K. K. Wagh Institute of Engineering Education and Research, Nashik
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Model Answer
End-Sem Examination-I, Winter 2025

Academic Year: 2025-2026	Semester: Sem III
Class: PG II	Program: MBA
Branch Code: 10	Pattern: 2024
Name of Course: Logistics Management	Course Code: 2410613D

Q. No.	Details	Max. Marks
Q.1	Outline the step-by-step export procedure in India, from obtaining IEC to shipment realization. Discuss the role of key documents like Shipping Bill and commercial invoice in customs clearance. (6 marks) India's export procedure follows a structured sequence from registration to payment realization, governed by DGFT and customs regulations. **Step-by-Step Export Procedure** 1. Obtain IEC: Apply online via DGFT portal with PAN, Aadhaar, and bank details for a lifetime 10-digit Importer-Exporter Code (IEC), mandatory for all exports. 2. Registration and Compliance: Register with Export Promotion Councils (e.g., EPCG for machinery), obtain RCMC, and secure licenses for restricted items via DGFT. 3. Secure Order and Finance: Finalize sales contract/Incoterms with buyer, arrange pre-shipment finance (e.g., LC packing credit), and procure raw materials duty-free under Advance Authorisation. 4. Production and Inspection: Manufacture goods per quality standards; obtain pre-shipment inspection certificates if required (e.g., for food/agri). 5. Customs Filing and Clearance: File electronic Shipping Bill on ICEGATE with supporting docs; customs examines/appraises goods and issues Let Export Order (LEO). 6. Shipment and Negotiation: Load goods post-LEO, obtain Bill of Lading/Airway Bill; submit Export General Manifest (EGM) and negotiate documents via bank for realization within 9 months. **Role of Key Documents in Customs Clearance** The Shipping Bill serves as the core customs declaration, detailing HS code, value, quantity, and buyer info; filed electronically, it triggers assessment, examination (physical/random), and LEO issuance—mismatches delay clearance or attract penalties. The Commercial Invoice evidences transaction value for duty drawback/ad valorem calculations, cross-verified against packing list/BL to prevent undervaluation fraud, ensuring accurate forex realization reporting to RBI.	[6]
Q.2	Differentiate between Logistics Real Estate, Logistics Parks, and freight villages. (6 marks)	[6]

Aspect	Logistics Real Estate	Logistics Parks	Freight Villages
Scale/Scope	Single building/facility	Multi-tenant campus	Intermodal transfer hub
Ownership	Private lease/sale	Developer-managed	Often public-private
Primary Focus	Storage/fulfillment	Mixed ops/services	Cargo consolidation
Location	Transport nodes	Urban peripheries	Multimodal corridors
Integration	Standalone	Shared infra	Mode-switching

Q.3

a) Explain the logistical characteristics of roadway freight transport. Discuss its importance with a case.

(8 marks)

Road freight transport offers unmatched flexibility for perishable goods distribution across India's diverse urban-rural network, enabling door-to-door delivery without intermodal transfers. Despite challenges like traffic congestion on NH48 and fuel price surges (diesel up 15% in 2025), it handles time-sensitive loads better than rail or air for mid-distances.

Road Freight Advantages

Flexibility shines in dynamic routing to multiple cities (e.g., Mumbai to Pune, Nashik, Aurangabad), allowing last-minute order changes unlike fixed rail schedules. Door-to-door service cuts handling risks for perishables, maintaining cold chain integrity via reefer trucks, with lower upfront costs than air freight for 1,000 km hauls.

Road transport handles 70-80% of inland freight in India/EU due to its versatility for last-mile and urgent deliveries, reducing inventory needs via just-in-time logistics.

[16]

8+8

Any Case by student. Sample Case: Amazon India's Peak Delivery Network: During 2024 festive season, Amazon relied on 1.5 lakh road trucks/partner fleets for 1 crore+ daily parcels across 20,000 pincodes, achieving 99% OTD despite monsoons. GPS-optimized TMS rerouted around jams (saving 20% time), electric vehicles cut fuel costs 30%, and FTL for bulk enabled door-to-door from fulfillment centers. This boosted revenue ₹50,000 Cr, underscoring road's role in e-commerce scalability over rigid rail options.

OR

b) What are the differences between wagonload transport, part-load transport, and combined transport?

