

Unit I

1. Define inventory

Answer: Inventory is the stock of goods, raw materials, work-in-progress, finished products, and other resources maintained by an organization to meet future demand and ensure smooth operations.

2. State the principles of inventory management

Answer:

1. Demand Forecasting

Depending on the industry, inventory ranks in the top five business costs. Accurate demand forecasting has the highest potential savings for any of the principles of inventory management. Both over supply and under supply of inventory can have critical business costs. Whether it is end-item stocking or raw component sourcing, the more accurate the forecast can be.

Establishing appropriate max-min management at the unique inventory line level, based on lead times and safety stock level help ensure that you have what you need when you need it. This also avoids costly overstocks. Idle inventory increases incremental costs due to handling and lost storage space for fast-movers.

2. Warehouse Flow

The old concept of warehouses being dirty and unorganized is out dated and costly. Lean manufacturing concepts, including 5S have found a place in warehousing. Sorting, setting order, systemic cleaning, standardizing, and sustaining the discipline ensure that no dollars are lost to poor processes.

The principles of inventory management are not any different from other industrial processes. Disorganization costs money. Each process, from housekeeping to inventory transactions needs a formal, standardized process to ensure consistently outstanding results.

3. Inventory Turns/Stock Rotation

In certain industries, such as pharmaceuticals, foodstuffs and even in chemical warehousing, managing inventory down to lot numbers can be critical to minimizing business costs. Inventory turns is one of the key metrics used in evaluating how effective your execution is of the principles of inventory management.

Defining the success level for stock rotation is critical to analyzing your demand forecasting and warehouse flow.

4. Cycle Counting

One of the key methods of maintaining accurate inventory is cycle counting. This helps measure the success of your existing processes and maintain accountability of potential error sources. There are financial implications to cycle counting. Some industries require periodic 100% counts. These are done through perpetual inventory count maintenance or through full-building counts.

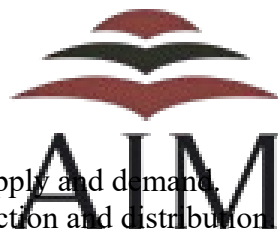
5. Process Auditing

Proactive error source identification starts with process audits. One of the cornerstone principles of inventory management is to audit early and often. Process audits should occur at each transactional step, from receiving to shipping and all inventory transactions in between.

- Maintain adequate availability of materials.
- Balance between holding costs and service levels.
- Avoid excess or shortage of stock.
- Ensure timely replenishment.
- Optimize cost while meeting demand.

3. Explain the role of inventory in logistics

Answer:



- Acts as a buffer between supply and demand.
- Ensures continuity in production and distribution.
- Stabilizes supply chain fluctuations.
- Enhances customer service levels.
- Supports bulk purchasing and economies of scale.

4. List the functions of inventory

Answer:

- Facilitates uninterrupted production.
- Protects against uncertainties in demand and supply.
- Provides flexibility to meet customer requirements.
- Enables bulk purchasing and cost savings.
- Supports maintenance and repair activities.

5. Why is inventory important?

Answer:

- Ensures smooth operations without interruptions.
- Improves customer satisfaction by avoiding stock-outs.
- Stabilizes production schedules.

- Provides competitive advantage in the market.
- Helps organizations respond quickly to demand changes.

6. Name the types of inventory with examples

Answer:

Raw Materials: Unprocessed basic materials used to manufacture a product
investopedia.com/terms/i/inventory.asp. [1, 2, 3]

Work-In-Progress (WIP): Partially finished goods currently on the production floor awaiting completion investopedia.com/terms/i/inventory.asp.

Finished Goods: Completed products that are fully assembled, packaged, and ready for sale or distribution investopedia.com/terms/i/inventory.asp.

MRO Goods (Maintenance, Repair, and Operations): Supplies used to run the business and maintain production, but do not become part of the final product (e.g., cleaning supplies, office stationery)

- **Raw Materials:** Steel, cotton.
- **Work-in-Progress (WIP):** Semi-stitched garments.
- **Finished Goods:** Packaged food items.
- **Spare Parts:** Machine gears.
- **Consumables:** Lubricants, stationery.

7. What is inventory policy?

Answer: Inventory policy is a set of guidelines that determine how much stock should be maintained, when to reorder, and how to balance cost with service level. It is influenced by demand variability, lead time, costs, and service expectations.

8. List the costs associated with inventory

Answer:

1. Carrying (Holding) Costs

These are expenses incurred for storing and maintaining unsold goods over a period. They typically make up 20% to 30% of your total inventory value and consist of **Capital Costs:** The opportunity cost of capital or interest paid to finance the money tied up in inventory.

- **Storage Space Costs:** Warehousing rent, utilities, property taxes, and lighting.
- **Inventory Service Costs:** Insurance, security, and the labor required to handle the goods.
- **Inventory Risk Costs:** Losses due to spoilage, expiration, theft, shrinkage, and obsolescence.

2. Ordering Costs

Also known as setup costs, these are the administrative and logistical expenses associated with replenishing your stock. They include **Processing:** Creating, approving, and sending purchase orders.

- **Logistics:** Shipping, freight, and delivery charges.
- **Reception:** Time spent inspecting, counting, and entering the goods into the system.

3. Shortage (Stockout) Costs

These financial penalties and invisible losses occur when demand outstrips your available supply. They include **Lost Revenue:** Direct loss of sales from customers choosing competitors.

- **Expediting Fees:** Paying a premium for rush shipping to quickly restock.
- **Reputation Damage:** Loss of customer loyalty and trust
- **4. Purchase Costs**

The direct baseline expense of acquiring the inventory from suppliers. This figure typically includes the manufacturing or wholesale cost, plus applicable import duties, and tariffs

- **Ordering Cost:** Cost of placing and processing orders.
- **Holding Cost:** Storage, insurance, depreciation.
- **Stock-out Cost:** Loss of sales, goodwill, and customer trust.
- **Purchase Cost:** Cost of acquiring inventory.

9. State the objectives of inventory management

Answer:

- Ensure material availability at the right time.
- Minimize total inventory cost.
- Improve supply chain efficiency.
- Support production and sales strategies.
- Enhance customer satisfaction.



10. What are the symptoms of poor inventory management?

Answer:

Symptoms of poor inventory management

Understanding the signs of inventory inefficiency is the first step in remedying the issue and creating a business you can scale seamlessly.

Here are the top symptoms of poor inventory management that may be getting in the way of your company's growth:

- Stockouts and shortages
- Excess inventory
- No access to real-time inventory data
- Highly manual processes
- Lack of supply chain resilience

Let's take a closer look at how each one impacts your business and what you can do to fix them.

Stockouts and shortages

Running out of products to sell is one of the first clear signs of inventory inefficiency, and it's an issue that many businesses have faced.

In one survey, 35% of procurement leaders shared that they're concerned about supply shortages over the next 12 months, making it the most commonly anticipated supply chain issue.

Stockouts and product shortages can cause a host of other issues for your business, including:

- Customer churn
- Damaged brand reputation
- Lost revenue opportunities
- Reduced growth
- Dissatisfied customers
- Lower profit margins

Not to mention, understocking products with the highest profit margins can be especially damaging to your bottom line.

Stockouts can be caused by a lack of accurate inventory data, inaccurate demand forecasting, supply chain inefficiencies, excessive lead times, and insufficient safety stock.

That said, there are several steps you can take to avoid shortages and improve your inventory efficiency. These include improving inventory visibility, carrying adequate safety stock, and creating more accurate demand forecasts.

Cin7 helps you do this by giving you access to real-time inventory levels and data for your entire supply chain, from purchasing to sales.

