CMR INSTITUTE OF TECHNOLOGY	USN										

Sub:	Logistics and Supply chain Management	

	II-IAT- SCHEMA & SOLUTIONS	Marks
	Part A - Answer Any Two Full Questions (2* 20 = 40 marks)	
1 (a)	Mention any three types of inventories with one example each. **Scheme of Evaluation:** Each inventory type: 1 mark × 3 = 3 marks **Suggested Answer:** 1. **Raw Materials Inventory** – Basic inputs for production. *Example*: Steel used in car manufacturing. 2. **Work-In-Progress (WIP)** – Semi-finished goods under production. *Example*: Assembled engine in a car factory. 3. **Finished Goods Inventory** – Completed products ready for sale. *Example*: A packaged television in the warehouse.	[03]
(b)	Compare ABC analysis with VED classification and discuss when each method is appropriate. **Scheme of Evaluation:** • ABC concept – 2 marks • VED concept – 2 marks • Comparative table/points – 2 marks • Application context – 1 mark **Suggested Answer:** **ABC Analysis (Always Better Control):** • Categorizes inventory based on **monetary value**. • **A items** – High value, low quantity; **B** – Medium; **C** – Low value, large quantity. • Helps prioritize inventory control efforts. **VED Classification:** • Based on **criticality of items** (mainly in pharma/hospitals). • **V** – Vital, **E** – Essential, **D** – Desirable. • Used when item availability directly affects operations. **Application:** • **ABC** is useful in retail/industrial sectors. • **VED** is critical in healthcare or defense inventory systems.	[07]
(c)	Evaluate how Material Requirements Planning (MRP) contributes to efficient inventory replenishment in modern industries. **Scheme of Evaluation:** • MRP definition – 2 marks • Components (BOM, Inventory status, Master Production Schedule) – 3 marks • Working mechanism – 2 marks • Benefits (cost reduction, timely replenishment) – 3 marks	[10]

	Suggested Answer: **MRP** is a computer-based system that schedules material requirements for production based on forecast demand and existing inventory. **Key Components:** 1. **Bill of Materials (BOM)** – Hierarchical list of raw materials. 2. **Inventory Status File** – Current stock and orders in pipeline. 3. **Master Production Schedule (MPS)** – Production timeline. **Working:** • MRP calculates "net requirements" by deducting on-hand inventory and scheduled receipts from gross requirements. • Suggests when to **order** or **produce** each component. **Benefits:** • Avoids overstocking/stockouts. • Reduces **inventory carrying costs**. • Improves **production efficiency** and customer service. • Enhances **supply chain visibility** and responsiveness.	
2 (a)	Mention any three packaging-related issues that affect transportation **Scheme:** • 1 mark for each relevant issue **Answer:** 1. **Improper packaging size** – Leads to inefficient use of transport space. 2. **Weak packaging material** – Causes product damage during transit. 3. **Non-stackable design** – Increases handling and storage costs.	[03]
(b)	Describe the factors affecting road transport costs and their implications on distribution efficiency. **Scheme:** • Listing factors – 3 marks • Explanation with implications – 4 marks **Answer:** **Factors:** 1. **Fuel costs** – Affects freight rates directly. 2. **Toll charges and taxes** – Adds to the cost burden. 3. **Driver wages and labor laws** 4. **Vehicle maintenance** 5. **Traffic congestion and delays** **Implications:** • Increased costs reduce **profit margins**. • Poor road conditions cause **delays**, affecting **lead times**. • Optimized routing and vehicle loading improve **distribution efficiency**.	[07]
(c)	Assess the challenges of designing global distribution networks and propose a distribution strategy for an FMCG company operating in India. **Scheme:** • Challenges – 5 marks • Strategy proposal – 5 marks **Answer:** **Challenges:**	[10]

