
	<b>Akhil Bharatiya Maratha Shikshan Parishad's Anantrao Pawar College of Engineering &amp; Research</b>	
	<b>Unit Test-I Notes</b>	

**Subject Teacher: Anil M. Naikwade**

**Class: TY**

<b>Subject Name: Shelf Life, Ware House Operations Management &amp; Material Transactions</b>	
Semester: II	<b>Course Code : 7.GV.02</b>
<b>Weekly Teaching Hours: Theory : 03</b>	<b>Scheme of Marking Theory: 100 Marks Insem: 50 Marks Endsem: 50 Marks</b>
Credit : 3	Scheme of Marking PR: --

**Part –I MCQ questions**

**1). Warehouses emphasize \_\_\_\_ and their primary purpose is to maximize \_\_\_\_.**

- a. Product storage; throughput
- b. Product storage; usage of available storage space
- c. Rapid movement of product; throughput
- d. Rapid movement of product; usage of available storage space

Ans-b

**2) What is the primary goal of warehouse management?**

- a) Maximizing warehouse space
- b) Reducing labor costs
- c) Ensuring timely order fulfillment
- d) Minimizing inventory levels

Ans:c

**3) What does the process of receiving in warehouse management involve?**

- a) Packing and shipping orders
- b) Organizing products in the warehouse
- c) Accepting and inspecting incoming shipments

Ans:D

**4) Which warehouse storage equipment is best used to stock products subject to shelf life?**

- a) Cantilever racks
- b) Pallet racks
- c) Flow racks
- d) Storage racks

Ans : c

**5) Shelf life means**

- a) no spoilage of food
- b) Deterioration of food after short period of time
- c) Preservation of food
- d) Adulteration of food

Ans-c

**6) What is the primary purpose of warehousing?**

- a) Transportation optimization
- b) Inventory storage and management
- c) cost reduction in manufacturing
- d) Customer service enhancement

Ans-b

**7) A supply chain is a sequence of firms that perform activities required**

- a) to find products that are similar
- b) to facilitate wholesalers inventory selections
- c) to create and deliver goods to consumers
- d) to support the acquisition of raw materials

Ans-c

**8) It is estimated that the logistics costs of a new car are about**

- a)10-20%

b) 20-25%

c) 25-30%

d) 30-40%

Ans-c

**09) What is the primary purpose of a warehouse?**

a) Manufacturing goods

b) Storing goods

c) Selling goods

d) Transporting goods

Ans-b

**10) Which of the following is NOT a function of warehouse management?**

a) Inventory control

b) Order picking

c) Product development

d) Space optimization

Ans-c

**11. What is the primary purpose of a warehouse?**

- a) Manufacturing products
- b) Storing goods
- c) Selling products to customers
- d) Transporting goods

**Answer:** b) Storing goods

**12. Which of the following is a common picking method in warehouses?**

- a) Just-In-Time (JIT) picking
- b) First-In, Last-Out (FILO) picking
- c) Batch picking
- d) Random picking

**Answer:** c) Batch picking

**13. Which technology is commonly used for real-time inventory tracking in warehouses?**

- a) GPS
- b) RFID
- c) Blockchain
- d) Cloud computing

**Answer:** b) RFID

**14. What does FIFO stand for in warehouse management?**

- a) First-In, Fast-Out
- b) First-In, First-Out
- c) Fast-In, First-Out
- d) Free-In, Free-Out

**Answer:** b) First-In, First-Out

**15. What is the benefit of using automated storage and retrieval systems (ASRS) in a warehouse?**

- a) Increased manual labor
- b) Reduced storage capacity
- c) Faster order fulfillment
- d) Decreased inventory accuracy

**Answer:** c) Faster order fulfillment

**16. Which of the following is a primary advantage of cross-docking in warehouses?**

- a) Increased storage time
- b) Reduced handling costs
- c) Decreased shipping speed
- d) Higher inventory levels

**Answer:** b) Reduced handling costs

**17. Which of the following is not a function of a warehouse management system (WMS)?**

- a) Inventory tracking
- b) Demand forecasting
- c) Order picking
- d) Payroll management

**Answer:** d) Payroll management

**18. What is the main goal of warehouse safety protocols?**

- a) To speed up order fulfillment
- b) To protect goods from damage
- c) To reduce operational costs
- d) To protect employee health and safety

**Answer:** d) To protect employee health and safety

**19. Which of the following is considered a value-added service in a warehouse?**

- a) Storing goods
- b) Picking orders
- c) Packaging and labeling products
- d) Unloading shipments

**Answer:** c) Packaging and labeling products

**20. What does "shelf life" refer to?**

- a) The time it takes for a product to be delivered
- b) The period a product remains usable or saleable
- c) The amount of space a product occupies on a shelf
- d) The duration a product takes to be manufactured

**Answer:** b) The period a product remains usable or saleable

**21. Which of the following factors does NOT typically affect the shelf life of a product?**

- a) Temperature
- b) Humidity
- c) Barcode design
- d) Light exposure

**Answer:** c) Barcode design

**22. What is the main purpose of managing shelf life in a warehouse?**

- a) To ensure products are stored in the correct location
- b) To maximize the usage of available space
- c) To prevent the sale of expired or unsafe products
- d) To speed up the manufacturing process

**Answer:** c) To prevent the sale of expired or unsafe products

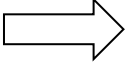

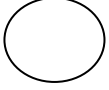
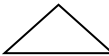
**Part –II Short Note Questions**

**1) Shelf life is period between processing to retail purchase to consuming of the food product**

- a) True
- b) False

Ans -True

2) **In the process chart symbol used for inspection is**

- a) 
- b) 
- c) 
- d) 

Ans-B

3) **What is shelf life, and why is it important in warehouse management?**

### **Importance of Shelf Life in Warehouse Management**

1. **Inventory Control:** Managing products with varying shelf lives ensures that older stock is used or sold before newer stock, reducing the risk of waste. This is often referred to as the First-In, First-Out (FIFO) method.
2. **Quality Assurance:** Monitoring shelf life helps in maintaining the quality of products that reach customers. For perishable goods, ensuring that items are within their shelf life is critical to customer satisfaction and safety.
3. **Regulatory Compliance:** Many industries, such as food, pharmaceuticals, and chemicals, have strict regulations on product shelf life. Proper management ensures compliance with these regulations, avoiding legal issues and penalties.
4. **Cost Efficiency:** By reducing the amount of expired or obsolete inventory, businesses can minimize losses and improve cost efficiency. Effective shelf life management can also help in optimizing stock levels, preventing overstocking of perishable goods.
5. **Customer Satisfaction:** Delivering products that are within their shelf life ensures that customers receive items in optimal condition, which can enhance trust and brand reputation.
6. **Warehouse Space Optimization:** By managing products based on their shelf life, warehouses can be more efficiently organized, with space allocated to items that need to be moved quickly.