Aspect	Wagonload	Part-Load	Combined
Scale	Full wagon (high volume/weight)	Partial vehicle space (low-	Standardized units

		mid)	(variable)
Consolidation	Wagons grouped into trains	Loads in shared truck	Multi-modal with containers
Best For	Bulk, long rail hauls	Small/urgent road shipments	Long-distance eco-efficient
Transit Time	Predictable but yard-dependent	Flexible but multi-stop	Optimized bulk legs
Cost Driver	Per wagon, bundling savings	Per pallet/m^3	Mode mix, distance-based

c) Consider a European rail network upgrading from diesel to electric high-speed freight lines amid rising energy costs. Explain rail freight's significance in bulk transport, its development history, and technologies like automated signalling. Evaluate transport value (capacity) versus affinity (speed limitations) with strategies for intermodal integration

(8 marks)

Students are expected to answer based on the concept of rail freight, transport value and affinity.

European rail networks upgrading to electric high-speed freight lines address rising energy costs (electricity 30-40% cheaper than diesel) and decarbonization goals, enhancing bulk transport efficiency across corridors like Betuweroute.

Rail Freight Significance

Rail excels in bulk transport of commodities like coal, aggregates, and intermodals (e.g., 1,500-2,000 tons per train), offering low cost per ton-km (₹0.5-1 vs. road's ₹2-3) and CO2 savings of 75% over trucks for 500+ km hauls. It decongests roads, supports EU Green Deal targets, and handles 20-30% of freight volume in mature networks like Germany/Netherlands.

Value vs. Affinity Evaluation

Rail's transport value lies in massive capacity (74-ton axle loads, 1.5 km trains) for bulk, but affinity lags with speed limits (160-200 km/h freight vs. 300+ passenger), extending door-to-door times. Strategies: intermodal hubs for seamless truck-rail swaps (e.g., 40-ft containers on pocket wagons), TMS for synchronized schedules, and last-mile electromobility to match road flexibility, targeting 15-20% market share growth.

OR

d) Explain the logistical characteristics of pipeline transport. Elaborate the four different categorizations of pipeline transport.

It is an independent mode of transport. However, unlike other transport modes, transport route, transport container, and means of transport form a unit in this instance. Pipelines can be categorized into four groups: oil, gas, and product pipelines, as well as other energy pipelines.

Q.4	a) Explain the role of IT in logistics and provide an example of its benefits for the company. IT plays a pivotal role in modern logistics by enabling real-time data integration, automation, and analytics across supply chain functions like inventory, transportation, and warehousing. **Core Roles of IT** IT systems such as TMS, WMS, and ERP streamline operations through visibility (e.g., GPS/IoT tracking), predictive analytics for demand forecasting, and automation of routing/inventory to cut errors and delays. Communication standards like EDI/GS1 ensure seamless data exchange among carriers, forwarders, and CEP providers, while AI optimizes routes and identifies disruptions. **Key Benefits** IT reduces costs (15-30% via optimized fleets/inventory), boosts efficiency (e.g., 99% order accuracy), and enhances decision-making with dashboards linking KPIs like OTD and turnover. It supports scalability for peaks and compliance via blockchain for traceability. **Company Example: DHL Implementation** DHL Freight adopted a cloud-based TMS with AI rerouting, cutting fuel costs by 20% and improving OTD to 98% during disruptions; integrated WMS reduced warehouse errors by 40%, yielding €10M annual savings through better carrier bidding and real-time visibility. **OR** b) Describe the EDI principle. Outline the informational connections in ERP systems. EDI (Electronic Data Interchange) enables the automated, structured exchange of business documents like purchase orders, invoices, and shipping notices between trading partners' computer systems, replacing paper-based processes with standardized formats. **EDI Principle** EDI operates on four core principles: standardization (using formats like EDIFACT or ANSI X12 for compatibility), automation (machine-to-machine transfer via secure networks like AS2/VPN, eliminating manual entry), integration (seamless linkage with ERP/WMS/TMS for real-time data flow), and simplification (streamlined workflows reducing errors by 30-50% and processing time). Documents are translated from internal formats, enveloped securely, transmitted, and acknowledged, ensuring traceability in logistics chains. **Informational Connections in ERP Systems** ERP systems connect informational flows across modules via EDI gateways: (1) Procurement to Inventory—EDI 850 orders auto-update stock levels in real-time. (2) Sales to Shipping—EDI 940 updates warehouse picks and TMS routing. (3) Finance to Suppliers—EDI 810 invoices trigger payments via 820 remittance. (4) Logistics to Customers—EDI 856 ASNs provide	[16] 8+8

