

# 2

## Material

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### Learning Objectives

After studying this chapter you will be able to:

- Understand the concept of materials,
- Understand its need and importance.
- Describe the procedures involved in procuring, storing and issuing material.
- Differentiate amongst the various methods of valuing material.
- Evaluate different methods of pricing material issues, material received and material return.
- Understand the meaning and accounting treatment for normal and abnormal loss of material.
- Understand the meaning and the accounting treatment of waste, scrap, spoilage and defectives.

### 2.1 Introduction

We have acquired a basic knowledge about the concepts, objectives, advantages, methods and elements of cost. We shall now study each element of cost separately begin with material. The general meaning of material is all commodities/ physical objects supplied to an organization. It may be direct material or indirect material. Materials constitute a very significant portion of total cost of finished product. A proper recording and control over the material costs is very essential. Importance of proper recording and control of material are following:

- (a) Dependence of the Quality of finished product:** The exact quality of raw materials required should be determined according to the required quality of the finished product. Quality and cost both should be given equal consideration.
- (b) Price of the product:** The price paid should be the minimum possible otherwise the higher cost of the finished products would make the product uncompetitive in the market.
- (c) Continuity in production:** There should not be any interruption in the production process for want of materials and stores, including small inexpensive items like lubricating oil for a machine.

- (d) **Cost of holding material:** There should not be over stocking of materials because this would result in loss of interest charges, higher warehouse charges, deterioration in quality and losses due to obsolescence
- (e) **Wastages:** Wastage and losses while the materials are in store and during the process of manufacture should be avoided as far as possible; and
- (f) **Regular information about resources:** It may also be added that information about availability of materials and stores should be continuously available so that production may be planned properly and the required materials purchased in time.

## 2.2 Material Control

The publication of the Chartered Institute of Management Accountants (CIMA) on Inventory Control defines it as *“The function of ensuring that sufficient goods are retained in stock to meet all requirements without carrying unnecessarily large stocks.”*

**2.2.1 Objectives of system of material control:** The objectives of a system of material control are the following:

- (i) **Minimising interruption in production process:** Ensuring that no activity, particularly production, suffers from interruption for want of materials and stores. It should be noted that this requires constant availability of every item that may be needed howsoever small its cost may be.
- (ii) **Cost of Material:** Seeing to it that all the materials and stores are acquired at the lowest possible price considering the quality that is required and considering other relevant factors like reliability in respect of delivery, etc. Holding cost should also be tried to be minimized.
- (iii) **Reduction in Wastages:** Avoidance of unnecessary losses and wastages that may arise from deterioration in quality due to defective or long storage or from obsolescence. It may be noted that losses and wastages in the process of manufacture, concern the production department.
- (iv) **Adequate Information:** Maintenance of proper records to ensure that reliable information is available for all items of materials and stores that not only helps in detecting losses and pilferages but also facilitates proper production planning.
- (v) **Completion of order in time:** Proper material management is very necessary for fulfilling orders of the firm. This adds to the goodwill of the firm.

**2.2.2 Requirements of material control:** Material control requirements can be summarised as follows:—

1. Proper co-ordination of all departments involved *viz.*, finance, purchasing, receiving, inspection, storage, accounting and payment.

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2. Determining purchase procedure to see that purchases are made, after making suitable enquiries, at the most favourable terms to the firm.
3. Use of standard forms for placing the order, noting receipt of goods, authorising issue of the materials etc.
4. Preparation of budgets concerning materials, supplies and equipment to ensure economy in purchasing and use of materials.
5. Operation of a system of internal check so that all transactions involving materials, supplies and equipment purchases are properly approved and automatically checked.
6. Storage of all materials and supplies in a well designated location with proper safeguards.
7. Operation of a system of perpetual inventory together with continuous stock checking so that it is possible to determine at any time the amount and value of each kind of material in stock.
8. Operation of a system of stores control and issue so that there will be delivery of materials upon requisition to departments in the right amount at the time they are needed.
9. Development of system of controlling accounts and subsidiary records which exhibit summary and detailed material costs at the stage of material receipt and consumption.
10. Regular reports of materials purchased, issue from stock, inventory balances, obsolete stock, goods returned to vendors, and spoiled or defective units.

**2.2.3 Elements of Material Control:** Material control is a systematic control over the procurement, storage and usage of material so as to maintain an even flow of material.

Material control involves efficient functioning of the following operations:

- Purchasing of materials
- Receiving of materials
- Inspection of materials
- Storage of materials
- Issuing materials
- Maintenance of inventory records
- Stock audit.

## 2.3 Materials Procurement Procedure

Material procurement procedure can be understood with help of the following diagram. Documents required and the departments who initiate these documents are shown sequentially.