Effective shelf life management is crucial for reducing waste, ensuring product quality, and optimizing warehouse operations.

4) **How does proper shelf life management affect inventory turnover?**

Proper shelf life management plays a crucial role in optimizing inventory turnover, which is the rate at which inventory is sold and replaced over a given period. Here's how it affects inventory turnover:

- **Accelerates Sales of Older Inventory**
- **FIFO Method:** By implementing a First-In, First-Out (FIFO) strategy, older inventory with shorter shelf life is sold first. This ensures that products are sold before they expire or deteriorate in quality, leading to more frequent inventory replenishment.
- **Reduced Dead Stock:** Proper shelf life management minimizes the accumulation of dead stock (unsellable inventory) by prioritizing the sale of items with a shorter remaining shelf life, thus improving turnover rates.
- **Prevents Overstocking**
- **Demand Forecasting:** Understanding shelf life helps in accurate demand forecasting and ordering, reducing the risk of overstocking items that might expire before they can be sold. This leads to leaner inventory levels, which enhances turnover.
- **Inventory Control:** Effective monitoring and control ensure that the warehouse does not hold excess inventory of products with limited shelf life, maintaining a balance between supply and demand.
- **Enhances Product Availability**
- **Continuous Replenishment:** By ensuring that inventory is turned over frequently, shelves are consistently stocked with fresh products. This leads to better product availability, meeting customer demand promptly and reducing the risk of stockouts.
- **Improved Cash Flow:** Faster inventory turnover through proper shelf life management can improve cash flow, allowing businesses to reinvest in inventory that has higher demand or longer shelf life.
- **Reduces Waste and Losses**
- **Minimized Expiration:** By managing shelf life effectively, the chances of products expiring before they are sold are reduced. This minimizes waste and the associated costs, leading to a more efficient inventory turnover.
- **Cost Savings:** Lower waste levels translate into cost savings, which can be reinvested in optimizing inventory levels, further enhancing turnover.
- **Improves Supplier Relationships**
- **Consistent Ordering Patterns:** Regular turnover of inventory due to proper shelf life management can lead to more consistent ordering patterns, which can strengthen relationships with suppliers and potentially lead to better pricing or terms.
- **Volume Discounts:** Higher turnover rates may enable businesses to take advantage of volume discounts from suppliers, further reducing costs and improving profitability.
- **Boosts Customer Satisfaction**
- **Fresh Products:** Customers are more likely to receive fresh, high-quality products when shelf life is properly managed. Satisfied customers are likely to make repeat purchases, contributing to faster inventory turnover.
- **Brand Loyalty:** Providing products that are within their shelf life enhances brand reputation and customer trust, leading to increased sales and faster inventory turnover.

## 5) Explain the role of First-In, First-Out (FIFO) in managing shelf life.

The **First-In, First-Out (FIFO)** method is a key inventory management technique that plays a critical role in managing shelf life, especially for perishable goods or products that degrade over time. Here's how FIFO operates and its role in shelf life management:

- **Basic Principle of FIFO**
- **First-In, First-Out** means that the first items that enter inventory are the first to be sold or used. In a warehouse setting, this involves arranging products so that the oldest stock is positioned at the front, making it easier to pick and dispatch before newer stock.
- **Preventing Expiration and Obsolescence**
- **Minimizing Waste:** By selling the oldest inventory first, FIFO ensures that products are used or sold before they reach the end of their shelf life. This reduces the risk of products expiring or becoming obsolete, which would otherwise result in waste and financial loss.
- **Efficient Rotation:** FIFO promotes efficient inventory rotation, ensuring that all products are cycled through the inventory before they lose value, which is crucial for maintaining product quality and safety.
- **Maintaining Product Quality**
- **Consistent Freshness:** For perishable goods, FIFO ensures that customers receive products that are within their optimal shelf life, which helps maintain quality, safety, and customer satisfaction.
- **Compliance with Regulations:** In industries such as food, pharmaceuticals, and chemicals, FIFO helps in adhering to regulatory requirements regarding the sale and distribution of products with specific shelf life constraints.
- **Optimizing Storage Space**
- **Space Efficiency:** FIFO can help in optimizing warehouse space by preventing the accumulation of unsellable stock. By continuously moving older stock out, space is freed up for new inventory, which can be critical in high-turnover environments.
- **Orderly Storage:** Implementing FIFO often requires systematic and orderly storage practices, which can lead to better overall warehouse organization and easier inventory management.
- **Reducing Financial Losses**
- **Cost Control:** Products that expire or become obsolete represent a direct financial loss. By reducing the likelihood of this occurring through FIFO, businesses can better control costs associated with inventory shrinkage.
- **Inventory Turnover:** FIFO contributes to higher inventory turnover rates by ensuring that products are sold before they lose value, which is crucial for profitability.



- **Improving Forecasting and Ordering**
- **Accurate Reordering:** FIFO can provide better visibility into inventory levels and consumption patterns, allowing for more accurate forecasting and reordering. This prevents overstocking of items with a limited shelf life and reduces the likelihood of stockouts.
- **Data Insights:** The systematic approach of FIFO often leads to better data collection and analysis, providing insights into product performance and shelf life trends, which can inform future inventory decisions.
- **Enhancing Customer Satisfaction**
- **Delivering Fresh Products:** By ensuring that the oldest stock is used first, customers receive fresher products with longer remaining shelf life, which can lead to higher satisfaction and repeat business.
- **Building Trust:** Consistently providing high-quality products that are within their shelf life builds trust with customers and strengthens brand reputation.

