vendor relationships into shared partnerships improves contract terms, pricing negotiations, and communication. • Superior Customer Service: Faster fulfillment, precise delivery tracking, and fewer stockouts lead to higher client retention and stronger brand loyalty. • Agility and Incident Management: Interconnected supply networks can easily adapt to demand spikes or supply disruptions, detecting and resolving issues before they impact the end customer. • Strict Quality Control: A single, concerted compliance framework across the entire chain ensures faulty products are caught early and addressed quickly.	
2.	(a)	Concept of Integrated Supply Chain • An integrated supply chain coordinates ☐ Procurement, ☐ Production, ☐ Quality, ☐ Packaging, ☐ Distribution, and ☐ Delivery • Integration' in the context of the supply chain is concerned with coordination: • Establishing the 'rules of the road' whereby material and information flows work in practice. Benefits of Integration of Supply Chain • Controlled Costs & Reduced Waste: By synchronizing demand planning and logistics, businesses eliminate excess inventory, lower transactional costs, and prevent overproduction. • Enhanced Supplier Collaboration: Transforming vendor relationships into shared partnerships improves contract terms, pricing negotiations, and communication.	4 M 3M
	(b)	Mission of Logistics Management • The mission of logistics management is to plan and co-ordinate all those activities necessary to achieve desired levels of delivered service and quality at the lowest possible cost. • Logistics must therefore be seen as the link between the marketplace and the supply base. • The scope of logistics spans the organisation, from the management of raw materials through to the delivery of the final product.	3 M
		Mission of Logistics Management and Organizational Efficiency Logistics management acts as the engine for organizational efficiency by integrating core business functions like procurement, warehousing, and transportation. The primary missions and resulting benefits include: • Cost Reduction: Optimizing freight consolidation, route planning, and warehouse storage minimizes unnecessary expenditures and drives profit	2 M

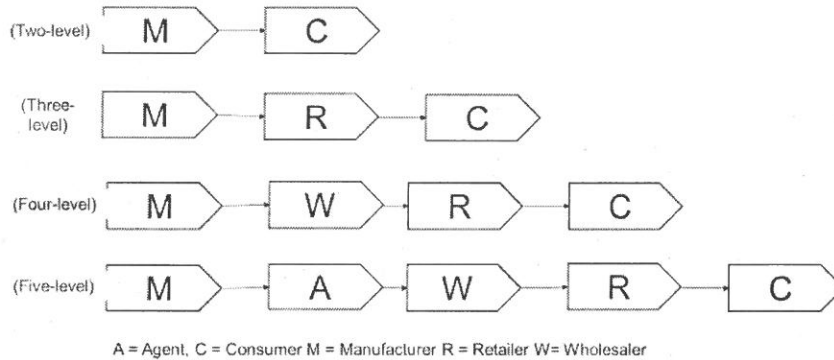
		maximization. • Workflow Optimization: Efficient handling of inbound materials ensures manufacturing pipelines remain uninterrupted and productive. • Customer Satisfaction: Meeting delivery metrics directly improves the customer experience and builds long-term brand loyalty. • Competitive Edge: Companies leverage fast, reliable delivery and reduced order errors to gain a strong market advantage over competitors.	
UNIT – II			
3.	(a)	Customer Service in Logistics Customer service can be defined as a process of enhancing the level of customer satisfaction by meeting or exceeding customer expectations. It can provide a competitive advantage to the firm and the supply chain by maximizing the total value to the final customer. LaLonde and Zinszer in a major study of customer service practices suggested that customer service could be examined under three headings: 1. Pre-transaction elements 2. Transaction elements 3. Post-transaction element	3 M
		Customer Retention • Real-Time Transparency: Implement digital tracking and automated alert systems. Shippers expect instant quotes, online booking, and predictive visibility into where their cargo is. • Proactive Communication: Do not let the customer discover a delay on their own. Establish dedicated support teams that notify clients early and provide mitigation plans when supply chain disruptions occur. • Optimize Last-Mile & Returns: Offer flexible, scheduled deliveries and simplify the reverse logistics process with clear return policies and prepaid labels. • Leverage Data Analytics: Analyze customer complaints, delivery exceptions, and reverse logistics data to fix recurring bottlenecks. • Personalized Services: Tailor your logistics solutions to meet specific industry needs. This builds a strong partnership rather than a transactional vendor relationship.	3 M
	(b)	Concept of Customer Expectation Customer expectations describe how customers envision each interaction with your company. From self-service options to customer service wait times, these expectations span every touchpoint throughout the customer journey. There are three basic questions that business needs to answer: 1. Who are the customers? 2. What do they desire and expect? 3. How well does the business perform in order to meet those expectations? Customer Value Expectation=Highest Quality+ Lowest Price+ Quick Service	3 M
4.		Reasons for increasing the Customer Expectation • Digital Transformation: Consumers are accustomed to seamless, intuitive, and mobile-friendly digital experiences. If a company's web or app interface is slow or complex, it drives instant frustration. • The "Always-On" Culture: Powered by real-time messaging and	6 M