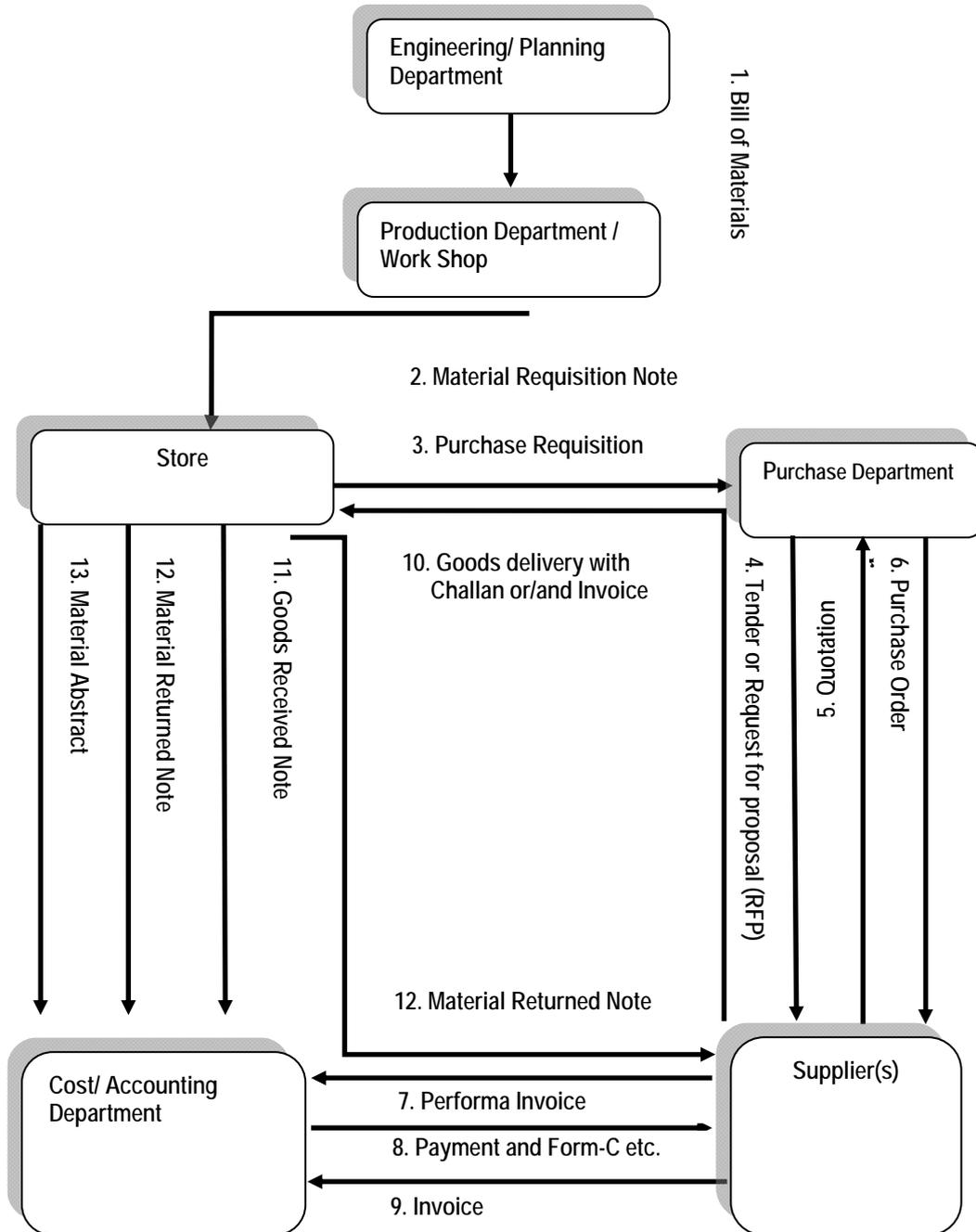


Diagram: Material Procurement Procedure

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**2.3.1 Bill of Materials:** It is also known as Materials Specification List or simply Materials List. It is a schedule of standard quantities of materials required for any job or other unit of production. A comprehensive Materials List should rigidly lay down the exact description and specifications of all materials required for a job or other unit of production and also required quantities so that if there is any deviation from the standard list, it can easily be detected. The materials specification list is prepared by the Engineering or Planning Department in a standard form. The numbers of copies prepared vary according to the requirement of each business. Generally Bill of Material is sent to Production control department, Store department, Cost/ Accounting department and a copy retained with engineering or planning department. A proforma of Bill of Materials is as follows:

### Bill of Materials

Job No. ....				No. ....		
Department authorised .....				Date .....		
Sl.	Code	Description	Qty.	Date of	Rate	Amount
No.	No.		issued	issue & Qty. Date Qty.	₹	₹
Authorised by .....				Received by .....		
Store Keeper's signature .....				Checked by .....		
				Cost clerk .....		

*The advantages of using "bill of materials", by the concerned departments may be summed up as follows:—*

#### Stores Department:

1. A bill of material serves as an important basis of preparing material purchase requisitions by stores department.
2. It acts as an authorisation for issuing total material requirement.
3. The clerical activity is reduced as the stores clerk issues the entire/part of the material requirement to the users if the details of material asked are present in the bill of materials.

**Cost Accounts Department:**

1. Bill of material, is used by Cost Accounts department for preparing an estimate/budget of material cost for the job/process/operation, it is meant.
2. It may be used as a device for controlling the excess cost of material used. This is done after determining material variances and ascertaining the reasons for their occurrence.

**Production Control Department:**

1. Bill of material may be used by this department for controlling usage of materials.
2. Its usage saves time which otherwise would have been wasted for preparing separate requisitions of material.

**Engineering or Planning department:** As stated earlier this department prepares the materials list in a standard form. A copy of list is sent to stores, cost accounts and production control department.

**2.3.2 Material Requisition Note:** It is also known as material requisition slip, It is the voucher of the authority regarding issue of materials for use in the factory or in any of its departments. Generally it is prepared by the production department and materials are withdrawn on the basis of material requisition list or bill of materials. If no material list has been prepared, it is desirable that the task of the preparation of material requisition notes be left to the planning department or by the department requires the materials. Usually, a foreman's authority is enough but, in the case of costly materials, it would be desirable to have such requisitions duly approved by some higher authority, like the superintendent or works manager before these are presented to Stores. Apart from sending a material requisition to store a copy is sent to cost accounting department and one copy is retained as office copy.

A specimen form of the Material Requisition is shown below:

<b>Material Requisition Note</b>				
<i>Work Order No.</i> .....		<i>No.</i> .....		
<i>Department</i> .....		<i>Date</i> .....		
<i>Item No.</i>	<i>Particulars</i>	<i>Qty.</i>	<i>Rate</i> ₹	<i>Amount</i> ₹
<i>Store-keeper</i>	<i>Workman receiving the material</i>	<i>Foreman</i>	<i>S.L. Clerk</i>	

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### *Difference between Bill of Materials and Material Requisition Note:*

Bill of Materials	Material Requisition Note
1. It is the document prepared by the drawing office.	1. It is prepared by the Foreman of the consuming department.
2. It is a complete schedule of component parts and raw materials required for a particular job or work order.	2. It is a document authorizing Store-keeper to issue materials to the consuming department.
3. It often serves the purpose of a Stores Requisition as it shows the complete schedule of materials required for a particular job i.e. it can replace stores requisition.	3. It cannot replace a bill of materials.
4. It can be used for the purpose of quotations.	4. It is useful in arriving historical cost only.
5. It helps in keeping a quantitative control on materials drawn through stores Requisition.	5. It shows the material actually drawn from stores.