## 6) Why is safety important in warehouse operations?

### Protecting Employee Health and Well-being

- **Preventing Accidents:** Warehouses are high-risk environments with potential hazards such as forklifts, heavy lifting, stacking, and moving large objects. Ensuring safety protocols reduces the risk of accidents like slips, trips, falls, and equipment-related injuries.
- **Health Concerns:** Repetitive motions, poor ergonomics, and exposure to harmful substances can lead to chronic health issues. Proper safety measures help mitigate these risks, ensuring that employees remain healthy and capable of performing their duties.
- **Compliance with Regulations**
- **Legal Requirements:** Various laws and regulations, such as the Occupational Safety and Health Administration (OSHA) guidelines in the U.S., mandate specific safety standards for warehouse operations. Non-compliance can lead to fines, legal action, and even shutdowns.
- **Industry Standards:** Adhering to industry safety standards helps ensure that a warehouse is operating within accepted norms, which is important for maintaining certifications and licenses.
- **Reducing Financial Costs**
- **Minimizing Injuries:** Accidents can lead to significant costs, including medical expenses, compensation claims, and increased insurance premiums. By prioritizing safety, these costs can be reduced or avoided altogether.
- **Preventing Damage:** Safety protocols also protect goods, equipment, and infrastructure from damage. Preventing such incidents reduces repair and replacement costs, contributing to overall financial efficiency.

- **Maintaining Operational Efficiency**
- **Avoiding Disruptions:** Accidents can lead to operational disruptions, including downtime, investigations, and the need for temporary staffing. Safety practices minimize these disruptions, ensuring that warehouse operations continue smoothly.
- **Sustaining Productivity:** Safe working conditions lead to higher employee morale and productivity. Workers are more likely to perform efficiently and effectively when they feel secure in their environment.
- **Enhancing Employee Morale and Retention**
- **Job Satisfaction:** Employees are more likely to be satisfied with their jobs when they feel safe at work. A strong safety culture shows that the company values its workers, which can improve job satisfaction and loyalty.
- **Retention Rates:** A safe working environment reduces turnover rates by fostering a positive workplace culture. Workers are less likely to leave a company that prioritizes their well-being.
- **Protecting the Public and the Environment**
- **Hazardous Materials:** Warehouses that store hazardous materials must adhere to strict safety protocols to prevent leaks, spills, and contamination, which could harm the public or the environment.
- **Community Impact:** Safe warehouse operations ensure that surrounding communities are not adversely affected by industrial activities, such as through pollution or unsafe storage practices.
- **Reputation and Brand Image**
- **Building Trust:** Companies known for maintaining high safety standards gain the trust of their employees, customers, and partners. A good safety record enhances a company's reputation and can be a competitive advantage.
- **Crisis Avoidance:** A serious safety incident can lead to negative publicity, damaging the company's brand and leading to a loss of business. Proactive safety measures help avoid such crises.
- **Encouraging Continuous Improvement**
- **Safety Culture:** Emphasizing safety fosters a culture of continuous improvement, where employees are encouraged to identify and report potential hazards. This proactive approach leads to ongoing enhancements in safety practices and operational efficiency.
- **Training and Development:** Regular safety training not only educates employees about potential risks but also equips them with skills that contribute to their overall professional development.

## 7) How can automation improve warehouse operations?

## Increased Efficiency

- **Faster Order Processing:** Automated systems like conveyors, robotic pickers, and sortation systems speed up the order fulfillment process. These systems can handle high volumes of goods quickly, reducing the time it takes to pick, pack, and ship orders.
- **24/7 Operations:** Automated systems can operate continuously without the need for breaks, enabling warehouses to run 24/7. This leads to higher throughput and faster delivery times.
- **Improved Accuracy**
- **Reduced Human Error:** Automation minimizes the chances of human error in tasks such as picking and packing. Automated systems use precise algorithms and sensors to ensure that the right products are picked and packed accurately.
- **Better Inventory Management:** Automated inventory tracking systems, such as RFID and barcode scanners, provide real-time data on stock levels, reducing discrepancies and ensuring accurate inventory counts.
- **Cost Reduction**
- **Labor Savings:** Automation reduces the need for manual labor in repetitive tasks, leading to significant cost savings. This allows businesses to reallocate human resources to more strategic tasks.
- **Optimized Space Utilization:** Automated storage and retrieval systems (ASRS) make better use of warehouse space by utilizing vertical storage and efficiently organizing goods. This reduces the need for additional storage space and associated costs.
- **Enhanced Safety**
- **Reduced Workplace Injuries:** Automation reduces the need for manual handling of heavy goods, lowering the risk of workplace injuries. Robots and automated guided vehicles (AGVs) can handle dangerous tasks, keeping employees safe.
- **Improved Hazard Detection:** Automated systems can be equipped with sensors and cameras to detect potential hazards, such as spills or obstacles, and take corrective action to prevent accidents.
- **Better Scalability**
- **Flexible Operations:** Automated systems can easily scale up or down based on demand, making it easier for warehouses to handle peak seasons or sudden increases in order volumes without compromising efficiency.
- **Modular Systems:** Many automated solutions are modular, meaning they can be expanded or upgraded as the warehouse grows, allowing for seamless scaling of operations.
- **Enhanced Data Analytics**
- **Real-Time Monitoring:** Automated systems provide real-time data on various aspects of warehouse operations, such as inventory levels, order processing times, and equipment performance. This data can be used to optimize operations and make informed decisions.

- **Predictive Maintenance:** Automation systems can monitor the health of equipment and predict when maintenance is needed, reducing downtime and ensuring that operations run smoothly.
- **Faster Order Fulfillment**
- **Automated Picking Systems:** Technologies like robotic arms and automated guided vehicles (AGVs) can pick and transport items faster than human workers, speeding up the order fulfillment process.
- **Efficient Sorting:** Automated sortation systems quickly and accurately sort products based on size, weight, or destination, ensuring that orders are packed correctly and dispatched quickly.
- **Improved Customer Satisfaction**

**8) Write Short note on what is shelf life testing and determination.**

Shelf Life Testing

Shelf life testing involves evaluating a product under controlled conditions to determine how long it will remain stable and retain its intended quality. This process helps identify the time frame within which a product can be stored and used without becoming unsafe or losing its effectiveness.

- Key Aspects of Shelf Life Testing:

**Sample Selection:** Products are chosen for testing, representing typical production batches.

**Storage Conditions:** Samples are stored under various conditions (temperature, humidity, light) that simulate real-world environments or accelerated aging.