Having accurate past data and insights into your entire procurement process can be especially beneficial for adapting to seasonal demand, such as major sales and the holidays.

Excess inventory

On the flip side of stockouts, excess inventory is also a symptom of poor inventory management. While you want to be sure to have enough products available to meet customer demand, too much can also be an issue.

Overstocking can lead to problems like:

- Decreased profit margins if you have to discount prices to move stock
- Higher inventory costs and warehousing expenses
- Restricted cash flow and limited working capital
- Increased risk of obsolete inventory

The negative financial impact of excess inventory increases if you overbuy items that already have a lower profit margin. You may need to incur losses just to free up storage space for better-moving products.

One of the most common causes of excess inventory is inaccurate demand forecasting for promotions or seasonal periods. As such, you can prevent overbuying by improving the quality of your inventory data and demand forecasts.

Opting for smaller and more frequent orders can also reduce deadstock because you can adjust your purchasing strategy and only replenish items that sell.

Cin7's inventory management software helps you get control over excess products by providing end-to-end supply chain visibility and up-to-date insights into your stock levels.

No access to real-time inventory data

If you don't know how much inventory you have or where your products are at any given moment, chances are high that your business is dealing with inventory inefficiency.

To have any chance of creating effective inventory management and growing your business, you need accurate data about your stock levels.

When surveyed, 77% of supply chain leaders said visibility is essential for success. Still, only 25% of companies are using real-time trackers, which means this is an opportunity for you to create a competitive advantage with the right tools.

Lack of real-time insight can cause difficulty with accounting and financial reporting and a negative customer experience.



Without real-time stock levels, making accurate data-driven decisions and feeling like you're in control of your business are impossible. Rather than focusing on your growth strategy, you spend all of your time on constant inventory pulls just to feel like you're staying afloat.

Cin7 gives you accurate real-time inventory levels and visibility across your entire supply chain, from procurement and holding to point of sale and fulfillment. As a result, you can prevent shortages and excess stock. Not to mention, real-time data helps you improve your inventory turnover rate, optimize reordering, and decrease carrying costs.

Highly manual processes

Time-consuming manual inventory processes that rely on Excel spreadsheets and frequent data imports and exports can make it challenging to scale your business. Instead of seamless growth, an increase in sales can turn into an overwhelming operational burden on you and your team.

Not to mention, manual inventory tracking and stocktaking can lead to such issues as:

- Increased labor costs if you have to hire new team members to handle growth
- Too much time spent working **for** your business instead of **on** it

- Reduced profit margins as your costs go up
- Inaccurate inventory information
- Poor warehouse management
- Data entry errors

When you don't have access to effective, user-friendly technology, you must rely on manual workflows that can take all of the excitement and growth potential out of your business.

Cin7 allows product sellers to take advantage of automated inventory management, which saves you hours of work each week and improves the accuracy of your orders and inventory data. Features like automated order processing and seamless sales channel integrations make it possible to stop working for your business and start working on it.

As your business grows and you expand into new channels and territories, you can also use Cin7's inventory management system to automate more complex tasks, such as fulfillment, replenishment, and purchasing for multiple locations.

Lack of supply chain resilience

Finally, if you have difficulty recovering from supply chain disruptions, that's a strong symptom of poor inventory management. When your inventory isn't running seamlessly, it's easy for external disruptors to create large ripple effects across your entire business.

Many inventory factors are outside of your control, but successful inventory management should be able to get your business through both good and bad times. That said, supply chain resilience doesn't happen by accident or by hoping that external disruptors will decrease.



In 2022 alone, 76.6% of companies experienced externally caused supply chain disruptions, such as geopolitical conflicts and extreme weather events. If you wait until a disturbance arises to deal with your inventory problems, it's already too late.

Proactivity is vital to building supply chain resilience. Having the right tools and strategies in place to weather external events not only helps ensure your business's survival but also can go a long way toward creating a competitive advantage for your brand.

PART-C

1. Explain the importance of inventory in business operations with examples.

- Ensures continuity of production.
- Enhances customer satisfaction by avoiding stock-outs.
- Stabilizes supply chain fluctuations.
- Provides competitive advantage. **Example:** FMCG companies maintain buffer stock to meet seasonal demand.

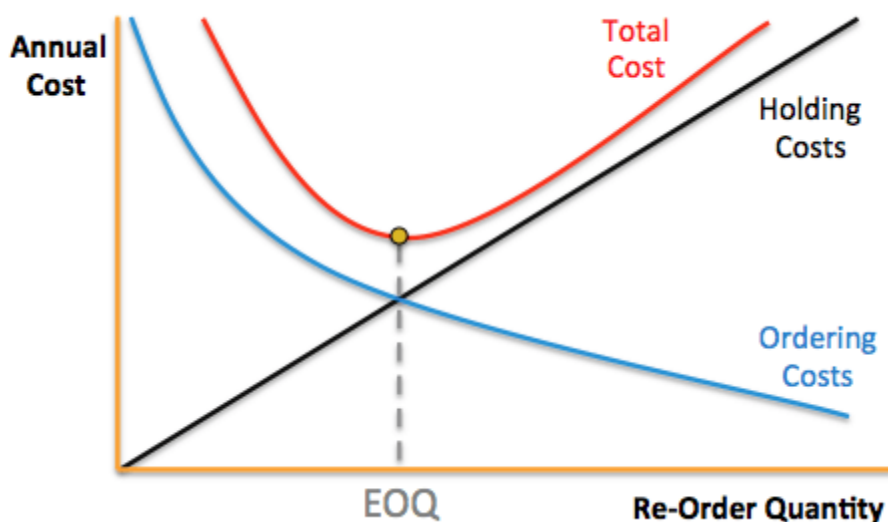
2. Discuss the types of inventory and their relevance in supply chain management.

- Raw Materials – ensure production readiness.
- Work-in-Progress – smooth flow of operations.
- Finished Goods – meet customer demand quickly.
- Spare Parts – support maintenance.
- Consumables – aid daily operations. **Relevance:** Each type supports different stages of the supply chain.

3. Describe inventory policy and the factors influencing it.

- **Definition:** Guidelines for stock levels, reorder points, and replenishment.
- **Factors:** Demand variability, lead time, holding cost, ordering cost, service level expectations.
- **Impact:** Determines efficiency and cost balance in supply chain.

4. Explain the costs associated with inventory with the help of the EOQ cost curve diagram.



- Ordering cost – cost of placing orders.
- Holding cost – storage, insurance, depreciation.
- Stock-out cost – lost sales, goodwill.
- Purchase cost – acquisition cost.
- **EOQ Curve:** Shows trade-off between ordering and holding costs; EOQ minimizes total cost.

5. Analyze the relationship between inventory and profitability.

- Excess inventory → high holding cost → reduced profit.
 - Insufficient inventory → lost sales → reduced revenue.
 - Optimal inventory → balance between cost and service → maximized profitability.
- Example:** Retail chains optimize stock levels to avoid markdown losses.

6. Discuss the impact of inventory decisions on total logistics cost.

- Inventory affects transportation, warehousing, and distribution.
- Poor control increases logistics cost.
- Efficient inventory reduces handling, storage, and transport expenses. **Example:** Cross-docking reduces warehousing costs.

7. Explain the objectives and importance of inventory management in modern organizations.

- Ensure material availability.
- Minimize cost.
- Improve supply chain efficiency.
- Support production and sales strategies. **Importance:** Directly linked to customer satisfaction and organizational competitiveness.

8. Identify the symptoms of poor inventory management and suggest remedies.

- Symptoms: frequent stock-outs, obsolete stock, high carrying costs, poor forecasting.
- Remedies: scientific forecasting, ERP/MRP systems, ABC analysis, supplier integration.