**2.3.3 Purchase Requisition:** Since the materials purchased will be used by the production departments, there should be constant co-ordination between the purchase and production departments. A purchase requisition is a form used for making a formal request to the purchasing department to purchase materials. This form is usually filled up by the store keeper for regular materials and by the departmental head for special materials (not stocked as regular items). The requisition form is duly signed by either works manager or plant superintendent, in addition to the one originating it. At the beginning a complete list of materials and stores required should be drawn up, the list should have weekly consumption figures. It should be gone through periodically so that necessary deletion and addition may be made. If there is any change in the rate of consumption per week (say, due to extra shift being worked), the purchase department should be informed about the new figures. Once an item has been included in the standard list, it becomes the duty of the purchase department to arrange for fresh supplies before existing stocks are exhausted. But if the production department requires some new material, it should make out an indent well in time and send it to the purchase department for necessary action.

For control over buying of regular store materials it is necessary to determine their maximum, minimum, reorder level and economic order quantities. The use of economic order quantities and various levels constitutes an adequate safeguard against improper indenting of regular materials. In respect of special materials, required for a special order or purpose, it is desirable that the technical department concerned should prepare materials specifications list specifying the quantity, size and order specifications of materials to be drawn from the store and those to be specially procured. It may originate either in the stores department in connection with regular stock of materials or in the production planning or in other technical

departments concerned in respect of special materials. Its purpose is to request and authorise the purchase department to order to procure the materials specified in stated quantities. It should be made out in triplicate and send to following.

<b>Purchase Requisition (Regular/Special)</b>			
(Use a separate form for each item)			
No.....	Department.....		
Date.....			
Purchase.....	Date by which material required.....		
Description of Materials required	Quantity required	Exact specification	
			..... Indentor
<b>For use in purchase department</b>			
Firm	1.	2.	3.
Quotations	Order No. & Date.....		
.....			
Price (including charges)	With.....		
.....			
Date of Delivery	Price.....		
.....			
Remarks	Date of dly.....		
.....			
			Purchase Manager

**2.3.4 Inviting Tender/ Requesting for proposal (RFP):** After receipt of purchase requisition from the store department or other competent departments, role of purchasing department comes into play. If a concern can afford or the size of the concern is big enough, there should be a separate purchase department for all purchases to be made on behalf of all other departments. Such a department is bound to become expert in the various matters to be

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attended to, for examples— units of materials to be purchased and licences to be obtained, transport, sources of supply, probable price etc.

Materials purchase department in a business house is confronted with the following issues:

- (i) What to purchase?
- (ii) When to purchase?
- (iii) How much to purchase?
- (iv) From where to purchase.
- (v) At what price to purchase.

To overcome these questions, purchase department make an enquiry into the market for the required material. The process of gathering information about the rate, quantity, technology, services and support etc., purchase department sent RFP to selected vendors in case if purchase policy allows this practice. Some organizations follow the open and transparent purchase policy and invite quotations from the interested vendors. This process is called Tender Notification or Invitation of Tender.

**2.3.5 Selection of Quotation/ Proposal:** After invitation of tender from the vendors, interested vendors who are fulfilling all the criteria mentioned in the tender notice send their price quotations/proposals to the purchase department. On the receipt of quotations a comparative statement is prepared. For selecting material suppliers the factors which the purchase department keeps in its mind are—price; quantity; quality offered; time of delivery; mode of transportation; terms of payment; reputation of supplier; etc. In addition to the above listed factors purchase manager obtains other necessary information from the statement of quotations; past records, buyer guides etc. for finally selecting material suppliers.

**2.3.6 Preparation and execution of Purchase Orders:** Having decided on the best quotation that should be accepted, the purchase manager or concerned officer proceeds to issue the formal purchase order. It is a written request to the supplier to supply certain specified materials at specified rates and within a specified period. Generally copies of purchase order are given to Store or order indenting department, receiving department and cost accounting department. A copy of the purchase order, alongwith relevant purchase requisitions, is held in the file of the department to facilitate the follow-up, of the delivery and also for approving the invoice for payment.

**2.3.7 Receipt and inspection of materials:** After execution of purchase order and advance payment (if terms of quotation so specified), necessary arrangement is made to receive the delivery of materials (in case of inter-state purchase way bill (e.g. Form-C) is get issued by the purchase or accounting department). After receipt of materials along with challan or/ and invoice, Receiving department arrange to inspect the materials for its conformity with purchase order. After satisfactory inspection materials are received and Goods Received Note is issued. If some materials are not found in good condition or not in conformity with the purchase order are returned back to the vendor alongwith a Material Returned Note.

**2.3.7.1 Goods Received Note:** If everything is in order and the supply is considered suitable for acceptance, the Receiving department prepares a Receiving Report or Material Inward Note or Goods Received Note. Generally it is prepared in quadruplicate, the copies being distributed to purchase department, store or order indenting department, receiving depart and accounting department.

A specimen form of the receiving report is given below:

<i>Goods Received Note</i>						
<i>Received from.....</i>				<i>No. ....</i>		
<i>Order No. ....</i>				<i>Date.....</i>		
<i>Amount</i>						
<i>Quantity</i>	<i>Code</i>	<i>Description</i>	<i>Amount due to supplier ₹</i>	<i>Charges ₹</i>	<i>Total ₹</i>	<i>Remarks</i>
<i>Inspector.....</i>				<i>Store Keeper.....</i>		
<i>Receiver.....</i>				<i>Store Ledger Clerk.....</i>		

**2.3.7.2 Material Returned Note :** Sometimes materials have to be returned to suppliers after these have been received in the factory. Such returns may occur before or after the preparation of the receiving report. If the return takes place before the preparation of the receiving report, such material obviously would not be included in the report and hence not debited in the stores books and ledgers. In that case, no adjustment in the account books would be necessary. But if the material is returned after its entry in the receiving report, a suitable document must be drawn up in support of the credit entry so as to exclude from the Stores of Material Account the value of the materials returned back. This document usually takes the form of a Material Returned Note or Material outward return note.

The Material outward return note is drawn up by the Stores or the Despatch Department. Five copies of it are usually prepared; two for the supplier (one of which is to be sent back by the supplier after he has signed the same), one for Store, one for Cost (stores) Ledger and one copy to be retained in the Material outward return book.