	shipment status. These bidirectional links create end-to-end visibility, with APIs/EDI middleware handling translations for carriers/forwarders, driving KPIs like 99% order accuracy	
	c) What are the central functions of a warehouse management system? Elaborate it with examples. (8 marks) Warehouse Management Systems (WMS) centralize and automate core warehouse operations to optimize inventory flow, labor, and space utilization. **Inventory Tracking and Management** WMS provides real-time visibility into stock levels, locations, and movements via barcode/RFID scanning, enabling cycle counts and replenishment alerts. Example: In an e-commerce warehouse, it prevents stockouts by auto-triggering reorder points when fast-movers drop below safety stock, achieving 99% accuracy vs. manual 85%. **Receiving and Put-Away** Goods receipt verifies inbound shipments against POs, directing optimal slotting (e.g., ABC analysis for high-velocity items near docks). Example: A 3PL uses directed put-away to place perishables in cooled zones, reducing search time by 40% and spoilage. **Order Picking, Packing, and Shipping** WMS generates optimized pick lists (wave/batch), supports pack verification, and automates label/shipping docs with carrier integration. Example: During peaks, wave picking groups orders by zone, boosting picks/hour from 50 to 150 while integrating EDI for CEP handoffs. **Labor and Yard Management** It assigns tasks dynamically, tracks productivity KPIs, and manages dock scheduling/cross-docking. Example: Slotting algorithms minimize travel (e.g., 20% less walker km), with yard modules sequence trailers to cut wait times by 30%. **OR** d) A mid-sized Indian manufacturer of consumer electronics ships 500+ LTL/FTL loads monthly from Chennai to northern cities (Delhi, Lucknow), facing ₹15 lakh monthly freight overruns due to manual carrier selection, 25% delays from poor routing, and 10% claims from shipment errors. Peak monsoon disruptions exacerbate issues, with no real-time visibility. The firm evaluates implementing a cloud TMS like SAP TM or Oracle OTM, integrating with existing WMS and EDI for forwarders. Explain the step-by-step role of TMS in resolving these challenges. Students can answer based on the concept and knowedge. A Transportation Management System (TMS) like SAP TM or Oracle OTM resolves the manufacturer's challenges through automated planning, execution, and analytics integrated with WMS and EDI. **Step 1: Carrier Rate Shopping and Tendering** TMS scans pre-loaded carrier rates and real-time bids via EDI, comparing	

	LTL/FTL options against ₹15 lakh overruns. It auto-tenders loads to top performers (e.g., DTDC for LTL), selecting optimal matches by cost, transit time, and monsoon reliability, cutting manual selection errors by 80% and freight by 15-20%. **Step 2: Dynamic Route Optimization** Using GPS, traffic APIs, and weather data, TMS generates multi-stop routes from Chennai to Delhi/Lucknow, factoring monsoons (e.g., avoiding NH44 floods). Load consolidation merges partials into FTLs, reducing trips/delays from 25% to <5%, with simulations showing 10-15% fuel savings via backhauls. **Step 3: Execution and Visibility** Post-tender, TMS dispatches digital PODs, tracks via IoT/CEP APIs for real-time ETAs shared with forwarders/WMS. Automated alerts reroute during disruptions (e.g., to rail hybrids), minimizing 10% claims through exception handling like geo-fencing proofs. **Step 4: Freight Audit, Claims, and Analytics** TMS audits invoices against contracts, auto-files claims (reducing disputes 60%), and dashboards KPIs (OTD >95%, cost/km). Post-shipment reports integrate WMS inventory data for demand forecasting, enabling Incoterms compliance (FOB loading proofs) and continuous tweaks like carrier scorecards	
Q.5	a) What possibilities do we have to design and equip a warehouse as flexible as possible? Students can design based on concept and their knowledge. Flexible warehouse design maximizes adaptability to fluctuating demand, SKU changes, and technology upgrades through modular layouts and scalable systems. **Modular Storage and Racking** Use adjustable pallet racking, mobile shelving, and dynamic slotting that reconfigures via WMS algorithms for ABC velocity analysis. This allows 20-40% space gains without reconstruction, suiting e-commerce peaks or seasonal shifts. **Multi-Functional Zoning** Divide into flexible zones: cross-docking for fast throughput, high-bay AS/RS for bulk, and mezzanine levels for overflow picking. Clear-span floors and wide aisles (3-4m) enable forklift/AMR reconfiguration between U/I/L-shaped flows. **Automation-Ready Infrastructure** Pre-install power/data conduits, reinforced floors for AGVs/cranes, and conveyor mounts. Hybrid manual-auto setups (e.g., goods-to-person pods) scale from 50 to 500 picks/hour, integrating IoT for future robotics. **Scalable Layout Principles** Apply product velocity zoning (80/20 rule: fast-movers near docks), vertical utilization (up to 15m), and buffer areas for expansion. Standard dimensions ensure forklift/CEP compatibility, with simulation software testing scenarios	[16] 8+8