	1. **Complex customs regulations** 2. **Variable lead times** 3. **Currency fluctuations** 4. **Coordination across regions** 5. **Demand forecasting difficulties** **Suggested Distribution Strategy for FMCG in India:** • **Hub-and-Spoke model**: Central warehouses in metros, regional distribution centers in Tier 2/3 cities. • **Demand-driven replenishment** using real-time POS data. • Collaborate with **3PL providers** for last-mile delivery. • Use of **cold chains** for perishable goods. • Leverage **digital tools** (AI, analytics) for demand planning.	
3 (a)	List and explain two key environmental challenges faced in logistics. **Scheme:** • 1.5 marks each challenge with explanation **Answer:** 1. **Carbon emissions** – High emissions from freight contribute to air pollution and climate change. 2. **Waste from packaging** – Excessive or non-biodegradable packaging causes landfill and ocean waste.	[03]
(b)	Examine how does IT help in mitigating logistics-related environmental issues? **Scheme:** • IT tools (ERP, TMS, GPS) – 3 marks • Explanation on sustainability – 4 marks **Answer:** • **Transportation Management Systems (TMS)** optimize routes and loads, reducing fuel usage. • **Real-time tracking** helps reduce idling time and emissions. • **Warehouse automation** leads to efficient energy use. • **E-documentation** reduces paper consumption. • IT enables **carbon tracking**, allowing for green logistics planning.	[07]
(c)	Evaluate the impact of digital transformation in supply chains by taking any example. **Scheme:** • Definition – 2 marks • Digital tools used – 3 marks • Case example with impact – 5 marks **Answer:** **Digital transformation** integrates technology to enhance transparency, speed, and flexibility in supply chains. **Tools:** • IoT devices for asset tracking • AI/ML for demand forecasting • Blockchain for traceability • Cloud-based SCM platforms **Example – Amazon:** • Uses **AI-driven inventory systems**. • **Robotics in warehouses** improve picking speed.	[10]

	• **Predictive analytics** help in proactive restocking. **Impact:** • Reduced stockouts • Faster delivery • Lower operational costs • Improved customer satisfaction	
4	**Case Study - Flipkart's Smart Replenishment System** During its Big Billion Days 2023 sale, Flipkart implemented an AI-powered smart replenishment system to improve stock availability and delivery speed. The system used customer browsing behavior, past purchases, and regional demand trends to auto-stock fast-moving items at local warehouses. As a result, order fulfillment speed improved by 20%, especially in metro areas. However, the system also caused overstocking of certain electronics in smaller towns, due to inaccurate demand predictions. This led to excess inventory holding costs and reverse logistics challenges. Despite the drawbacks, the technology enhanced overall supply chain responsiveness and positioned Flipkart as a tech-driven logistics leader. **Questions:** a. How did Flipkart's smart replenishment system enhance order fulfillment performance during the Big Billion Days? Discuss its impact on customer satisfaction and operational efficiency **Scheme:** • Description of system – 2 marks • Customer satisfaction – 1.5 marks • Operational efficiency – 1.5 marks **Answer:** • Flipkart used **AI-powered auto-replenishment** to stock fast-moving items closer to demand zones. • This led to **20% faster deliveries** in metro cities. • **Customer satisfaction** improved due to quick service and availability of products. • **Operational efficiency** increased through reduced inter-warehouse movement and improved pick-pack-ship processes. b. What challenges did Flipkart face due to overstocking in smaller towns, and what improvements would you suggest to refine its replenishment strategy? **Scheme:** • Challenge identification – 2 marks • Suggested improvements – 3 marks **Answer: Challenges:** • Overstocking in low-demand regions caused **higher holding costs**. • **Inaccurate demand forecasting** in smaller towns. • Led to **reverse logistics burden**. **Suggestions:** 1. Use **hybrid demand models** combining online behavior and historical offline sales. 2. Implement **dynamic safety stock policies**.	[05] [05]

	3. Collaborate with **local sellers for consignment-based inventory**. 4. Use **feedback loops** to retrain AI models with real-time data.	