**2.3.8 Checking and passing of bills for payment:** The invoice received from the supplier is sent to the stores accounting section to check authenticity and mathematical accuracy. The quantity and price are also checked with reference to goods received note and the purchase order respectively. The stores accounting section after checking its accuracy finally certifies and passes the invoice for payment. In this way the payment is made to supplier.

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### 2.4 Valuation of Material Receipts

After the procurement of materials from the supplier actual material cost is calculated. Ascertainment of cost of material purchased is called valuation of materials. Cost of material includes cost of purchase net of trade discounts, rebates, duty draw-back, Cenvat credit availed, etc. and other costs incurred in bringing the inventories to their present location and condition. The invoice of material purchased from the market sometime contain items such as trade discount, quantity discount, freight, duty, insurance, cost of containers, sales tax, excise duty, cash discount etc.

Treatment of items associated with purchase of materials is tabulated as below

Sl no.	Items	Treatment
<b>Discounts and Subsidy</b>		
(i)	Trade Discount	Trade discount is <b>deducted</b> from the purchase price if it is not shown as deduction in the invoice.
(ii)	Quantity Discount	Like trade discount quantity discount is also shown as deduction from the invoice. It is <b>deducted</b> from the purchase price if not shown as deduction.
(iii)	Cash Discount	Cash discount is <b>not deducted</b> from the purchase price. It is treated as interest and finance charges.
(iv)	Subsidy/ Grant/ Incentives	Any subsidy/ grant/ incentive received from the Government or from other sources <b>deducted</b> from the cost of purchase.
<b>Duties and Taxes</b>		
(v)	Road Tax/ Toll Tax	Road tax/ Toll tax if paid by the buyer then it is <b>included</b> with the cost of purchase.
(vi)	Octroi/ Entry Tax	Octroi/ Entry tax is collected by the Panchayats/ local authorities. It is <b>added</b> with cost of purchase if it is borne by the buyer.
(vii)	Central Sales Tax (CST)	Central Sales Tax (CST) is paid on inter-state sale and collected from the buyers. The buyer is not getting any credit for tax paid hence it is <b>added</b> with cost of purchase.
(viii)	State Sales tax or Value Added Tax (VAT)	State Sales Tax/ VAT is paid on intra-state sale and collected from the buyers. It is <b>excluded</b> from the cost of purchase if credit for the same is available. Unless mentioned specifically it should not form part of cost of purchase.

(ix)	Excise Duty	Excise duty is paid on manufacture of goods and collected from the buyer. It <b>is excluded</b> from the cost of purchase if credit (CENVAT) is available for the same. Unless mentioned specifically excise duty is not added with the cost of purchase.
(x)	Custom Duty	Custom duty is paid on import of goods from outside India. It <b>is added</b> with the purchase cost.
(xi)	Purchase Tax	It is a tax paid on purchase of goods from unregistered supplier. Credit on purchase tax is available hence unless specifically mentioned it <b>is not added</b> with the cost of purchase.
<b>Penalty and Charges</b>		
(xii)	Demurrage	Demurrage is a penalty imposed by the transporter for delay in uploading or offloading of materials. It is an abnormal cost and <b>not included</b> with cost of purchase
(xiii)	Detention charges/ Fine	Detention charges/ fines are imposed for non compliance of rule or law by any statutory authority. It is an abnormal cost and <b>not included</b> with cost of purchase
(xiv)	Penalty	Penalty of any type is <b>not included</b> with the cost of purchase
<b>Other expenditures</b>		
(xv)	Insurance charges	Insurance charges are paid for protecting goods during transit. It <b>is added</b> with the cost of purchase.
(xvi)	Commission or brokerage paid.	Commission or brokerage paid <b>is added</b> with the cost of purchase.
(xvii)	Freight inwards	It <b>is added</b> with the cost of purchase as it is directly attributable to procurement of material.
(xviii)	Cost of containers	Treatment of cost of containers are as follows: Non-returnable containers: The cost of containers <b>is added</b> with the cost of purchase of materials. Returnable Containers: If on return of containers cost of containers is returned back then in this case cost of containers <b>is not added</b> with the cost of purchase. If the amount of refund on returning the container is less than the amount paid then <b>only short fall is added</b> with the cost of purchase.
(xix)	Shortage	Shortage in materials are treated as follows: <b>Shortage due to normal reasons:</b> Good units absorb

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	<p>the cost of shortage due to normal reasons. Losses due to breaking of bulk, evaporation, due to unavoidable conditions etc. are the reasons of normal loss.</p> <p><b>Shortage due to abnormal reasons:</b> shortage arises due to abnormal reasons such as material mishandling, pilferage, due to avoidable reasons are not absorbed by the good units. Losses due to abnormal reasons are debited to costing profit and loss account.</p>
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### Illustration 1: (Valuation of material)

An invoice in respect of a consignment of chemicals A and B provides the following information:

	(₹)
Chemical A: 10,000 kgs. at ₹ 10 per kg.	1,00,000
Chemical B: 8,000 kgs. at ₹ 13 per kg.	1,04,000
Central Sales tax @ 2%	4,080
Railway freight	<u>3,840</u>
Total cost	<u>2,11,920</u>

A shortage of 500 kgs. in chemical A and 320 kgs. in chemical B is noticed due to normal breakages. You are required to determine the rate per kg. of each chemical, assuming a provision of 2% for further deterioration.

### Solution

#### Working:

Computation of effective quantity of each chemical available for use

	Chemical A (kg.)	Chemical B (kg.)
Quantity purchased	10,000	8,000
Less : Shortage due to normal breakages	500	320
	9,500	7,680
Less : Provision for deterioration 2%	190	153.6
Quantity available	9,310	7,526.4

#### Statement showing the computation of rate per kg. of each chemical

	Chemical A (₹)	Chemical B (₹)
Purchase price	1,00,000	1,04,000
Add : Central Sales tax @2%	2,000	2,080
Add: Railway freight		

(in the ratio of quantity purchased i.e., 5:4)	2,133	1,707
Total cost (A)	1,04,133	1,07,787
Effective Quantity (see working) (B)	9,310 kg.	7,526.4 kg.
Rate per kg. (A ÷ B)	11.19	14.32

**Illustration 2: (Valuation of material)**

At what price per unit would Part No. A 32 be entered in the Stores Ledger, if the following invoice was received from a supplier:

<i>Invoice</i>	<i>(₹)</i>
200 units Part No. A 32 @ ₹ 5	1,000.00
Less : 20% discount	(200.00)
	800.00
Add : Excise duty @ 15%	120.00
	920.00
Add : Packing charges (5 non-returnable boxes)	50.00
	970.00

- (i) A 2 per cent cash discount will be given if payment is made in 30 days.  
(ii) Documents substantiating payment of excise duty is enclosed for claiming CENVAT credit.