Inventory reduction techniques: 15 strategies to reduce inventory costs

Here we examine the 15 best ways to reduce inventory, with a focus on the four core areas of inventory management: Inventory planning, inventory management, manufacturing processes, and supply chain management.

1. Improve demand forecasting

Demand forecasting is the act of using historical sales data, combined with your personal knowledge of upcoming events (e.g. seasons, holidays), to predict what customer demand is going to look like.

This type of analysis is vital for any lean inventory model, so that you can plan out how much safety stock to hold and perhaps even organise purchasing certain goods in advance (but only barely in advance, of course). If you expect a surge, it means you've got the stock you need on hand to meet it without blowing out your carrying costs. If you expect a trough, you can reduce your safety stock feeling confident that a surge is unlikely.

- Learn more: [Inventory Forecasting Explained](#)

2. Re-evaluate your safety stock

We've talked a lot about lean inventory and Just-in-Time sales, but remember that every business, even a lean one, requires at least a little bit of excess inventory. This is your safety stock, and you'll always need some as it's generally better to have a tiny bit too much inventory than too little.

The trick is getting that safety stock level right to balance your attempt to go lean. That means holding enough extra stock to meet unexpected surges in demand, or high per-unit purchases of your products per customer.

- Learn more: [How to calculate safety stock - with formulas and examples](#)

Working through questions like how much safety stock you really need and what products are selling best will help determine how much of each product you should have in stock

3. Learn your ABCs to reduce inventory

According to the Pareto Principle, for most organisations 80% of its value is tied up in 20% of its products. The question is: which of your products fall into that 20% and which don't? That's where you need the ABC rule.

The ABC rule is a method of inventory control that splits up your products into three categories:

- Category A items are business critical and require careful inventory control
- Category B items are of average importance and require some management
- Category C items are less important for your business and require relatively little inventory control



If you were to run out of safety stock for items in Category A, it would have a much higher impact on the business than if you run out of stock for Category C – so Category A needs a lot of attention. But that doesn't mean you should overstock Category A items – maybe you have a reliable supply chain and even if you were to run out, you could resupply quite quickly, so you could risk running lean.

Either way, knowing how to split up your products will allow you to focus more of your inventory control efforts on the products that truly matter. This is especially important for companies with a limited time and budget.

- Learn more: [As Easy As ABC: Categorising and Managing Inventory](#)

4. Improve your data, improve your inventory management

Good data is the cornerstone of a modern business. Without it, very few types of automation or optimisation are possible – or at least they're unreliable.

Data allows you to make evidence-based strategic decisions, dispensing with the old 'gut feel' approach. You can combine data points to filter data by different categories, for example viewing sales by product, demographic, location, and other criteria. Or you can collect data to analyse your inventory using important metrics (see below).

But to be useful, the key is to have good data hygiene. Generally, data must:

- Sit within a central repository shared by as many functions of the business as possible. This is to eliminate the silo effect, where different systems hoard their data and others can't use it.

- **Speak the same language.** To be useful, data must be able to be parsed quite quickly – at a glance is best if possible. That means the different data points should be uniform in how they are displayed. For example, instead of your database containing line items that are from the US, USA and North America, they would all be from ‘United States’.
- **Only appear once.** Duplicates can be quite common in some databases, depending on the software in use, and they can cause inaccuracies – in other words, two pieces of software may accidentally add the same datapoint. If you can’t automatically remove duplicates, you’ll need to go through and clean up your database every so often.

Data will be central to your analysis of how to reduce your inventory, including key inventory performance metrics like inventory turnover and days sales of inventory (DSI)

5. Test your business against performance metrics

If you’re going to go lean, you must be able to track your progress. There are a few useful metrics here that will help you understand whether your efforts are going well – or not so well. These include:

- **Inventory turnover:** Calculates how quickly you sell through your entire inventory in a given period. Calculated by dividing Cost of Goods Sold by average inventory value. [Learn how to calculate inventory turnover here.](#)
- **Days sales of inventory:** Measures the number of days you hold a particular product before turning it into a sale. Calculated by dividing average inventory value by Cost of Goods Sold, then multiply that by the number of days in your given time period. [Learn how to use the days sales of inventory here.](#)
- **Product performance (best sellers):** Your top products by profitability. These are key to working out your ABCs. Calculated by looking at best sellers by actual revenue.
- **Product performance (worst sellers):** Your bottom-end products in terms of profitability. This is how you find dead products or slow movers. Calculated by looking at your worst sellers by revenue.

6. Centralise information with an inventory management system

Good inventory management is essential to running lean. Inventory management software, therefore, is just as essential.

This type of software is designed to take all the information you need to know about the comings and goings of your inventory and put that data in one place. That way, at a glance, you can quickly determine your current inventory level and its value, incoming stock from suppliers, outgoing stock through sales, shipment information, supplier details/relationships, and so on.

And with inventory software in place, you can easily access accurate data for inventory metrics so you can make strategic decisions informed by accurate and detailed information.

- Read more: [Unleashed inventory management software](#)
- Watch: [Unleashed inventory software demos](#)

7. Get rid of obsolete excess inventory

You might think you need to squeeze every last sale out of your inventory, but after a certain point it becomes more expensive to hold on to that stock that just isn't selling than any return you'll get from finally selling it.

With your inventory management software and the metrics given above, you can find what products in your warehouses aren't moving – or find the products that are most at risk of moving too slowly, or which are entering the end of their product life cycle.

What's the margin on these products versus what you pay for them? There will be a magic number – a certain length of time – after which it's no longer profitable to keep hold of them. As you near that point, consider a high-discount sale, selling to a clearance retailer, looking for a new market where the product may find new life, or just scrapping the stock.

One way to reduce stock is to offer your buyers a discount – after it's been sitting in the warehouse for some time, it becomes more expensive to hold onto than sell at a reduced price

8. Consider kitting

Product kitting is the act of selling multiple related products together as a single bundle. Gift boxes are one example, as are ready-to-order sets and pre-assembled products.

Kitting is a great way to lump together low-value or low-demand products with higher-value, higher-demand products. It could help you clear out obsolete items, or increase the value of Category B or C items by pairing them with Category A items (see the ABC method, above). This can save short-term profits while eliminating dead stock.

9. Recycle and reuse

If you take a step back and look at your entire business, what can you see that could be recycled or reused?

Being able to recycle components and/or containers may allow you to trim some inventory costs while cutting down on the amount of new inventory you need to order. It can also help you clean up inventory that's lying around, as you're putting it back into the sales pipeline, freeing up warehouse space for other products, and potentially streamlining your fulfilment process.

This may require you to take a look at your reverse supply chain functions, which you can learn more about here.

If you're in food & beverage manufacturing, you'll find ideas for recycling/reusing packaging here.

Recycling or reusing items – including components and packaging – is another way to reduce inventory, and is appealing to increasingly eco-conscious customers

10. Automate!

There are so many ways to automate processes these days it's almost unbelievable. And we're not just talking about expensive robots to help you manufacture goods faster, but rather software tools – perhaps combined with small hardware investments like barcode scanners or sensors – to take otherwise menial tasks and make them automatic.

Examples of simple automation that can benefit your manufacturing business include:

- Let your factory know when an order has come through
- Generate purchase orders based on current stock levels
- Track inventory locations, values and expiry dates
- Generate financial reports and data analysis
- Assign and track by batch or SKU

And a whole lot more. Each of these cuts the amount of time you and your staff spend on those tasks so they can focus more on value-adding activities, like strategy, forecasting and upskilling.

11. Use lean (Just-in-Time) principles to reduce inventory costs

We've used the term 'lean manufacturing' a few times in this article so far. If you're not sure what that really means, here's a quick definition:

Lean manufacturing is the optimisation of the manufacturing process to reduce or eliminate waste. The core principle behind it is that reducing waste can enable a business to cut costs, improve its efficiency and generate more value for customers.