**Testing Intervals:** Samples are periodically tested at different time intervals to monitor changes in quality attributes such as appearance, texture, taste, chemical composition, and microbial content.

**Data Analysis:** The data collected is analyzed to determine the rate of degradation and to estimate the product's shelf life.

- Shelf Life Determination

Shelf life determination is the process of establishing the actual time frame that a product can be stored before it becomes unsuitable for use. This is often based on the results of shelf life testing.

Key Steps in Shelf Life Determination:

**Define Quality Criteria:** Establish what constitutes acceptable quality for the product, such as safety, potency, taste, or appearance.

**Analyze Testing Results:** Evaluate the results from shelf life testing to identify when the product no longer meets the defined quality criteria.

**9) Explain Order Preparation in Ware house management.**

## Order Receipt and Processing

- **Order Entry:** Orders are received through various channels, such as e-commerce platforms, ERP systems, or manual entry. The warehouse management system (WMS) records the order details, including the items requested, quantities, and delivery instructions.
- **Order Verification:** The system verifies the availability of items in the inventory. If items are out of stock, the system may flag the order for partial fulfillment or backorder processing.
- **Order Picking**
- **Picking List Generation:** The WMS generates a picking list, which details the items, quantities, and locations within the warehouse. This list guides the warehouse staff or automated picking systems in retrieving the correct products.
- **Picking Methods:**
  - **Single Order Picking:** Each order is picked individually, which is ideal for small or customized orders.
  - **Batch Picking:** Multiple orders are picked simultaneously, with items for several orders collected in one pass through the warehouse. This method increases efficiency when there are many orders with similar items.
  - **Zone Picking:** The warehouse is divided into zones, and pickers are assigned to specific zones. Each picker gathers items from their zone, and the items are later consolidated.
  - **Wave Picking:** Orders are grouped into waves based on specific criteria, such as delivery schedules or shipping methods, and picked in waves to optimize workflow.
- **Order Consolidation**
- **Item Sorting:** If batch or zone picking methods are used, items are sorted by order after picking. This process ensures that each order contains the correct items.
- **Order Assembly:** Items for each order are assembled in one place for packing. In automated warehouses, this step may involve the use of conveyor systems or robotic sorting.
- **Packing**
- **Packaging Selection:** The appropriate packaging materials are chosen based on the nature of the products, such as boxes, bubble wrap, or pallets. Packaging must protect the items during transit while being cost-effective.
- **Labeling:** Each package is labeled with relevant information, such as the shipping address, barcode, and any special handling instructions. This ensures the package is correctly routed and tracked.
- **Documentation:** Packing slips, invoices, and any required regulatory documents are included in the package. This step is crucial for customer communication and legal compliance.
- **Quality Control**
- **Order Verification:** Before sealing the package, a quality control check is performed to ensure that all items are correct and in good condition. This step helps reduce errors and returns.

- **Weight and Dimension Check:** The package's weight and dimensions are checked to ensure they match the shipping specifications and avoid any discrepancies during transit.
- **Shipping and Dispatch**
- **Shipping Method Selection:** The WMS or shipping software selects the appropriate shipping method based on the order's destination, size, weight, and customer preferences.
- **Carrier Handoff:** The package is handed over to the designated carrier (e.g., FedEx, UPS, DHL) for delivery. In some cases, this may involve loading the package onto a truck or placing it in a designated area for carrier pickup.
- **Tracking Information:** The customer is notified with tracking information, allowing them to monitor the delivery status of their order.
- **Order Monitoring and Customer Service**
- **Tracking and Communication:** The WMS tracks the order throughout the shipping process, and the system may automatically update the customer on the status of their order. If issues arise, such as delays or damaged goods, the customer service team may step in to resolve them.
- **Post-Delivery Support:** After the order is delivered, customer feedback is gathered, and any issues such as returns or exchanges are processed according to company policy.
- **Returns Processing**
- **Reverse Logistics:** If a customer returns an item, the warehouse processes the return by inspecting the product, restocking it if in good condition, or disposing of it if necessary. The return process is integrated with the order preparation system to ensure accurate inventory records.

#### 10) State advantages of ware house

- **Storage of Goods**
- **Inventory Management:** Warehouses provide a secure place to store large quantities of goods, allowing businesses to maintain stock levels and meet customer demand without frequent reordering.
- **Seasonal Storage:** Businesses can store products that have seasonal demand, such as holiday decorations or winter clothing, ensuring they are available when needed.
- **Improved Supply Chain Efficiency**
- **Buffer Stock:** Warehouses allow companies to hold buffer stock, which helps manage fluctuations in supply and demand, reducing the risk of stockouts or overstocking.
- **Faster Order Fulfillment:** Proximity to customers or key markets allows for quicker dispatch and delivery of goods, improving lead times and customer satisfaction.
- **Cost Savings**
- **Economies of Scale:** By purchasing in bulk and storing goods in a warehouse, businesses can benefit from discounts and reduce the cost per unit, leading to overall cost savings.
- **Reduced Transportation Costs:** Warehouses located near production facilities or distribution hubs can minimize transportation costs by consolidating shipments and reducing the distance goods need to travel.
- **Better Risk Management**

- **Protection of Goods:** Warehouses provide a controlled environment that protects goods from damage, theft, and adverse weather conditions, ensuring that products remain in good condition until they are needed.
- **Insurance Benefits:** Goods stored in warehouses are often insured, reducing financial risk in case of unforeseen events such as fire, theft, or natural disasters.
- **Business Continuity**
- **Supply Chain Resilience:** Warehouses help businesses maintain continuity of operations by storing critical inventory that can be used during supply chain disruptions, such as natural disasters, strikes, or supplier delays.
- **Demand Fluctuations:** By storing excess inventory, businesses can continue to meet customer demand even during peak seasons or unexpected surges in orders.
- **Enhanced Customer Service**
- **Faster Delivery:** Warehouses positioned strategically near customer bases allow for quicker order fulfillment, leading to faster delivery times and improved customer satisfaction.
- **Order Accuracy:** With well-organized warehousing systems, the accuracy of order fulfillment is improved, reducing errors and returns.
- **Supporting Production Processes**
- **Just-In-Time (JIT) Production:** Warehouses enable businesses to implement JIT manufacturing by storing raw materials and components close to production lines, ensuring that they are available exactly when needed.