		automation, customers now expect 24/7 availability and immediate responses rather than waiting days for an email or being left on hold. • Hyper-Personalization: Over 73% of customers expect companies to anticipate their unique needs. They expect brands to remember their purchase history and tailor interactions accordingly. • The Power of Online Reviews: Word-of-mouth has moved to public digital spaces. Consumers now read and heavily rely on reviews before making purchases, which naturally holds brands to a higher, transparent standard. • Increased Competition: Customers have more choices than ever before. If one business fails to deliver an optimal experience, consumers are willing to switch to a competitor after just one bad encounter.	
		Customer Profitability Analysis Customer Profitability Analysis (CPA) in logistics calculates the exact net profit generated by an individual client or segment by subtracting their specific serving costs from total revenue. It is calculated as: $\text{Customer Profitability} = \text{Total Revenue} - \text{Total Cost to Serve}$. In supply chain and transport operations, large-volume accounts often suffer from hidden margin erosion. CPA uncovers these discrepancies by identifying the "cost-to-serve" drivers unique to each logistics relationship. Customer Profitability Analysis and Logistics Decisions To perform an accurate CPA, logistics managers must trace expenses beyond basic freight rates. Core cost drivers include: • Order Complexity: Frequent small-batch orders increase processing, picking, and packing costs. • Delivery Requirements: Expedited freight, weekend deliveries, or multi-stop routing require higher operational expenditure. • Returns & Reverse Logistics: Processing, restocking, and refunding returned items severely impact profitability. • Special Handling: Specialized warehousing, temperature control, or fragile/hazardous materials. • Payment Terms: Costs associated with carrying inventory for clients with extended payment cycles or financing.	6 M
UNIT – III			
5.		Supply Chain Process Mapping Supply chain mapping documents and visualizes the parties, facilities, and flows involved in moving a product from raw materials to the end customer. It is a living practice essential for mitigating risks, identifying operational bottlenecks, and ensuring compliance.	6 M

	The diagram illustrates a supply chain process. It starts with 'Raw Materials' (I, II, III, IV) which feed into 'Fabric Supplier' (I, II, III, IV). These suppliers feed into 'Dye House' (I, II, III, IV). The dye houses feed into 'Garment Manufacturing' which includes 'Supplier A', 'Supplier B', 'Supplier C', and 'Sub-contractor'. These then feed into 'Company Distribution Centers' (Company). The company distribution centers feed into 'Distributors' (Dist. 1, Dist. 2, Dist. 3, Dist. 4, Dist. 5), which finally lead to 'Sales'. A double-headed arrow at the bottom of the diagram is labeled 'Flow of information'.	
	Key Performance Indicators Traditional measures • Productivity • Quality • Customer service • Marketing-Logistics Interface • Customer Service & Retention • Cost related • Asset management Contemporary approach Involves application of frameworks and tools from management accountant perspective • Balanced score card • Activity Based Management and costing • Economic Value added • Process driven metrics - SCOR framework Productivity Measures • Ratio of output to input Time window and unit of measurement to be defined Indicative measures • Units shipped per employee • Units to labour cost • Equipment downtime • Capacity utilization • Order per sales person • Order entry efficiency Quality Measures Refers to an attribute of logistical or cross functional driver that can be used to gauge quality of supply chain performance Indicative measures: • Number of faultless notes invoiced • Order entry accuracy • Picking / Shipping accuracy	6 M

		• Number of customer returns • Damage frequency • Number of credit claims • Information availability	
6.	(a)	Concept of Benchmarking Benchmarking is a Strategic Management tool used to compare an organization's performance, processes, or practices against those of industry peers or best-in-class companies. It involves identifying key performance indicators (KPIs), metrics, or standards that are relevant to the organization's goals and objectives. By benchmarking, organizations can gain insights into their strengths, weaknesses, and areas for improvement relative to competitors or industry standards. This process enables organizations to identify best practices, adopt innovative strategies, and drive continuous improvement in areas such as quality, efficiency, customer satisfaction, and profitability.	2 M
		Significance of Benchmarking of the logistics process • Cost Optimization • Enhanced Customer Satisfaction • Operational Transparency • Fostering Innovation • Improved Supplier & Carrier Management	2M
	(b)	Channel Relationship in Supply Chains Logistics versus Marketing Distribution Channel Logistics Channel <pre> graph TD A[Supplier facility] --> B[Transportation] B --> C[Manufacturing facility] C --> D[Transportation] D --> E[Warehouse] E --> F[Transportation] F --> G[Retail Store] G --> H[Final Customer] </pre> Distribution Channel <pre> graph TD A[Supplier Sales] --> B[Manufacturing purchasing] B --> C[Wholesaler] C --> D[Retail Consumer] D --> E[Final Consumer] </pre>	4 M