**Solution****Computation of cost per unit**

	<i>(₹)</i>
Net purchase Price	800.00
Add : Packing charges (5 non-returnable boxes)	50.00
	850.00
No. of units purchased	200 units
Cost per unit	4.25

**Note:** (i) Cash discount is treated as interest and finance charges hence, it is not considered for valuation of material.

(ii) Excise duty is refundable; hence it will not be added to purchase cost.

## 2.5 Material Storage & Records

Proper storing of materials is of primary importance. It is not enough only to purchase material of the required quality. If the purchased material subsequently deteriorates in quality because of bad storage, the loss is even more than what might arise from purchase of bad quality

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materials. Apart from preservation of quality, the store-keeper also must ensure safe custody of the material. It should be the function of store-keeper that the right quantity of materials always should be available in stock.

**2.5.1 Duties of store keeper:** These can be briefly set out as follows:

- (i) **General control over store:** Store keeper should keep control over all activities in Stores department. He should check the quantities as mentioned in Goods received note and with the purchased materials forwarded by the receiving department and to arrange for the storage in appropriate places.
- (ii) **Safe custody of materials:** Store keeper should ensure that all the materials are stored in a safe condition and environment required to preserve the quality of the materials.
- (iii) **Maintaining records:** Store keeper should maintain proper record of quantity received, issued, balance in hand and transferred to/ from other stores.
- (iv) **Initiate purchase requisition:** Store keeper should initiate purchase requisitions for the replacement of stock of all regular stores items whenever the stock level of any item of store approaches the re-order level fixed.
- (v) **Maintaining adequate level of stock:** Store keeper should maintain adequate level of stock at all time. He/ she should take all necessary action so that production could not be interrupted due to lack of stock. Further he/ she should take immediate action for stoppage of further purchasing when the stock level approaches the maximum limit. To reserve a particular material for a specific job when so required.
- (vi) **Issue of materials:** Store keeper should issue materials only against the material requisition slip approved by the appropriate authority. He/ she should also refer to bill of materials while issuing materials to requisitioning department.
- (vii) **Stock verification and reconciliation:** Store keeper should verify the book balances with the actual physical stock at frequent intervals by way of internal control and check the any irregular or abnormal issues, pilferage, etc.

**2.5.2 Store Records:** The record of stores may be maintained in three forms:

- Bin Cards
- Stock Control Cards
- Store Ledger

**Bin Cards:** Bin refers to a box/ container/ space where materials are kept. Card is placed with each of the bin (space) to record the details of material like receipt, issue and return. The first two forms are records of quantities received, issued and those in balance, but in the third record i.e. store ledger, value of receipts, issues and closing balance is also maintained. Usually, records of quantities i.e. Bin cards and Store Control Cards are kept by the store keeper in store department while record of both quantity and value is maintained by cost accounting department.

**Stock Control Cards:** It is a record keeping document maintained by stores department for

every item of material. Recording includes receipt, issue, return, in hand and order given.

#### Advantages and Disadvantages of Bin Cards:

Advantages	Disadvantages
(i) There would be fewer chances of mistakes being made as entries will be made at the same time as goods are received or issued by the person actually handling the materials.	(i) Store records are dispersed over a wide area.
(ii) Control over stock can be more effective, in as much as comparison of the actual quantity in hand at any time with the book balance is possible.	(ii) The cards are liable to be smeared with dirt and grease because of proximity to material and also because of handling materials.
(iii) Identification of the different items of materials is facilitated by reference to the Bin Card the bin or storage receptacle.	(iii) People handling materials are not ordinarily suitable for the clerical work involved in writing Bin Cards.

#### Advantages and disadvantages of Stock Control Cards

Advantages	Disadvantages
(i) Records are kept in a more compact manner so that reference to them is facilitated.	(i) On the spot comparison of the physical stock of an item with its book balance is not facilitated.
(ii) Records can be kept in a neat and clean way by men solely engaged in clerical work so that a division of labour between record keeping and actual material handling is possible.	(ii) Physical identification of materials in stock may not be as easy as in the case of bin cards, as the Stock Control Cards are housed in cabinets or trays.
(iii) As the records are at one place, it is possible to get an overall idea of the stock position without the necessity of going round the stores.	

**Stores Ledger:** A Stores Ledger is a collection of cards or loose leaves specially ruled for maintaining a record of both quantity and cost of stores received, issued and those in stock. It being a subsidiary ledger to the main cost ledger, it is maintained by the Cost Accounting Department. It is posted from Goods Received Notes and Materials requisition.

The advantages of writing up Stores Ledger mechanically are:

- (i) **Distribution of work:** It enables distribution of work among a number of clerks due to which receipts and issues are posted quickly and regularly.

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- (ii) **Centralised record:** It enables stock records to be centralised in case of an organisation having a number of depots.
- (iii) **Testing of accuracy:** The accuracy of posting can be mechanically tested more conveniently.
- (iv) **Cost effective:** The records are clearer and neater. Also the recurring cost of maintaining them is much less than those kept manually.
- (v) **Control over stock:** If up-to-date records are available, the management will be able to exercise greater control over quantities held in stock from time to time which may result in a great deal of saving in both the amount of investment in stock and their cost.

### Difference between Bin Card & Stores Ledger

Bin Card	Stores Ledger
It is maintained by the storekeeper in the store.	It is maintained in costing department.
It contains only quantitative details of material received, issued and returned to stores.	It contains information both in quantity and value.
Entries are made when transactions take place.	It is always posted after the transaction.
Each transaction is individually posted.	Transactions may be summarized and then posted.
Inter-department transfers do not appear in Bin Card.	Material transfers from one job to another job are recorded for costing purposes.