11) Calculate the square feet area of ware house in length is 120 feet and width is 40 feet.

Area=Length×Width

Given:

- Length = 120 feet
- Width = 40 feet

Area=120 feet×40 feet=4800 square feet  
 $\text{Area} = 120 \text{ \text{feet}} \times 40 \text{ \text{feet}} = 4800 \text{ \text{square feet}}$

So, the area of the warehouse is **4,800 square feet**.

## Unit -2 Warehouse Functions

- **Theory for more Practice**

### Objectives

After going through this unit, you will be able to:

- Explain the meaning and importance of warehousing
- Describe the key functions of warehousing
- Discuss the concept of handling, transportation and storage of ISO containers

- State the utility and advantages of warehouses

- Identify the problems and issues in receiving processes.

- **MEANING OF WAREHOUSE-** Warehouse is a storage structure constructed for the protection of the quality and quantity of the stored produce. The need for a warehouse arises due to the time gap between production and consumption of products. Warehousing or storage refers to the holding and preservation of goods until they are despatched to the consumers. By bridging this gap, storage creates time utility. It involves providing facilities for preservation of goods in proper condition so as to prevent loss or damage, and making the goods available to traders or dealers for sale. Warehouses are places where storage facility exists. Thus, warehousing is an essential aid to trade or ancillary of trading activity. It creates both time and place utilities, as goods stored in warehouses can be available whenever and wherever needed by buyers. Manufacturers, wholesalers as well as dealers can make use of warehousing facilities to bridge the gap between the time when goods are procured or manufactured and the time they are demanded by customers. The warehousing also arises, from the modern systems of production and distribution of goods. Large-scale production generally takes place in anticipation of demand for goods, but not necessarily in response to specific orders of customers.

- **WAREHOUSING MANAGEMENT :** Warehouse Functions: Meaning of Warehousing - Importance — Functions: Receiving: Logistics support for Inward Transportation, Unloading, Inspection, Acceptance and Recording; Storing: Space allocation, Facilitation to stocking, Guarding & Recording; Risk bearing- Processing- Grading and branding — Disinfecting services -Issuing: Order preparation, Picking, Dispatching/ Delivery & Recording- Handling, Transportation & Storage of ISO Containers— Utility and Advantages of warehouses- Problems and issues in receiving processes. Unit-2: Warehouse Types: Own Warehouses- Hired Warehouses- Private Warehouses- Public Warehouses Government Warehouses- Bonded Warehouses- Co-operative Warehouses- Distribution Warehouses Fulfillment/ Consolidation Warehouses- Warehouses Providing Value Added Services- Cross Docking and Trans-loading Warehouses- Break Bulk Warehouses- Storage Warehouses- Refrigerated Warehouses Characteristics of ideal warehouses- Warehouse Layout- Principles and Facilities- Types. Unit-3: Internal Operations: Measures and metrics of warehouse operations- Logistics in the warehouse Localization of materials in a warehouse- Identification and classification of Materials and products in the warehouse- Managing the material/products turns in warehouse (FIFO/LIFO) - Problems and issues in shipment processes. Unit-4: Warehousing Equipment: Material Handling equipment and Systems — Role of Material Handling in Logistics- Unloading and loading equipment- Rolling Ladders-Lifting equipment- Carrying equipment Platform Trucks-Industrial Carts- Industrial Scales- Pallet Equipment - Pallet Trucks - Rack Systems- Safety Matting, Industrial Safety Equipment- Storage types and storage unit management- Material Storage Systems — principles — benefits — methods- Industrial Shelving, Industrial Storage Bins - Industrial Storage Cabinets - Spill Containment Systems- Industrial Waste Disposal. Unit-5: Inventory Management: Inventory Management- Need and functions- Stock Levels under Conditions of Certainty, Risk and Uncertainty- Cost of carrying or not holding adequate inventory- EOQ Stock-out cost based inventory decisions- Inventory Classification: ABC, VED and FSN- Methods of Inventory Issue Pricing- Cost and Profit implications- Inventory Ledger- Goods Receipt processing with inbound delivery/without inbound delivery - Goods issue with outbound delivery/internal consumption Stock transfer Scenarios. Unit-6: IT for Warehouse



Management (WM): Warehouse documentation- Information flows in the warehouse- ERP-WMS - Bar code — RFID- Organization Data- Warehouse Structure- Warehouse Master Data - WM Material master view- Organization Data- Define Warehouse structure- Warehouse number Storage type- Storage section - Storage Bin - Picking Area - Storage unit — Quantity- Creating Transfer requirement automatically/ manually - Creating Transfer requirement for storage

➤ **Types of Warehouses**

- **Private Warehouses:** These warehouses are owned and operated by big manufacturers and merchants to fulfil their own storage needs. Big business firms need large storage capacity on a regular basis and can afford money, construction and maintain their private warehouses. A big manufacturer or wholesaler may have a network of his own warehouses in different parts of the country. The private warehouses are licensed to private persons and only the goods imported by or on behalf of the licensee are stored in such warehouses.

- **Public Warehouses:** These warehouses are a specialised business establishment that provides storage facilities to the general public for a certain charge. It may be owned and operated by an individual or a cooperative society. It works under a licence from the Government. They are generally located near the junctions of railways, highways and waterways. They therefore, provide excellent facilities for the easy receipt, dispatch, loading and unloading of goods. They are very important in the marketing of agricultural products. A public warehouse is also known as 'duty paid warehouse'. Public warehouses are very useful to the business community as they can meet their storage needs easily and economically by making use of the public warehouse, without heavy investment. Such warehouses provide storage facilities to small manufacturers and traders at low costs. They provide facilities for the inspection of goods by prospective buyers. They also permit packaging and grading of goods. The public warehouses receipts are good collateral securities for borrowings.

- **Bonded Warehouses:** These warehouses are licenced by the Government to accept imported goods for storage until the payment of customs duty. They are located near the ports. They are either operated by the Government or work under the control of customs authorities. The warehouse is required to give an undertaking or 'Bond' that it will not allow the goods to be removed without the consent of the custom authorities. The goods are held in bond and cannot be withdrawn without paying the customs duty. Such warehouses are very helpful to importers and exporters. If an importer is unable to pay customs Warehouse Functions NOTES Self-Instructional Material 5 Warehousing Management NOTES duty immediately after the arrival of goods he can store the goods in a bonded warehouse. He can withdraw the goods in installments by paying the customs duty proportionately. Goods lying in a bonded warehouse can be packaged, graded and branded for the purpose of sale. Central Warehousing Corporation operates 75 Custom Bonded Warehouses with a total operated capacity of nearly 0.5 million Mts.