So what is 'waste'? Well, there are a few types, including:

- Excess inventory
- Inefficient processes
- Underutilised staff or equipment
- Over-production of a product
- Unnecessary transportation

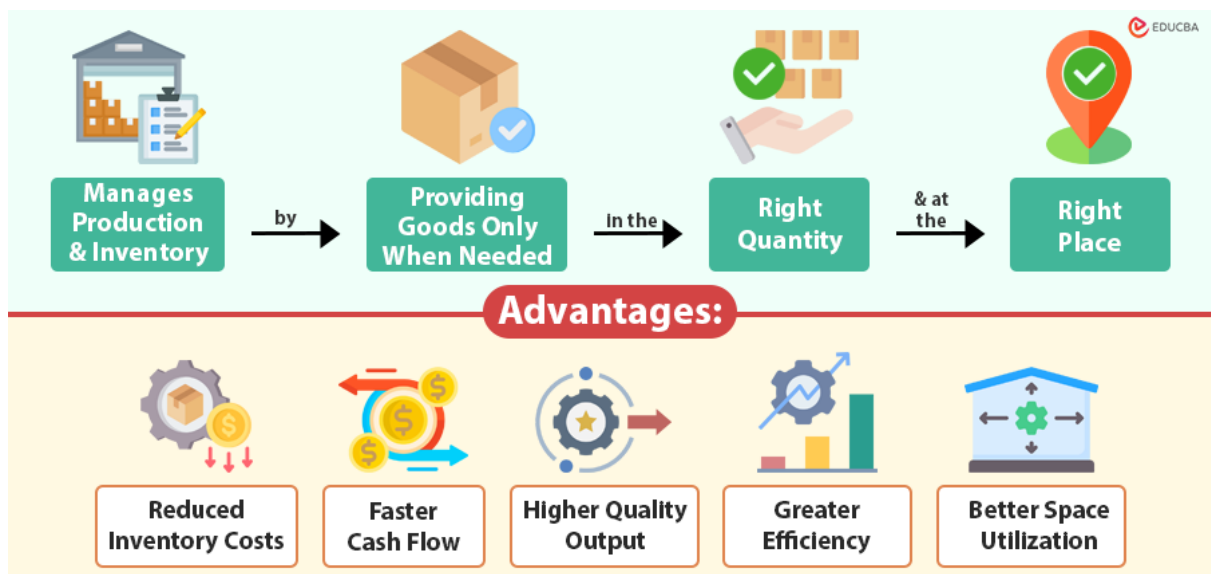
The data you're gathering to reduce inventory (mentioned above) will also be able to tell you if you have any of these types of waste. You'll need to play around with different metrics and time periods, but with the right data you should easily be able to find out how much of each of the above wastes your business is producing.

In your efforts to improve your business and reduce inventory, identifying and cutting these wastes could free up more cash flow and staff time to focus on your other optimisations.

9. How can the effectiveness of inventory management be improved? Illustrate with examples.

- Use IT tools (ERP, RFID).
- Adopt JIT and lean practices.
- Regular audits and reviews.
- Supplier collaboration.
- **Example:** Walmart uses real-time tracking to optimize inventory.

10. Case-based: “Toyota adopted Just-in-Time inventory system.” Discuss how this improved effectiveness of inventory management.



- JIT reduced excess stock.
- Lowered holding costs.
- Improved responsiveness to demand.
- Enhanced supplier coordination. **Result:** Cost savings, efficiency, and competitive advantage.

UNIT –II

1. Importance and Scope of Inventory Control

Answer (5 marks):

- Ensures uninterrupted production.
- Minimizes holding and ordering costs.
- Improves customer service levels.
- Prevents stock-outs and excess stock.
- Scope: Covers raw materials, WIP, finished goods, spare parts, and consumables.

2. Selective Inventory Control



- Focuses on controlling vital items rather than all items equally.
- Techniques: ABC analysis, VED analysis, FSN analysis.
- Helps prioritize resources and management attention.

3. Inventory Models

Economic Lot Size / EOQ

- $EOQ = \sqrt{(2DS / H)}$
 - D = Demand, S = Ordering cost, H = Holding cost.
- Minimizes total cost by balancing ordering and holding costs.

Economic Batch Quantity (EBQ)

- Used in production; determines optimal batch size.
- Formula considers setup cost and holding cost.

Reorder Level (ROL)

- Point at which new order must be placed.
- $ROL = \text{Lead time} \times \text{Average demand}$.

P Model (Periodic Review)

- Inventory reviewed at fixed intervals.
- Order quantity varies depending on stock level.

Q Model (Continuous Review)

- Inventory monitored continuously.
- Fixed order quantity placed when stock reaches ROL.

Two Bin System



- Stock divided into two bins.
- First bin used for consumption, second bin signals reorder.

Fair Share Allocation Model

- Distributes limited stock fairly among different demand points.

MRP (Material Requirements Planning)

- Computer-based system for planning material needs.
- Ensures right material at right time.

ABC Analysis

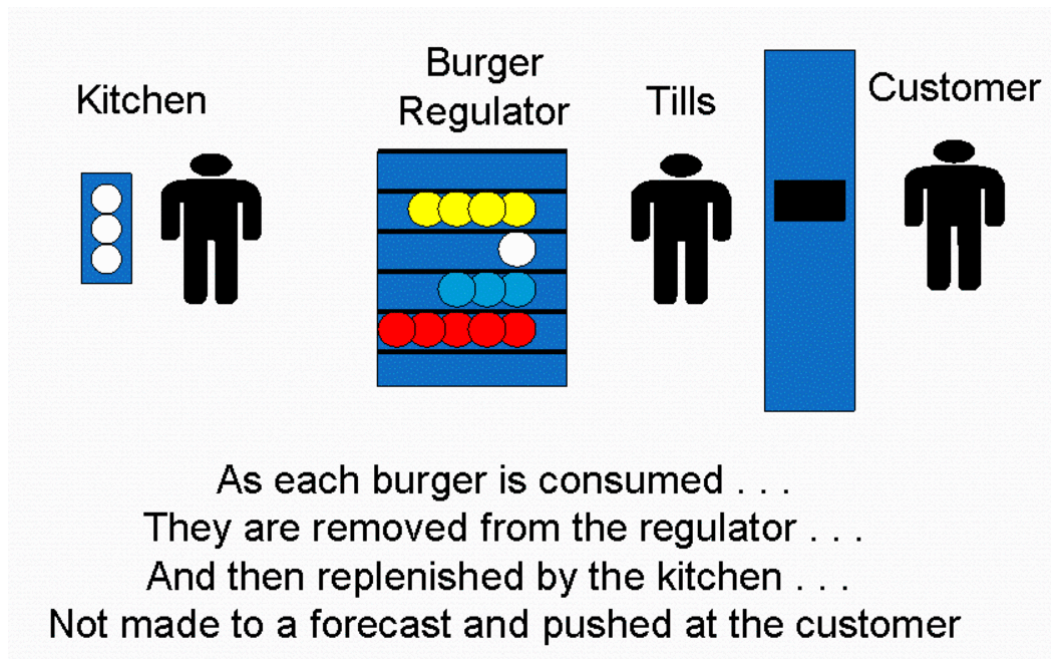
- Classifies items into A (high value, low quantity), B (moderate), C (low value, high quantity).
- Helps prioritize control efforts.

Just in Time (JIT)

- Inventory arrives exactly when needed.
- Reduces holding cost, increases efficiency.

4. Modern Methods

KANBAN



- Visual card system used in JIT.
- Signals when to produce or move items.