## 2.6 Inventory Control

The main objective of inventory control is to achieve maximum efficiency in production and sales with the minimum investment in inventory. Inventory comprises of stocks of raw materials, stores & consumables, work-in-progress, and finished products. The techniques commonly applied for inventory control are as follows:

### Techniques of Inventory control:

- (i) Setting of various stock levels.
- (ii) ABC analysis.
- (iii) Two bin system.
- (iv) Establishment of system of budgets.
- (v) Use of perpetual inventory records and continuous stock verification.
- (vi) Determination of economic order quantity.

(vii) Review of slow and non-moving items.

(viii) Use of control ratios.

### 2.6.1 Setting of Various Stock Levels:

(i) **Re-Order Quantity:** Re-order quantity is the quantity of materials for which purchase requisition is made by the store department. While setting quantity to be re-ordered consideration is given to the maintenance of minimum level of stock, re-order level, minimum delivery time and the most important cost.

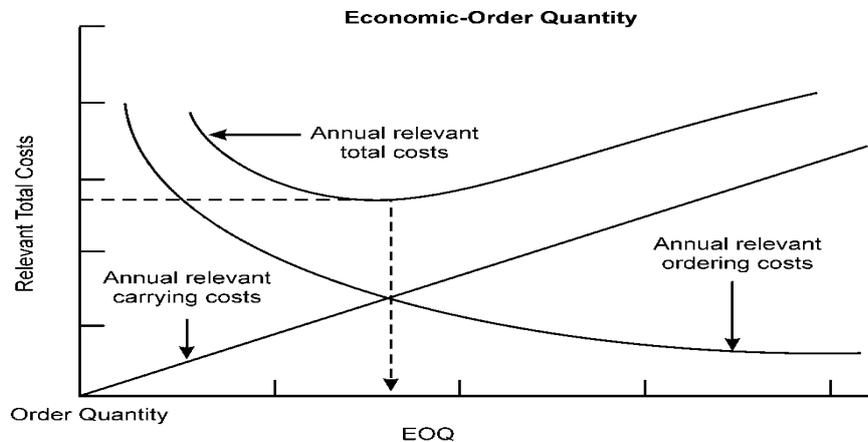
#### Economic Order Quantity (EOQ)

Meaning	Factors	Formula
The size of the order for which both ordering and carrying cost are minimum is known as economic order quantity or EOQ.	<p><b>Ordering Cost:</b> The costs which are associated with the purchasing or ordering of material. It includes costs of tender invitation, preparation of purchase orders, staff posted for ordering of goods, expenses incurred on transportation of goods purchased, inspection cost of incoming material etc.</p> <p><b>Carrying Cost:</b> The costs for holding the inventories. It includes the cost of capital invested in inventories, cost of storage, insurance cost etc.</p>	$EOQ = \sqrt{\frac{2AO}{C}}$ <p>where,</p> <p>A = Annual usage units</p> <p>O = Ordering cost per order</p> <p>C = Annual carrying cost of one unit, i.e., carrying cost percentage × cost of one unit.</p>

**Assumptions underlying E.O.Q.:** The calculation of economic order of material to be purchased is subject to the following assumptions:

- (i) Ordering cost per order and carrying cost per unit per annum are known and they are fixed.
- (ii) Anticipated usage of material in units is known.
- (iii) Cost per unit of the material is constant and is known as well.
- (iv) The quantity of material ordered is received immediately *i.e.* the lead time is zero.

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### (ii) Re-order level

Meaning	Factors	Formula
This level lies between minimum and the maximum levels in such a way that before the material ordered is received into the stores, there is sufficient quantity on hand to cover both normal and abnormal consumption situations. In other words, it is the level at which fresh order should be placed for replenishment of stock.	Maximum rate of Consumption Maximum Re-order period	Re-order level = Maximum re-order period × Maximum Usage (or) = Minimum level + (Average rate of consumption × Average time to obtain fresh supplies).

*(Re-order period or lead time: Time gap between placing an order and receiving the stock is known as lead time.)*

### (iii) Minimum level

Meaning	Factors	Formula
The lowest figure of inventory balance, which must be maintained in hand at all times, so that there is no stoppage of production due to non-availability of inventory.	1. Information about maximum consumption and maximum delivery period in respect of each item to determine its re-order level. 2. Average rate of consumption for each	Minimum level of inventory = Re-order level - (Average rate of consumption × average time of inventory delivery)

	<p>inventory item.</p> <p>3. Average delivery period for each item. This period can be calculated by averaging the maximum and minimum period.</p>	
--	--	--

## (iv) Maximum level

Meaning	Factors	Formula
It indicates the maximum figure of inventory quantity held in stock at any time.	<ol style="list-style-type: none"> <li>1. The fixation of maximum level of an inventory item requires information about its-re-order level. The re-order level itself depends upon its maximum rate of consumption and maximum delivery period. It in fact is the product of maximum consumption of inventory item and its maximum delivery period.</li> <li>2. Knowledge about minimum consumption and minimum delivery period for each inventory item should also be known.</li> <li>3. The determination of maximum level also requires the figure of economic order quantity.</li> <li>4. Availability of funds, storage space, nature of items and their price per unit are also</li> </ol>	<p>Maximum level of inventory = Re-order-level + Re-order quantity – (Minimum consumption × Minimum re-order period)</p>

## 2.21 Cost Accounting

	<p>important for the fixation of maximum level.</p> <p>5. In the case of imported materials due to their irregular supply, the maximum level should be high.</p>	
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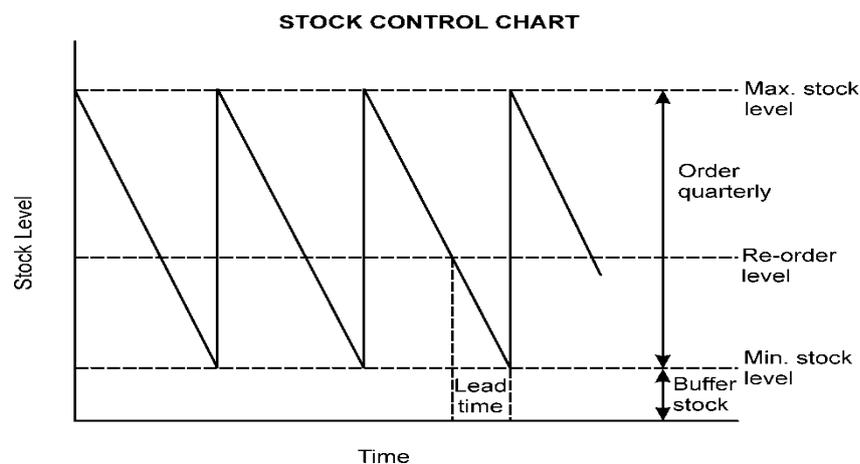
### (v) Average Inventory Level