➤ **FUNCTIONS OF WAREHOUSE-** Warehousing is a key component of the overall business supply chain. The supply chain consists of the facilities and distribution options for the procurement of materials from manufacturer to customer and all points in between. It includes the production of materials into components and finished products and then the distribution to customers. The warehousing functionality today is much more than the traditional function of storage. The following are main function that warehousing serves today:

- • Receiving goods — receive and accept responsibility by updating records.
- • Identifying goods — place, label, colour code (normal stocks, promotional stocks, special customer stocks like CSD, price changes, batch etc). sorting goods- sort out the

received goods based on identification for appropriate storage area. For example special customer goods, revised price goods, promotional goods should be sorted out separately. Dispatching/ put away the sorted goods in an appropriate storage place — for temporary storage with easy accessibility. 6 Self-Instructional Material

- • Holding goods — security against pilferage and deterioration.
- • Selecting, retrieving, packing — items are retrieved and grouped according to customer order for dispatch.
- • Marshaling goods — check the items of a single order for completeness and order records are updated. Dispatching goods- consolidated order is packaged and directed to right transport.
- • Preparing records — of stocks and replenishment requirements. The following sub-sections provide a detailed discussion on warehousing functions.
- **Receiving of Inventory** -The first and most important function of a warehouse is to receive the inventory. It is very important for a warehouse manager to make proper inspection and recording of the receiving inventory. While receiving of goods the following points should be considered: 1. Logistics Support for Inward Transportation  
Inward transport or traffic moves materials from suppliers to an organization's receiving area. For this, managers have to choose the type of transport (road, rail, air, etc.), find the best transport operator, design a route, make sure that all safety and legal requirements are met, ensure deliveries on time, and keep costs low, and so on. The following are the key mode of transportation: (a) Road Transport Large producers and dealers of goods often use their own motor trucks, delivery vans and other vehicles for inward and outward transport of goods. There are also public transport agencies which operate trucks and vans on hire. Vehicles owned by producers and dealers are put to use, whenever required. A separate department is generally entrusted with the task of proper maintenance of the vehicles and regulating their movement. Hired vehicles are generally used on a contract basis for regular purposes. Alternatively vehicles are hired from agencies as and when required. A truck service can also be arranged for less than full truck load. Before they are loaded into the vehicle, goods are required to be packed in crates or wooden cases or in bales or any other form depending on the nature of the product. However, packing may not be needed in the case of goods like iron rods, beams, bricks, sand, stone chips, minerals, coal, etc., which are carried in bulk. Motor vehicles are also specially made known as tankers, for carrying liquids in bulk.

## Part –I MCQ questions

### Unit- 3 MCQ

**Which of the following is NOT a type of warehouse?**

- a) Public Warehouse
- b) Private Warehouse
- c) Cold Storage
- d) Bank Vault

**Answer:** d) Bank Vault

**What is the main purpose of a bonded warehouse?**

- a) Storing hazardous materials
- b) Storing imported goods before duty payment
- c) Distributing perishable goods
- d) Manufacturing products

**Answer:** b) Storing imported goods before duty payment

**Which warehouse management strategy reduces inventory levels?**

- a) Just-in-Time (JIT)
- b) Bulk Storage
- c) Cross-Docking
- d) Vendor-Managed Inventory (VMI)

**Answer:** a) Just-in-Time (JIT)

**Cross-docking in warehouses aims to:**

- a) Increase storage capacity
- b) Eliminate the need for long-term storage
- c) Automate inventory tracking
- d) Minimize labor costs

**Answer:** b) Eliminate the need for long-term storage

**Which technology is commonly used in warehouse management systems (WMS)?**

- a) Blockchain
- b) RFID
- c) IoT
- d) All of the above

**Answer:** d) All of the above

**Which of the following is a characteristic of an owned warehouse?**

- a) High initial investment
- b) Flexible lease terms
- c) No maintenance responsibility
- d) Short-term storage solution

**Answer:** a) High initial investment

**What is a major advantage of a rented warehouse?**

- a) Long-term asset value
- b) Lower upfront costs
- c) High customization options
- d) Complete operational control

**Answer:** b) Lower upfront costs

**Owned warehouses are best suited for companies that:**

- a) Have fluctuating storage needs
- b) Need short-term storage solutions
- c) Have stable, long-term storage requirements
- d) Operate in multiple locations temporarily

**Answer:** c) Have stable, long-term storage requirements

**A rented warehouse is often preferred by businesses because it:**

- a) Requires significant capital investment
- b) Provides long-term tax benefits
- c) Offers scalability based on storage needs
- d) Guarantees full control over operations

**Answer:** c) Offers scalability based on storage needs

**Which type of warehouse allows for ownership of the property?**

- a) Rented warehouse
- b) Bonded warehouse
- c) Owned warehouse
- d) Public warehouse

**Answer:** c) Owned warehouse

**Which of the following is a primary feature of a refrigerated warehouse?**

- a) High-temperature storage
- b) Temperature-controlled environment
- c) Long-term dry goods storage
- d) Stacking unregulated goods

**Answer:** b) Temperature-controlled environment

**Refrigerated warehouses are commonly used to store:**

- a) Electronics
- b) Pharmaceuticals
- c) Furniture
- d) Construction materials

**Answer:** b) Pharmaceuticals

**What is the primary purpose of general storage warehouses?**

- a) Storing perishable goods
- b) Bulk storage of non-perishable goods
- c) Managing temperature-sensitive items
- d) Exporting bonded goods

**Answer:** b) Bulk storage of non-perishable goods

**Which of the following industries relies heavily on refrigerated warehouses?**

- a) Apparel
- b) Food and Beverage
- c) Automotive
- d) Construction

**Answer:** b) Food and Beverage

**In refrigerated warehouses, which factor is critical for maintaining product quality?**

- a) Ventilation system
- b) Humidity and temperature control
- c) Large storage capacity
- d) Automated sorting systems