DRP (Distribution Requirements Planning)

- Plans inventory distribution across multiple locations.
- Ensures balanced stock levels in supply chain.

ERP (Enterprise Resource Planning)

- Integrated software system.
- Links inventory with finance, HR, production, and sales.

1. Explain the importance and scope of inventory control.

- Importance: cost reduction, service improvement, production continuity.
- Scope: raw materials, WIP, finished goods, spare parts, consumables.
- Example: FMCG companies use strict control to avoid expiry losses.

2. Discuss EOQ and EBQ models with formulas.

- EOQ formula and graph.
- EBQ application in batch production.
- Example: Textile industry uses EBQ for dyeing batches.

3. Differentiate between P model and Q model.

- P model: periodic review, variable order size.
- Q model: continuous review, fixed order size.
- Diagram comparison.

4. **Explain ABC analysis with an example.**

- Classification of items.
- Focus on A items for strict control.
- Example: Automobile industry spare parts.

5. **Describe modern inventory control methods – Kanban, DRP, ERP.**

- Kanban: visual signals.
- DRP: distribution planning.
- ERP: integrated enterprise system.
- Example: Toyota uses Kanban; Walmart uses ERP.

UNIT III

1. Inventory Ranking Methods and Quadrant Technique

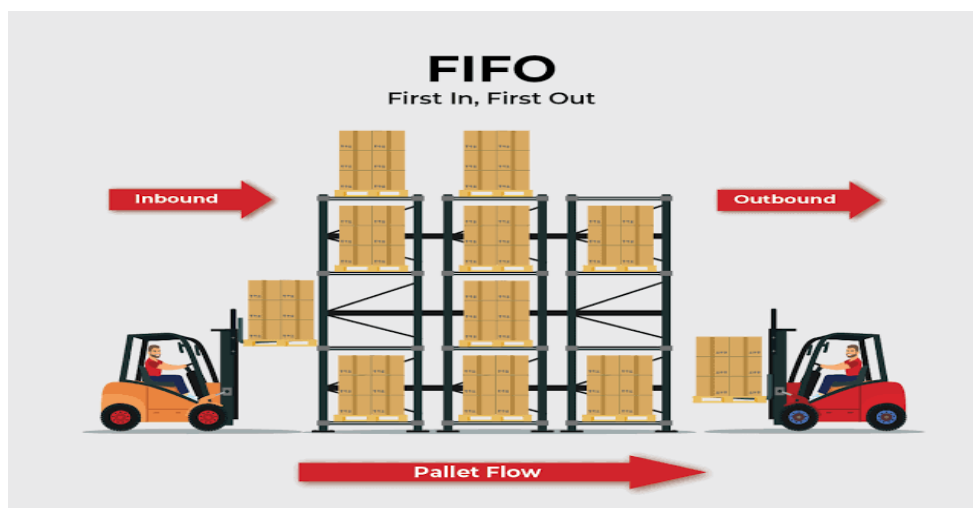
Answer (5 marks):

- **Ranking Methods:** Classify items based on value, usage, or criticality (e.g., ABC, VED, FSN).
- **Quadrant Technique:** Plots items on a 2×2 matrix (high/low value vs. high/low usage) to prioritize control.
- Helps managers focus on critical items.



2. FIFO (First In, First Out)

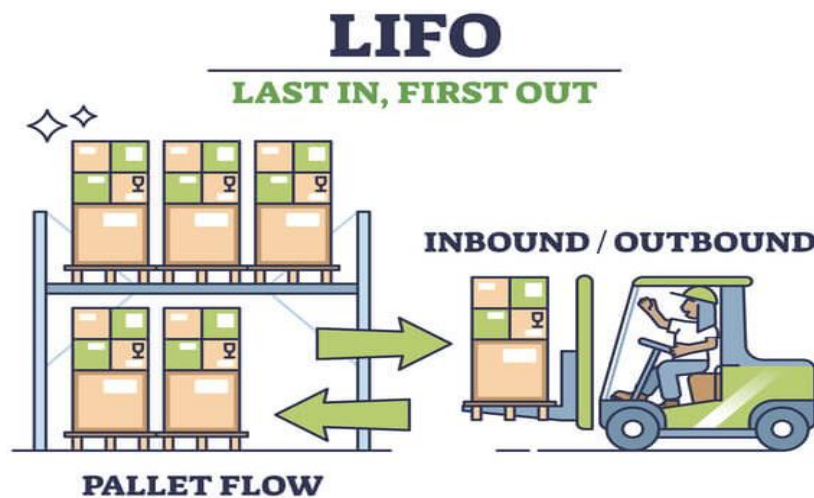
Answer (5 marks):



- Oldest stock is issued first.
- Ensures items are used before expiry.
- Common in perishable goods industries. **Example:** Food and pharmaceuticals.

3. LIFO (Last In, First Out)

Answer (5 marks):



- Latest stock is issued first.
- Useful when prices are rising (matches current cost with revenue).
- Rarely used in physical goods, more in accounting.

4. Weighted Average Method

Answer (5 marks):



- Calculates average cost per unit by dividing total cost by total quantity.
- Smooths out price fluctuations.
- **Example:** Used in industries with frequent price changes.

5. Inventory under Certainty and Uncertainty

Answer (10 marks):

- **Certainty:** Demand and lead time are known; EOQ and ROL models apply.
- **Uncertainty:** Demand or lead time fluctuates; safety stock and probabilistic models are used.
- Risk management tools are applied to balance service level and cost.

6. Risk Management in Inventory

Answer (5 marks):

- Identifying risks: stock-outs, obsolescence, demand variability.
- Mitigation: safety stock, supplier diversification, forecasting.
- Tools: ABC analysis, simulation models.

7. Work in Progress (WIP) Inventories

Answer (5 marks):

- Semi-finished goods in production.
- Ensures smooth flow between processes.
- Example: Half-assembled automobiles.

8. Finished Goods Inventories

Answer (5 marks):

- Products ready for sale.
- Directly linked to customer satisfaction.
- Example: Packaged consumer goods.

9. Spare Parts Inventories

Answer (5 marks):

- Maintained for maintenance and repair.
- Critical for industries with machinery.
- Example: Machine gears, electrical components.

10. Use of Computers in Inventory Management

Answer (5 marks):

- **RFID (Radio Frequency Identification):** Tracks items in real time.
- **EDI (Electronic Data Interchange):** Automates communication between suppliers and buyers.
- **Satellite Tracking System:** Monitors movement of goods across supply chains.
- **Benefits:** Accuracy, speed, reduced human error, better decision-making.

1. Explain FIFO, LIFO, and Weighted Average methods with examples.
2. Discuss inventory management under certainty and uncertainty.
3. Analyze the role of risk management in inventory control.
4. Explain the importance of WIP, finished goods, and spare parts inventories.
5. Describe modern computer-based methods (RFID, EDI, satellite tracking) in inventory management.