pre-build.

OR

b) Discuss the different types of storage system and their area of applications.

Storage is a key element of the logistical system of services and occurs in all stages of a supply chain and on all levels of the value-adding process and production process. Storage is of particular importance for distribution logistics in the context of end-customer delivery of goods. Apart from the actual storing of goods, additional functions, such as picking, packaging, or return processing need to be fulfilled in this area.

Thus, storage systems fall into three categories. In a *static storage system,* the packages or loading units remain in one place without being moved between admission to the warehouse and taking out of the warehouse. This does not include movements as a result of a temporary withdrawal to remove individual parts of a loading unit or to re-stock the loading unit in another place. In *dynamic storage systems* the goods are moved within the storage area during their storage time. These movements are triggered by specific storage techniques, which, for example, enable goods to move forward as soon as one unit is removed at the front. Another distinction can be made according to the accessibility of storage goods. In cases where *line storage* is employed, all loading units can be accessed at any time, which is not possible if the loading units are stacked in compact *block storage*. Finally, we distinguish between storage systems *with storage racks* and *without storage racks*.

c) Name the advantages and disadvantages of unmanned transport systems and the resulting task areas.

(8 marks)

Unmanned transport systems, such as AGVs (Automated Guided Vehicles), AMRs (Autonomous Mobile Robots), and conveyor shuttles, automate intra-warehouse goods movement, reducing human intervention.

Advantages

- Efficiency and Speed: Operate 24/7 without fatigue, boosting throughput (e.g., AGVs handle 50-100 pallets/hour) and consistency via precise navigation.
- Safety: Minimize accidents by eliminating forklifts in shared spaces; sensors avoid collisions, cutting injury rates by 70%.
- Cost Savings Long-Term: Lower labor needs (20-40% reduction) and optimized routes reduce energy use; scalable without proportional staffing.
- Accuracy: 99.9% pick/place precision via WMS integration, minimizing damages/errors.

Disadvantages

- High Initial Costs: CAPEX for robots/sensors (₹50-200 lakh/unit) and infrastructure; ROI takes 2-3 years.

	• Limited Flexibility: Fixed paths (AGVs) struggle with layout changes; traffic jams in dense ops reduce scaling. • Maintenance Dependency: Requires specialized tech support; downtime from sensor failures impacts entire flows (single points of failure). • No Density Gains: Doesn't optimize storage; suited for transport, not retrieval in high-SKU environments. **OR** d) Name the areas in which continuous and discontinuous conveyors can each be applied. Continuous conveyors maintain uninterrupted material flow, while discontinuous ones handle items in batches or stops. **Continuous Conveyors Applications** These systems excel in high-volume, steady-state operations requiring non-stop throughput: belt conveyors transport packages/carton over long distances in sorting facilities or assembly lines (e.g., e-commerce parcel hubs at 100-300 m/min); chain conveyors move heavy pallets in manufacturing for bulk loading/unloading; pneumatic conveyors shift powders/bulk goods in food/pharma enclosed spaces, ideal for 24/7 production feeds without manual intervention. **Discontinuous Conveyors Applications** Discontinuous systems suit variable loads with indexing, accumulation, or precise positioning: roller conveyors (gravity/motorized) accumulate items at packing stations or merges in order fulfillment; reciprocating lifts/vertical conveyors transfer discrete loads between mezzanine levels in multi-story warehouses; slat or shuttle conveyors enable stop-go for inspection/weighing in quality control zones or slow-moving pick faces.	