Common Channel Structures



Channel structure in practice

Tata Chemicals	→	Distributor	→	Stockist	→	Retailers	→	Consumer
ITC	→	Wholesale Dealer	→	Wholesalers	→	Retailers	→	Consumers
Forito – Lay	→	C&F Agent	→	Stockist	→	Wholesaler	→	Retailer → Consumer
Castrol	→	Distributors	→	Dealers	→	Retailers	→	Consumer

Strengthening the channel relationship to improve logistics efficiency

- **Centralized Platforms:** Adopt a shared Transportation Management System (TMS) to manage schedules, updates, and issue tracking. [
- **Automated Triggers:** Implement Vendor-Managed Inventory (VMI) systems connected via EDI or APIs to automate reordering and reduce human error.
- **Shared Insights:** Give distributors access to real-time inventory dashboards to prevent stockouts and reduce overstocking across multiple nodes.

4M

UNIT – IV

(a) Importance of Coordination in Supply Chains

- Supply chain coordination happens only when physical flow, information flow, and financial flow are synchronized.
- Physical flow management from receiving of order to supply of goods and services
- Information flow is critical for transmittal and tracking of servicing an order by SC partners
- Financial flow is critical as all partners are engaged in creating value in monetary and real terms.

3 M

	<pre> graph LR A[Receipt of an order] --> B[Funding from own and bank] B --> C[Procuring materials] C --> D[Manufacture—own and outsourced] D --> E[Delivery to buyer] E --> F[Banker receiving buyer confirmation] F --> G[Receipt of balance payments] G --> H[Balance payments to creditors] </pre>	
	Problems in lack of Coordination • The Bullwhip Effect: Demand distortion results in overproduction and bloated inventory, which escalate holding costs and require costly markdowns or write-offs. • Information Silos: A lack of real-time visibility across NetSuite Supply Chain Challenges or supplier networks creates blind spots, causing delayed responses to disruptions. • Misaligned Incentives: When individual tiers optimize for local targets (e.g., maximizing bulk discounts) rather than overall system efficiency, they diminish total profitability. • Operational Inefficiencies: Poor communication with logistics and transportation providers results in missed deliveries, capacity shortages, and higher freight expenditures.	4 M
(b)	Basics of Transportation Economics • The word ‘channel’ has its origins in the word for canal, • This for marketing can be interpreted as a route taken by products as they flow from production to points of intermediate and final use. • Marketing is a key factor in a continuous cycle that begins and ends with consumer wants. • It is the role of the marketer to interpret consumer wants and combine them with empirical market data such as ▪ Location of consumers, ▪ Their numbers and preferences, ▪ To establish the starting point for manufacture. • On completion of manufacture, the finished product is moved to the consumer and the cycle is complete when he or she obtains satisfaction resulting from product ownership.	3 M
	Transportation Economics and Logistics Costs • Cost-Distance Relationship: Transport costs increase with distance but at a decreasing rate due to the fixed costs of pickup and delivery amortized over longer line-hauls. • Density and Stowability: High-density items spread fixed transport costs across more weight units, resulting in lower relative per-unit shipping costs. Efficient packaging enhances stowability, maximizing trailer capacity.	2 M

		• Macro-economic Factors: National logistics costs as a percentage of GDP typically drop as economies transition from manufacturing and agriculture toward service-based industries. For example, targeted infrastructure improvements and policy realignments can substantially shift macro metrics. • Operational Optimization: Improving load utilization—such as redesigning pallets or standardizing shipping policies—minimizes expensive line-haul rates.	
UNIT – V			
8.		Sourcing Decisions • The sourcing function has primary responsibility for the supply side of the organization, • whereas marketing has primary responsibility for the customer side of the organization. • We can also say that sourcing addresses the “upstream” part of the supply chain. • The sourcing function is often referred to by a number of different terms and there is some confusion regarding its name. • These names include “purchasing,” “procurement,” “sourcing,” “strategic sourcing,” and “supply management.	4 M
		Transportation Decisions • Mode of Transport: Choose between Road, Rail, Sea & Air by weighing cost versus speed. Air and trucking (TL/LTL) offer quick transit for time-sensitive or high-value freight, while rail and maritime are cost-effective for bulk shipments over long distances. • Consolidation: Optimize Transport Decisions in Logistics by utilizing vehicle and carrier consolidation. Grouping smaller, partial loads (less-than-truckload or LTL) into full loads or multi-stop routes minimizes decision-making criteria and reduces line-haul costs. • Routing and Scheduling: Maximize fleet utilization and minimize travel distance by leveraging software to solve Freight and Transportation Optimization problems. This avoids transportation increase by properly scheduling dock flows and load planning. • Network Design: Decide between direct shipping, central distribution centers (DCs), and milk runs based on your specific inventory and coordination requirements.	4 M
		Pricing Decisions • Cost Categories: Fixed costs like facility rent and variable costs like fuel, tolls, and driver wages. • Pricing Methods: Choosing between contract rates, spot market rates, and dynamic pricing models. • Optimization Tools: Utilizing intelligent Decision Support Systems and algorithmic quote generators to align with current market conditions. • Value-Added Services: Incorporating handling, specialized packaging, and guaranteed delivery times into the final price.	4 M
9.		Techniques of Aggregate Planning • Hiring and laying off workers - Hiring additional workers as needed or by	8 M