PART-C

1. Explain FIFO, LIFO, and Weighted Average methods with examples

- **FIFO (First In, First Out):**

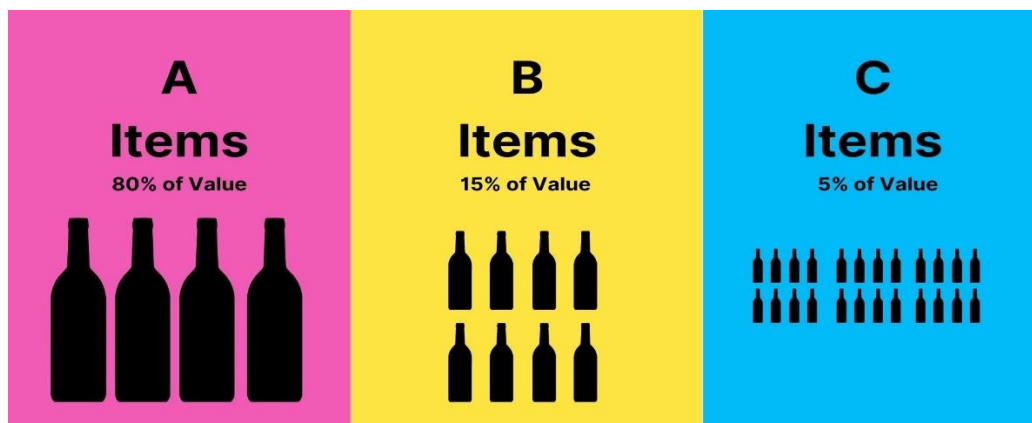
- Oldest stock issued first.
- Prevents obsolescence, suitable for perishable goods.
- *Example:* Food industry uses FIFO to avoid expiry.
- **LIFO (Last In, First Out):**
 - Latest stock issued first.
 - Matches current cost with revenue, useful in inflationary periods.
 - *Example:* Accounting method in industries facing rising prices.
- **Weighted Average Method:**
 - Average cost per unit = Total cost ÷ Total quantity.
 - Smooths out price fluctuations.
 - *Example:* Chemical industry with frequent price changes.

2. Discuss inventory management under certainty and uncertainty

- **Certainty:**
 - Demand and lead time known.
 - Models: EOQ, ROL.
 - Predictable replenishment.
- **Uncertainty:**
 - Demand or lead time fluctuates.
 - Requires safety stock, probabilistic models.
 - Risk of stock-outs or excess inventory.
- **Application:**
 - Certainty: Automobile assembly line.
 - Uncertainty: Fashion retail with unpredictable demand.

3. Analyze the role of risk management in inventory control

- **Risks:** Stock-outs, obsolescence, demand variability, supplier delays.
- **Strategies:**
 - Safety stock.
 - Supplier diversification.
 - Forecasting and simulation models.
 - ABC analysis for prioritization.



- **Outcome:** Reduces financial loss, improves service levels.
- *Example:* Pharma companies maintain safety stock to avoid shortages.

4. Explain the importance of WIP, finished goods, and spare parts inventories

- **Work in Progress (WIP):**
 - Semi-finished goods.
 - Ensures smooth flow between processes.
 - *Example:* Half-assembled automobiles.



- **Finished Goods:**
 - Ready for sale.
 - Directly linked to customer satisfaction.
 - *Example:* Packaged consumer goods.
- **Spare Parts:**
 - Maintained for maintenance and repair.
 - Critical for industries with machinery.
 - *Example:* Machine gears, electrical components.

5. Describe modern computer-based methods (RFID, EDI, satellite tracking) in inventory management

- **RFID (Radio Frequency Identification):**
 - Tracks items in real time.
 - Improves accuracy and reduces manual errors.
- **EDI (Electronic Data Interchange):**
 - Automates communication between suppliers and buyers.
 - Speeds up order processing and reduces paperwork.
- **Satellite Tracking System:**
 - Monitors movement of goods across supply chains.
 - Enhances visibility and security in logistics.
- **Benefits:**
 - Faster decision-making.
 - Reduced costs.

- Improved customer service.
- *Example:* Walmart uses RFID for real-time stock tracking.

UNIT IV

1. Definition of Warehouse

Answer: A warehouse is a planned space for the storage and handling of goods and materials, designed to balance supply and demand efficiently.

2. Principles of Warehouse Management

Answer:

- Efficient use of space.
- Safe handling of goods.
- Easy accessibility and retrieval.
- Proper documentation and record keeping.
- Cost minimization with maximum service.

3. Roles of Warehouses

Answer:

- Acts as a buffer between production and consumption.
- Facilitates bulk storage and distribution.
- Provides value-added services like packaging, labeling.
- Supports logistics and supply chain operations.



4. Importance of Warehouses

Answer:

- Ensures continuous supply of goods.
- Reduces transportation cost through bulk storage.
- Improves customer service levels.
- Helps stabilize prices by storing surplus stock.

5. Need for Warehousing

Answer:

- Seasonal demand and supply variations.
- Protection against uncertainties.
- Efficient distribution network.
- Support for export/import activities.

6. Warehouse Selection and Planning

Answer:

- Factors: location, accessibility, cost, safety, scalability.
- Planning involves layout design, equipment selection, staffing, and IT systems.

7. Functions and Operations of a Warehouse

Answer:



- Receiving goods.
- Inspection and quality check.
- Storage and preservation.
- Order picking and packing.
- Dispatch and distribution.

8. Warehouse Location

Answer:

- Should be close to markets or production centers.
- Accessible by road, rail, air, or sea.
- Consider cost of land, labor, and utilities.

9. Area of Warehouse

Answer:



- Determined by volume of goods, type of storage system, and handling equipment.
- Must allow for expansion and efficient movement.

10. Factors Affecting Warehousing Cost

Answer:

- Land and building cost.
- Labor and staffing.
- Equipment and technology.
- Utilities and maintenance.
- Insurance and security.



11. Warehouse Layout

Answer:

- Logical arrangement of receiving, storage, and dispatch areas.
- Should minimize handling and movement.
- Incorporates safety and accessibility.

12. Design Principles of Warehouses

Answer:

- Optimize space utilization.
- Ensure smooth flow of materials.
- Provide flexibility for future expansion.
- Incorporate safety and ergonomics.
- Integrate IT systems for tracking and control.

PART-C

1. Explain the importance and need for warehousing in modern supply chains

- **Importance:**
 - Ensures continuous supply of goods.
 - Reduces transportation cost through bulk storage.
 - Improves customer service levels.
 - Helps stabilize prices by storing surplus stock.
- **Need:**
 - Seasonal demand and supply variations.
 - Protection against uncertainties.
 - Efficient distribution network.
 - Support for export/import activities. **Example:** Agricultural products stored in warehouses to balance seasonal supply with year-round demand.

2. Discuss the principles of warehouse management with examples

- Efficient use of space.
- Safe handling of goods.
- Easy accessibility and retrieval.
- Proper documentation and record keeping.
- Cost minimization with maximum service. **Example:** Amazon warehouses use systematic shelving and barcode systems to ensure quick retrieval and accuracy.

3. Describe the functions and operations of a warehouse

- **Functions:**
 - Storage of goods.
 - Protection and preservation.
 - Value-added services (packaging, labeling).
 - Facilitating bulk breaking and consolidation.
- **Operations:**
 - Receiving goods.
 - Inspection and quality check.
 - Storage and inventory control.
 - Order picking and packing.
 - Dispatch and distribution.
 - **Example:** FMCG warehouses handle bulk shipments, break them into smaller lots, and distribute to retailers.

4. Analyze the factors affecting warehousing cost

- Land and building cost.
- Labor and staffing.
- Equipment and technology.

- Utilities and maintenance.
- Insurance and security.
- Transportation accessibility.
- **Example:** A warehouse near a port may have higher land cost but lower distribution cost.

5. Explain warehouse layout and design principles with diagrams

- **Layout:**
 - Logical arrangement of receiving, storage, and dispatch areas.
 - Should minimize handling and movement.
 - Incorporates safety and accessibility.