**Answer:** b) Humidity and temperature control

#### **Unit-4 MCQ**

**What is the primary objective of inventory management?**

- a) Minimize stock levels
- b) Maximize profits
- c) Ensure adequate stock while minimizing costs
- d) Automate warehouse operations

**Answer:** c) Ensure adequate stock while minimizing costs

**Which inventory system records transactions immediately?**

- a) Periodic inventory system
- b) Perpetual inventory system
- c) Batch processing system
- d) Manual inventory system

**Answer:** b) Perpetual inventory system

**What does EOQ (Economic Order Quantity) aim to achieve?**

- a) Maximize stock levels
- b) Minimize ordering and holding costs
- c) Reduce supplier lead time
- d) Increase demand for products

**Answer:** b) Minimize ordering and holding costs

**What is safety stock?**

- a) Excess inventory to increase profits
- b) Reserve stock to handle demand variability
- c) Obsolete inventory in the system
- d) Items awaiting disposal

**Answer:** b) Reserve stock to handle demand variability

**Which inventory management technique focuses on reordering when stock reaches a specific level?**

- a) ABC Analysis
- b) Reorder Point System
- c) Just-in-Time (JIT)
- d) FIFO Method

**Answer:** b) Reorder Point System

**What does a material transaction in a warehouse typically involve?**

- a) Movement of financial records
- b) Movement of goods or materials
- c) Employee shift changes
- d) Maintenance activities

**Answer:** b) Movement of goods or materials

**Which document is essential for receiving materials in a warehouse?**

- a) Invoice
- b) Goods Receipt Note (GRN)
- c) Delivery Schedule
- d) Bill of Materials

**Answer:** b) Goods Receipt Note (GRN)

**What is the primary purpose of a picking list?**

- a) Document outgoing goods
- b) Guide warehouse staff to pick items for dispatch
- c) Track incoming shipments
- d) Record stock discrepancies

**Answer:** b) Guide warehouse staff to pick items for dispatch

**Which term refers to tracking material movement within the warehouse?**

- a) Inventory control
- b) Material flow
- c) Cycle counting
- d) Stocktaking

**Answer:** b) Material flow

**What is a transfer order in a warehouse?**

- a) An order to move items from one location to another
- b) A customer purchase order
- c) A return of defective items
- d) A list of incoming goods

**Answer:** a) An order to move items from one location to another

## **Part –II Short Note Questions**

**What is the primary purpose of warehouse management?**

To efficiently store, organize, and distribute goods.

**Define cross-docking.**

Transferring goods directly from inbound to outbound without storage.

**What is a Warehouse Management System (WMS)?**

Software used to manage warehouse operations.

**List two key functions of a warehouse.**

Storage and order fulfillment.

**What is the role of inventory tracking?**

Ensures accurate stock levels and reduces discrepancies.

**Explain "safety stock."**

Extra inventory to handle demand or supply fluctuations.

**What are bonded warehouses?**

Facilities for storing imported goods before customs duties are paid.

**Mention one advantage of automated warehouses.**

Increased efficiency and reduced human errors.

**What is the significance of a picking list?**

Guides staff to collect items for orders.

**How does JIT impact warehouse storage?**

Minimizes inventory by receiving goods only when needed.

**What is inventory management?**

The process of tracking and controlling stock to meet demand efficiently.

**Why is inventory management important?**

It minimizes costs, prevents stockouts, and ensures smooth operations.

**What is EOQ (Economic Order Quantity)?**

The optimal order quantity to minimize total inventory costs.

**Define safety stock.**

Extra inventory kept to handle demand and supply uncertainties.

**What is the FIFO method?**

"First In, First Out" ensures older inventory is used or sold first.

**What is a perpetual inventory system?**

A system that updates stock levels in real time after every transaction.

**What is cycle counting?**

A method of counting inventory in small portions regularly.

**Define reorder point.**

The stock level at which a new order is placed.

**What is ABC analysis in inventory?**

A method to classify inventory based on value and importance.

**What is JIT inventory management?**

A system where goods are received only when needed, reducing storage costs.

**What is FIFO in inventory management? Explain with an example.**

**Answer:**

FIFO (First In, First Out) is an inventory valuation method where the oldest inventory is used or sold first. This ensures that products do not become obsolete or expire.

**Example:**

A grocery store receives 100 cartons of milk on Day 1 and 50 cartons on Day 2. Using FIFO, the milk from Day 1 is sold first. This method is commonly used for perishable goods to maintain freshness.

➤ **4 Marks questions unit 4**

---

**1. What is FILO in inventory management? Explain with an example.**

**Answer:**

FILO (First In, Last Out) is a hypothetical method where the most recently received inventory is used or sold first, leaving older stock untouched. This method is not widely used in inventory due to risks of obsolescence or expiration.

**Example:**

A construction company stores materials like sand. If FILO is applied, the sand added last is used first, while older sand remains at the bottom of the pile.

---

**2. Compare FIFO and FILO.**

**Answer:**

Aspect	FIFO	FILO
<b>Order of Use</b>	Oldest stock is used first.	Newest stock is used first.
<b>Application</b>	Common for perishable goods.	Rarely used, mostly hypothetical.
<b>Advantages</b>	Prevents expiration or obsolescence. Easy access to recent stock.	
<b>Disadvantages</b>	May increase costs during inflation. Older stock may expire or degrade.	

**3. What is Cross-Docking?**

**Answer:**

Cross-docking is a logistics strategy where goods are transferred directly from incoming trucks to outgoing trucks with minimal or no storage in the warehouse. It reduces storage time and speeds up the supply chain.

**Example:** A retailer receives products from manufacturers and immediately ships them to stores without storing them in the warehouse.

**Advantages:**

- Reduces storage costs.
  - Speeds up delivery times.
  - Improves inventory management.
- 

**4. What is Overloading of a Warehouse?**

**Answer:**

Overloading occurs when a warehouse exceeds its capacity to store goods, leading to disorganization, reduced efficiency, and potential damage to inventory.

**Causes:**

- Poor inventory management.
- Unexpected demand spikes.



- Inefficient space utilization.

### **Consequences:**

- Operational delays.
- Increased risk of accidents.
- Higher handling costs.

### **Solution:**

- Implement inventory control techniques (e.g., JIT).
- Optimize storage layouts.
- Use external storage solutions during peak periods.