Meaning	Factors	Formula
Average inventory level is the average stock held by an organisation	Minimum level of inventory Maximum level of inventory Re-order quantity	$\text{Average inventory level} = \text{Minimum level} + \frac{1}{2} \text{ Re-order quantity}$ <p>or</p> $\frac{\text{Maximum level} + \text{Minimum level}}{2}$

### (vi) Danger level

Meaning	Factors	Formula
It is the level at which normal issues of the raw material inventory are stopped and emergency issues are only made.	Normal or Average consumption Lead time (re-order period) for emergency purchase	$\text{Danger level} = \text{Average consumption} \times \text{Lead time for emergency purchases}$

(vii) **Buffer Stock:** Some quantity of stock may be kept for contingency to be used in case of sudden order, such stock is known as buffer stock.



**Illustration 3: (Calculation of EOQ)**

Calculate the Economic Order Quantity from the following information. Also state the number of orders to be placed in a year.

Consumption of materials per annum	:	10,000 kg.
Order placing cost per order	:	₹ 50
Cost per kg. of raw materials	:	₹ 2
Storage costs	:	8% on average inventory

**Solution**

$$EOQ = \sqrt{\frac{2A \times O}{C}}$$

A = Units consumed during year

O = Ordering cost per order

C = Inventory carrying cost per unit per annum.

$$EOQ = \sqrt{\frac{2 \times 10,000 \times 50}{\frac{2 \times 8}{100}}} = \sqrt{\frac{2 \times 10,000 \times 50 \times 25}{4}}$$

$$= 2,500 \text{ kg.}$$

$$\begin{aligned} \text{No. of orders to be placed in a year} &= \frac{\text{Total consumption of materials per annum}}{EOQ} \\ &= \frac{10,000 \text{ kg.}}{2,500 \text{ kg.}} = 4 \text{ Orders per year} \end{aligned}$$

**Illustration 4: (Calculation of EOQ and Total variable cost)**

(i) Compute E.O.Q. and the total variable cost for the following:

Annual Demand	=	5,000 units
Unit price	=	₹ 20.00
Order cost	=	₹16.00
Storage rate	=	2% per annum
Interest rate	=	12% per annum
Obsolescence rate	=	6% per annum

(ii) Determine the total variable cost that would result for the items if an incorrect price of ₹ 12.80 is used.

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### Solution

(i) Carrying cost =	Storage rate	=	2%
	Interest Rate	=	12%
	Obsolescence Rate	=	<u>6%</u>
	Total		<u>20%</u> per annum

C = 20% of ₹ 20 = ₹ 4 per unit per annum.

$$\text{E.O.Q} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 5000 \times 16}{4}} = \sqrt{40,000} = 200 \text{ units}$$

#### Total variable cost:

Purchase price of 5,000 units @ ₹ 20.00 per unit	=	₹ 1,00,000
Ordering cost = $\frac{5000}{200}$ = 25 orders @ ₹ 16	=	₹ 400
Carrying cost of average Inventory = $\frac{200}{2}$ = 100 units @ ₹ 4	=	<u>₹ 400</u>
Total variable cost		<u>₹ 1,00,800</u>

(ii) If an incorrect price of ₹ 12.80 is used:

C = 20% of 12.80 = ₹ 2.56 per unit per annum.

$$\text{E.O.Q.} = \sqrt{\frac{2 \times 5,000 \times 16}{2.56}} = 250 \text{ units}$$

#### Total variable cost:

Purchase price of 5,000 units @ ₹ 12.80 per unit	=	₹ 64,000
Ordering cost = $\frac{5,000}{250}$ = 20 orders @ ₹ 16	=	₹ 320
Carrying cost (of average inventory) = $\frac{250}{2}$ = 125 units @ ₹ 2.56	=	<u>₹ 320</u>
Total variable cost		<u>₹ 64,640</u>

### Illustration 5: (Evaluation of existing policy and EOQ)

Anil & Company buys its annual requirement of 36,000 units in 6 installments. Each unit costs ₹ 1 and the ordering cost is ₹ 25. The inventory carrying cost is estimated at 20% of unit value. Find the total annual cost of the existing inventory policy. How much money can be

saved by Economic Order Quantity.

**Solution:**

(a) Total Annual Cost in Existing Inventory Policy

	(₹)
Ordering cost (6 orders @ ₹ 25)	150
Carrying cost of average inventory (36,000 ÷ 6) = 6,000 units per order	
Average inventory = 3,000 units	
Carrying cost = 20% of ₹1 × 3,000 = 3,000 × 0.20	<u>600</u>
Total cost	A <u>750</u>

(b) Total Annual Cost in E.O.Q

$$EOQ = \sqrt{\frac{2 \times 36,000 \times 25}{₹1 \times 20\%}} = 3000 \text{ units}$$

	(₹)
No. of orders = 36,000 ÷ 3,000 units = 12 orders	
Ordering cost (12 × ₹ 25) =	300
Carrying cost of average inventory (3,000 × 0.20) ÷ 2 =	<u>300</u>
Total Cost	B <u>600</u>
Savings due to E.O.Q ₹ (750 – 600)	(A – B) <u>150</u>

**Note :** As the units purchase cost of ₹ 1 does not change in both the computation, the same has not been considered to arrive at total cost of inventory for the purpose of savings.

**Illustration 6: (Evaluation of discount offer and EOQ)**

A Company manufactures a special product which requires a component 'Alpha'. The following particulars are collected for the year 20X1:

- |                               |                 |
|-------------------------------|-----------------|
| (i) Annual demand of Alpha    | 8,000 units     |
| (ii) Cost of placing an order | ₹ 200 per order |
| (iii) Cost per unit of Alpha  | ₹ 400           |
| (iv) Carrying cost p.a.       | 20%             |

The company has been offered a quantity discount of 4 % on the purchase of 'Alpha' provided the order size is 4,000 components at a time.