Shapes of Warehouse:

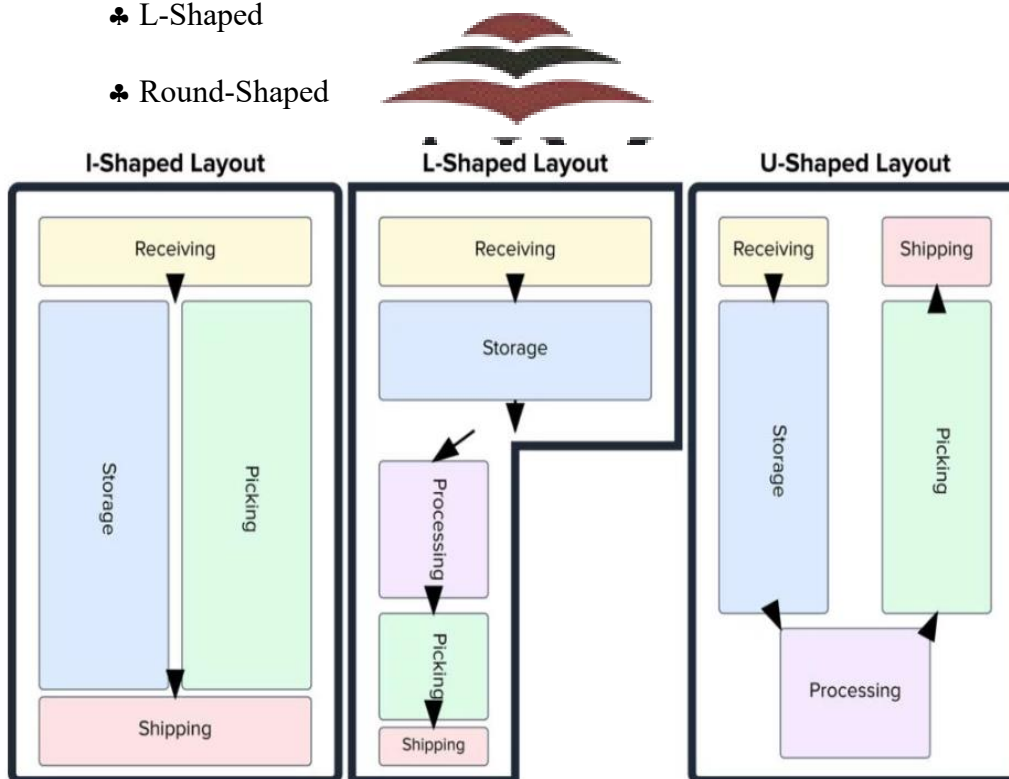
♣ Rectangle / Square Shaped

♣ U-Shaped

♣ I-Shaped

♣ L-Shaped

♣ Round-Shaped



- **Design Principles:**
 - Optimize space utilization.
 - Ensure smooth flow of materials.
 - Provide flexibility for future expansion.
 - Incorporate safety and ergonomics.

- Integrate IT systems for tracking and control.
- Flowchart showing Receiving → Storage → Picking → Dispatch.
- Layout sketch showing zones for inbound, storage racks, outbound.

UNIT V

1. Codification and Standardization of Materials

- **Codification:** Assigning unique codes to materials for easy identification.
- **Standardization:** Ensuring uniform specifications to reduce variety and cost.
- **Benefits:** Simplifies procurement, reduces duplication, improves efficiency.
Example: Using alphanumeric codes for spare parts in automobile industry.

2. Incoming Materials Receipts, Retrieval, and Transaction Processing System

- **Receipts:** Verification of quantity and quality at entry.
- **Retrieval:** Systematic picking of materials for use.
- **Transaction Processing:** Recording receipts, issues, and balances in ERP/MRP systems. **Example:** Barcode scanning for automated receipts and retrieval.

3. Security and Loss Prevention

- **Measures:** Surveillance systems, restricted access, insurance, audits.
- **Goal:** Prevent theft, pilferage, damage, and fraud. **Example:** CCTV monitoring in pharmaceutical warehouses.



4. Consumption-Based Planning – MRP and Lot Sizing Procedure

- **MRP (Material Requirements Planning):** Calculates material needs based on demand forecasts and production schedules.
- **Lot Sizing:** Determines optimal order quantity (EOQ, lot-for-lot, fixed order quantity). **Example:** Electronics industry uses MRP to plan component purchases.

5. Forecasting Parameters and Results

- **Parameters:** Past demand, seasonal trends, lead time, market conditions.
- **Results:** Predict future demand, reduce uncertainty, improve planning accuracy.
Example: Retail chains forecast demand spikes during festive seasons.

6. Planned Order Planning File Consolidation

- Consolidates planned orders into a master file.
- Ensures coordination between procurement, production, and distribution.
- Reduces duplication and improves visibility.

7. Breakbulk, Cross-docking, Mixing, Assembly – Competitive Advantage

- **Breakbulk:** Splitting bulk shipments into smaller lots.
- **Cross-docking:** Direct transfer from inbound to outbound trucks without storage.
- **Mixing:** Combining different products for distribution.
- **Assembly:** Final assembly in warehouse before dispatch. **Competitive Advantage:** Reduces cost, speeds delivery, improves customer service. **Example:** Walmart uses cross-docking to minimize storage cost.

8. Production Support Warehouse – ERP

- ERP integrates warehouse with production planning.
- Provides real-time visibility of stock.
- Supports JIT and lean manufacturing. **Example:** SAP ERP used in automotive industry for production support.



9. Role of IT in Warehousing

- **RFID:** Real-time tracking of goods.
- **EDI:** Electronic communication between suppliers and buyers.
- **Satellite Tracking:** Monitors goods in transit.
- **ERP Systems:** Integrates inventory, finance, HR, and logistics. **Benefits:** Accuracy, speed, reduced human error, better decision-making.
- **Example:** Amazon uses RFID and ERP for efficient warehouse operations.

PART-C

1. Explain codification and standardization of materials

Answer Outline:

- **Codification:** Assigning unique codes to materials for easy identification, retrieval, and control.

- **Standardization:** Establishing uniform specifications to reduce variety, simplify procurement, and lower costs.
- **Benefits:**
 - Avoids duplication of items.
 - Improves efficiency in purchasing and storage.
 - Facilitates automation in ERP systems.
- **Example:** Automobile industry uses alphanumeric codes for spare parts to streamline procurement.

2. Describe incoming materials receipts, retrieval, and transaction processing system

Answer Outline:

- **Receipts:** Verification of quantity and quality at entry.
- **Retrieval:** Systematic picking of materials for production or dispatch.
- **Transaction Processing:** Recording receipts, issues, and balances in ERP/MRP systems.
- **Benefits:** Accuracy, speed, reduced manual errors.
- **Example:** Barcode scanning and RFID tagging in FMCG warehouses.

3. Discuss security and loss prevention in warehouses

Answer Outline:

- 
- **Risks:** Theft, pilferage, damage, fraud.
 - **Measures:**
 - CCTV surveillance.
 - Restricted access zones.
 - Insurance coverage.
 - Regular audits and stock verification.
 - **Outcome:** Protects assets, reduces financial loss, ensures trust.
 - **Example:** Pharmaceutical warehouses use biometric access and CCTV monitoring.

4. Explain consumption-based planning – MRP and lot sizing procedure

Answer Outline:

- **MRP (Material Requirements Planning):** Calculates material needs based on demand forecasts and production schedules.
- **Lot Sizing:** Determines optimal order quantity (EOQ, lot-for-lot, fixed order quantity).
- **Benefits:** Reduces excess stock, ensures timely availability.
- **Example:** Electronics industry uses MRP to plan component purchases for assembly lines.

5. Discuss forecasting parameters and results in inventory planning

Answer Outline:

- **Parameters:** Past demand, seasonal trends, lead time, market conditions.
- **Results:** Predict future demand, reduce uncertainty, improve planning accuracy.
- **Benefits:** Better resource allocation, reduced stock-outs, improved customer service.
- **Example:** Retail chains forecast demand spikes during festive seasons.