## **5.Characteristics of an Ideal Warehouse**

### **1. Efficient Layout and Design:**

- A well-organized floor plan that maximizes space utilization and allows easy movement of goods.
- Proper zoning for receiving, storage, picking, and shipping areas.

### **2. Optimal Storage Solutions:**

- Utilizes appropriate shelving, racking, and stacking systems to maximize storage space.
- Adjustable and flexible to accommodate various types of inventory.

### **3. Scalability:**

- Ability to expand or adjust operations as business needs grow, including storage capacity and workforce requirements.

### **4. Good Inventory Management:**

- Accurate tracking of inventory with up-to-date records and efficient methods like barcode scanning or RFID.
- Use of automated systems (WMS) for real-time monitoring and control.

### **5. Safety and Security:**

- Adequate safety measures, such as fire safety systems, proper handling equipment, and well-maintained flooring.
- Security features like surveillance cameras and restricted access areas to protect against theft and damage.

### **6. Efficient Material Handling Equipment:**

- Availability of forklifts, pallet jacks, conveyors, and other machinery to assist with loading, unloading, and transporting goods within the warehouse.

### **7. Advanced Technology Integration:**

- Incorporation of modern technologies like automation, robotics, and Warehouse Management Systems (WMS) to streamline operations and improve accuracy.

### **8. Climate Control (if needed):**

- Suitable temperature and humidity controls for sensitive goods like food, pharmaceuticals, or chemicals. Refrigerated or climate-controlled storage may be necessary.

### **9. Effective Communication Systems:**

- Clear communication channels among warehouse staff, supervisors, and other departments for smooth operations.
- Use of intercoms, radios, or digital communication tools.

#### 10. Labor Efficiency and Training:

- A well-trained and skilled workforce capable of efficiently handling goods, managing inventory, and ensuring safe operations.
- Clear workflows and processes to minimize delays.

#### 11. Environmental Considerations:

- Sustainable practices such as energy-efficient lighting, waste management, and eco-friendly packaging.

#### 12. Cost-Effectiveness:

- Focused on minimizing operational costs while maintaining high service levels, such as through lean inventory practices or optimized storage techniques.

### 6. Material Transaction Policies in Warehouse Management

Material transaction policies in warehouse management refer to the guidelines and procedures that govern the movement, tracking, and handling of materials within the warehouse. These policies ensure that material flows are efficient, accurate, and aligned with organizational goals. Below are key aspects of material transaction policies:

---

#### 1. Receiving Policies

- **Purpose:** To ensure that materials or goods are accurately received and documented when they arrive at the warehouse.
  - **Process:**
    - Goods are checked for quantity and quality upon arrival.
    - Any discrepancies between the purchase order, packing list, and the received items are recorded.
    - The goods are assigned a location for storage, and inventory records are updated.
  - **Best Practices:**
    - Use of barcodes or RFID scanning for fast and accurate receipt.
    - Documentation of any damaged or missing items.
- 

#### 2. Inventory Control Policies

- **Purpose:** To track inventory accurately and maintain optimal stock levels.
  - **Process:**
    - Goods are monitored throughout their lifecycle (from receiving to shipping).
    - Inventory is regularly counted, either via cycle counting or full stocktakes, to ensure accuracy.
    - Reorder points are set to trigger new orders before stock runs out.
  - **Best Practices:**
    - Implementation of an inventory management system (WMS) to track real-time stock levels.
    - Regular audits to minimize shrinkage (loss due to theft, damage, or errors).
-

### 3. Storage Policies

- **Purpose:** To define how materials are stored to optimize space and ease of access.
  - **Process:**
    - Materials are organized based on size, type, and frequency of use.
    - Items with higher turnover rates are placed in easily accessible areas.
    - Proper labeling and categorization of stock to minimize search time and picking errors.
  - **Best Practices:**
    - Using vertical storage to maximize warehouse space.
    - Ensuring proper stacking methods to avoid damage.
- 

### 4. Picking and Packing Policies

- **Purpose:** To ensure that the correct items are picked and packed for shipment, reducing errors and enhancing efficiency.
  - **Process:**
    - Orders are processed based on picking lists, which guide warehouse staff to select the correct items.
    - Materials are picked in the most efficient manner (e.g., single order picking, batch picking).
    - Once picked, the items are packed securely for shipping.
  - **Best Practices:**
    - Use of barcode scanning to verify items during picking and packing.
    - Clear instructions for handling fragile or perishable goods.
- 

### 5. Shipping and Dispatch Policies

- **Purpose:** To ensure that materials are delivered to customers or other locations in a timely and accurate manner.
  - **Process:**
    - Shipping orders are reviewed and confirmed against inventory records before dispatch.
    - Dispatch documentation such as shipping labels and bills of lading are prepared.
    - Coordination with carriers for timely delivery.
  - **Best Practices:**
    - Use of tracking systems to monitor shipments and resolve issues promptly.
    - Quality checks to ensure all items are packed correctly and are in good condition before leaving the warehouse.
- 

### 6. Returns and Replenishment Policies

- **Purpose:** To define how returned materials and stock replenishments are handled.
- **Process:**

- Returned goods are inspected for damage or defects.
  - Reusable items are restocked, while defective goods are sent for disposal or repair.
  - Replenishment processes are triggered when stock levels fall below a certain threshold.
  - **Best Practices:**
    - Clear criteria for accepting returns based on the condition and reason for return.
    - Timely and accurate reorder procedures to avoid stockouts.
- 

## 7. Safety and Compliance Policies

- **Purpose:** To ensure that materials are handled safely and in compliance with legal and regulatory standards.
  - **Process:**
    - Proper handling procedures are in place for hazardous materials, ensuring that staff use appropriate PPE (Personal Protective Equipment).
    - Compliance with industry standards and government regulations (e.g., OSHA, environmental laws).
  - **Best Practices:**
    - Regular safety training for warehouse staff.
    - Labeling and proper storage of hazardous materials.
- 

## 8. Loss Prevention and Security Policies

- **Purpose:** To minimize material losses and ensure the security of warehouse operations.
- **Process:**
  - Implementing access control measures to restrict unauthorized entry to the warehouse.
  - Regularly monitoring warehouse areas through security cameras and alarms.
  - Managing the movement of high-value or sensitive materials with increased surveillance.
- **Best Practices:**
  - Performing background checks on warehouse staff.
  - Using secure storage methods for high-value or sensitive items.