10.		laying off workers not currently required. • Overtime - This entails asking or requiring workers to work extra hours a day or an extra day per week, firms can create a temporary increase in capacity without the added expense of hiring additional workers. • Part-time or casual labour - By utilizing temporary workers or casual labour (workers who are considered permanent but only work when needed, on an on/call basis, and typically without the benefits given to full/time workers) companies reduce the salary bill significantly. • Inventory - Finished/goods inventory can be built up in periods of slack demand and then used to fill demand during periods of high demand • Subcontracting - Frequently firms choose to allow another manufacturer or service provider to provide the product or service to the subcontracting firm's customers	
		Examples Basic Strategies • Chase (the demand) strategy; produce at the instantaneous demand rate • fast food restaurants • Level strategy; produce at the rate of long run average demand • swim wear • Time flexibility; high levels of workforce or capacity • machining shops, army Deliver late strategy spare parts for your Jag	4 M
	(a)	MADM Model • This decision paradigm underlies multicriteria decision-making (MCDM) in general. • In practice, almost everyone may face an MCDM problem on a daily bases, which most cope with by aggregating the criteria through an intuition-oriented weighting mechanism. • Nevertheless implementing a systematic MCDM approach is essential to making informed and logical decision. • The historical origins of MADM can be traced back to series of correspondence letter between Nicolas Bernoulli (1687–1759) and Pierre Rémond de Montmort (1678–1719), • While discussing a mathematical brain teaser, known as the St. Petersburg paradox (Tzeng and Huang 2011).	3 M
		Significance of MADAM Model • Objective Evaluation: It minimizes subjective bias by quantifying qualitative and quantitative variables into standardized, weighted scores. • Conflict Resolution: It explicitly handles conflicting attributes (e.g., maximizing performance while minimizing cost) by applying assigned weights to calculate an optimal compromise. • Efficiency and Trade-offs: The process guides stakeholders in recognizing the exact trade-offs being made when selecting one option over another.	2 M
	(b)	Objectives of Aggregate Production Planning • Minimizing Operating Costs: APP evaluates cost trade-offs across regular production, overtime, subcontracting, and stockpiling to identify the most	4 M

		economical path. • Balancing Capacity and Demand: It matches manufacturing output to expected demand curves, smoothing out spikes and drops so the facility is neither over-stressed nor idle. • Minimizing Inventory Investment: It optimizes stock levels to reduce holding and storage costs while ensuring there is enough supply to prevent stockouts. • Stabilizing Workforce and Production Levels: By calculating optimal employment sizes and equipment usage, it limits the costs and inefficiencies associated with frequent hiring, layoffs, idle time, and rapid shifts in production rates. • Maximizing Resource Utilization: It efficiently distributes the workload across different production lines and shifts to avoid machine overload and maintain continuous output. • Cross-Functional Alignment: It unites departments like sales, finance, and procurement to make sure operational plans support overarching business and financial goals without getting bogged down in day-to-day item-level (SKU) details.	
		Importance of Aggregate Production Planning • Cost Optimization: By forecasting demand and aligning production, companies can minimize expenses associated with overtime, inventory holding, hiring, layoffs, and subcontracting. • Balancing Demand and Capacity: APP serves as a foundational bridge in the Sales and Operations Planning (S&OP) process. It identifies gaps between market demand and available production capabilities, allowing businesses to adjust strategies before costly bottlenecks occur. • Resource Allocation: Efficiently plans how to utilize labor, materials, and machinery. Instead of reacting to day-to-day fluctuations, manufacturers can maintain steady workforces and prevent machine overload. • Cross-Functional Coordination: Fosters collaboration by aligning disparate departments (sales, marketing, finance, human resources, and operations) under a single, unified production target. • Improved Customer Service: By proactively planning production smoothing or chase strategies, businesses can ensure product availability, reduce wait times, and meet varying market trends with higher value	3 M
PART – C			
11.	(a)	Sourcing situation and Eco-friendly products *	3 M
	(b)	Problems in Current Transportation Model*	4 M
	(c)	Pricing Dilemma*	3 M

* As per the discretion of Examiner