6. Explain planned order planning file consolidation

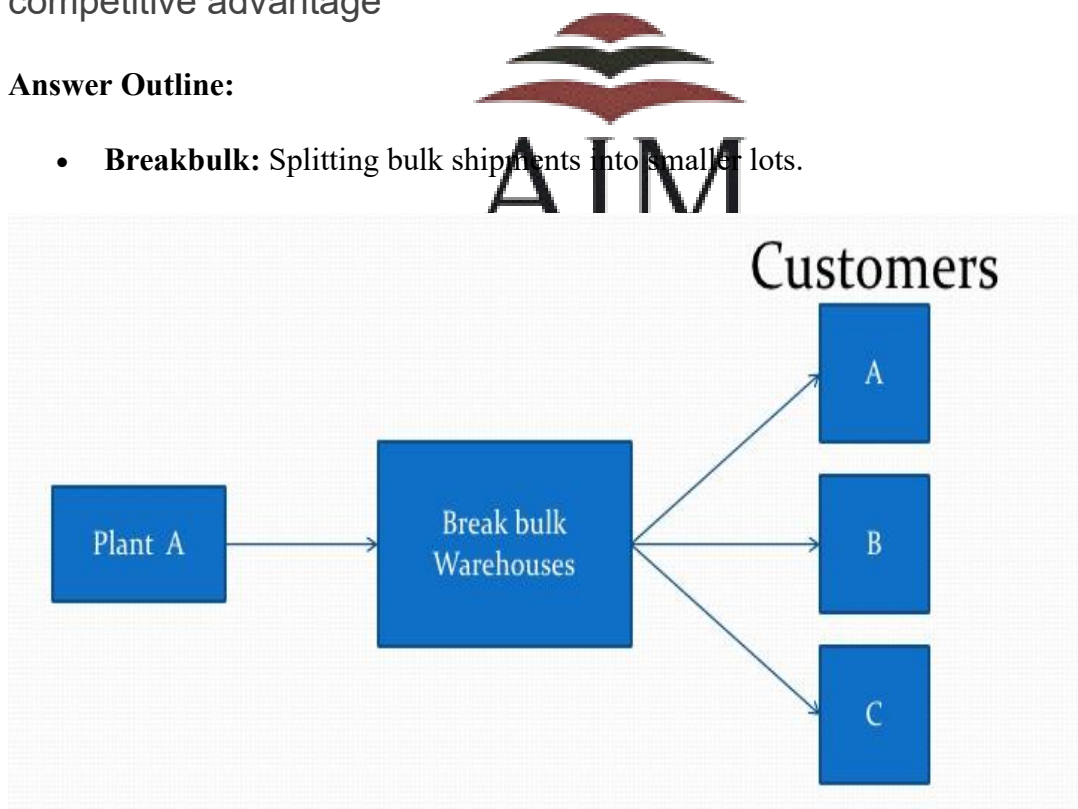
Answer Outline:

- Consolidates planned orders into a master file.
- Ensures coordination between procurement, production, and distribution.
- Reduces duplication and improves visibility.
- **Example:** ERP systems consolidate planned orders for multiple plants to avoid overlap.

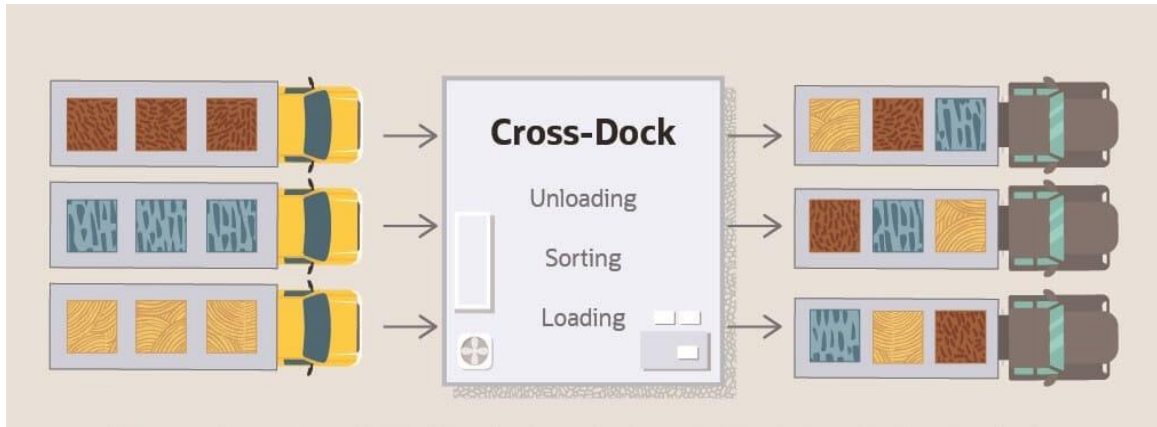
7. Describe breakbulk, cross-docking, mixing, and assembly – competitive advantage

Answer Outline:

- **Breakbulk:** Splitting bulk shipments into smaller lots.



- **Cross-docking:** Direct transfer from inbound to outbound trucks without storage.



- **Mixing:** Combining different products for distribution.
- **Assembly:** Final assembly in warehouse before dispatch.
- **Competitive Advantage:** Reduces cost, speeds delivery, improves customer service.
- **Example:** Walmart uses cross-docking to minimize storage cost and improve responsiveness.

8. Explain production support warehouse – ERP

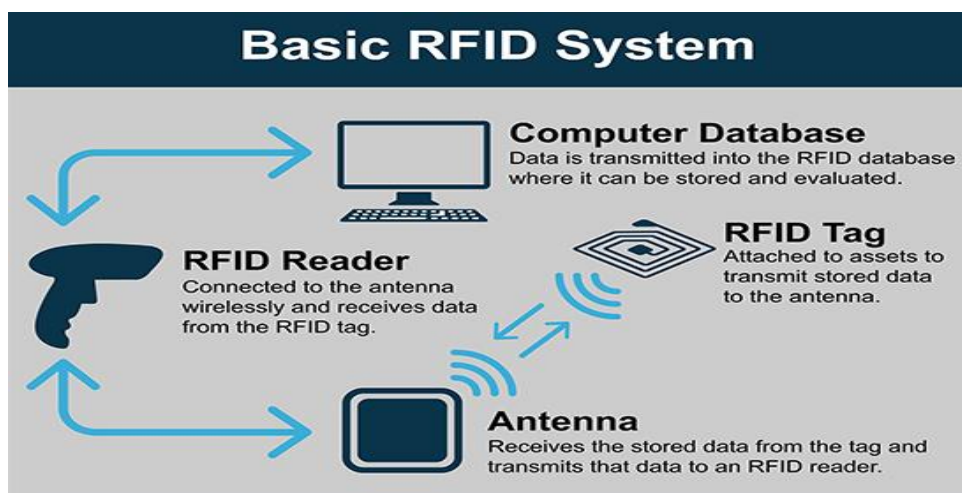
Answer Outline:

- ERP integrates warehouse with production planning.
- Provides real-time visibility of stock.
- Supports JIT and lean manufacturing.
- **Benefits:** Synchronizes production and inventory, reduces waste.
- **Example:** SAP ERP used in automotive industry for production support.

9. Discuss the role of IT in warehousing

Answer Outline:

- **RFID:** Real-time tracking of goods.



- **EDI:** Electronic communication between suppliers and buyers.

- **Satellite Tracking:** Monitors goods in transit.
- **ERP Systems:** Integrates inventory, finance, HR, and logistics.
- **Benefits:** Accuracy, speed, reduced human error, better decision-making.
- **Example:** Amazon uses RFID and ERP for efficient warehouse operations.