**Required :**

- (i) Compute the economic order quantity
- (ii) Advise whether the quantity discount offer can be accepted.

## 2.25 Cost Accounting

### Solution

(i) Calculation of Economic Order Quantity

$$EOQ = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 8,000 \text{ units} \times ₹ 200}{₹ 400 \times 20/100}} = 200 \text{ units}$$

(ii) Evaluation of Profitability of Different Options of Order Quantity

(a) When EOQ is ordered

		(₹)
Purchase Cost	(8,000 units × ₹ 400)	32,00,000
Ordering Cost	[(8,000 units/200 units) × ₹ 200]	8,000
Carrying Cost	(200 units × ₹ 400 × ½ × 20/100)	8,000
Total Cost		32,16,000

(b) When Quantity Discount is accepted

		(₹)
Purchase Cost	(8,000 units × ₹ 384)	30,72,000
Ordering Cost	[(8,000 units/4000 units) × ₹ 200]	400
Carrying Cost	(4000 units × ₹ 384 × ½ × 20/100)	1,53,600
Total Cost		32,26,000

Advise – The total cost of inventory is lower if EOQ is adopted. Hence, the company is advised not to accept the quantity discount.

### Illustration 7: (Calculation of EOQ)

The complete Gardener is deciding on the economic order quantity for two brands of lawn fertilizer. Super Grow and Nature's Own. The following information is collected:

	Fertilizer	
	Super Grow	Nature's Own
Annual demand	2,000 bags	1,280 bags
Relevant ordering cost per purchase order	₹ 1,200	₹ 1,400
Annual relevant carrying cost per bag	₹ 480	₹ 560

Required:

- (i) Compute EOQ for Super Grow and Nature's own.
- (ii) For the EOQ, what is the sum of the total annual relevant ordering costs and total annual relevant carrying costs for Super Grow and Nature's own?

(iii) For the EOQ, compute the number of deliveries per year for Super Grow and Nature's own.

**Solution**

$$EOQ = \sqrt{\frac{2AO}{C}}$$

Where,

A = Annual Demand

O = Ordering cost per order

C = Inventory carrying cost per unit per annum

(i) Calculation of EOQ

Super Grow	Nature's own
$EOQ = \sqrt{\frac{2 \times 2,000 \times 1,200}{480}}$ $= \sqrt{10,000} \text{ or } 100 \text{ bags}$	$EOQ = \sqrt{\frac{2 \times 1,280 \times 1,400}{560}}$ $= \sqrt{6,400} \text{ or } 80 \text{ bags}$

(ii) Total annual relevant cost = Total annual relevant ordering costs + Total annual relevant carrying cost

Super Grow	Nature's own
$= (2,000/100 \times ₹1,200) + (\frac{1}{2} \times 100 \text{ bags} \times ₹480)$ $= ₹ 24,000 + ₹ 24,000 = ₹ 48,000$	$= (1,280/80 \times ₹1,400) + (\frac{1}{2} \times 80 \text{ bags} \times ₹ 560)$ $= ₹ 22,400 + ₹ 22,400 = ₹ 44,800$

(iii) Number of deliveries for Super Grow and Nature's own fertilizer per year

$$= \frac{\text{Annual demand for fertilizer bags}}{EOQ}$$

Super Grow	Nature's own
$= \frac{2,000 \text{ bags}}{100 \text{ bags}} = 20 \text{ orders}$	$= \frac{1,280 \text{ bags}}{80 \text{ bags}} = 16 \text{ orders.}$

**Illustration 8: (Calculation of Stock Levels)**

Two components, A and B are used as follows :

Normal usage

50 per week each

Maximum usage

75 per week each

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<i>Minimum usage</i>	<i>25 per week each</i>
<i>Re-order quantity</i>	<i>A : 300; B : 500</i>
<i>Re-order period</i>	<i>A : 4 to 6 weeks</i>
	<i>B : 2 to 4 weeks</i>

Calculate for each component (a) Re-ordering level, (b) Minimum level, (c) Maximum level, (d) Average stock level.

### Solution

#### (a) Re-ordering level:

Maximum usage per week × Maximum delivery period.

Re-ordering level for component A = 75 units × 6 weeks = 450 units

Re-ordering level for component B = 75 units × 4 weeks = 300 units

#### (b) Minimum level:

Re-order level – (Normal usage × Average period)

Minimum level for component A = 450 units – (50 units × 5 weeks) = 200 units

Minimum level for component B = 300 units – (50 units × 3 weeks) = 150 units

#### (c) Maximum level:

Re-order level + Re-order quantity – (Min. usage × Minimum period)

Maximum level for component A = (450 units + 300 units) – (25 units × 4 weeks) = 650 units

Maximum level for component B = (300 units + 500 units) – (25 units × 2 weeks) = 750 units

#### (d) Average stock level:

$\frac{1}{2}$  (Minimum + Maximum) stock level

Average stock level for component A =  $\frac{1}{2}$  (200 units + 650 units) = 425 units.

Average stock level for component B =  $\frac{1}{2}$  (150 units + 750 units) = 450 units.

### Illustration 9: (Calculation of Stock Levels)

A Company uses three raw materials A, B and C for a particular product for which the following data apply:

Raw Material	Usage per unit of Product (Kgs.)	Re-order quantity (Kgs.)	Price per Kg.	Delivery period (in weeks)			Re-order level (Kgs)	Minimum level (Kgs.)
				Minimum	Average	Maximum		
A	10	10,000	10	1	2	3	8,000	?

B	4	5,000	30	3	4	5	4,750	?
C	6	10,000	15	2	3	4	?	2,000

Weekly production varies from 175 to 225 units, averaging 200 units of the said product. What would be the following quantities:

- (i) Minimum stock of A,
- (ii) Maximum stock of B,
- (iii) Re-order level of C,
- (iv) Average stock level of A.

**Solution**

**(i) Minimum stock of A**

$$\begin{aligned} & \text{Re-order level} - (\text{Average rate of consumption} \times \text{Average time required to obtain fresh delivery}) \\ & = 8,000 - (200 \times 10 \times 2) = 4,000 \text{ kgs.} \end{aligned}$$

**(ii) Maximum stock of B**

$$\begin{aligned} & \text{Re-order level} + \text{Re-order quantity} - (\text{Minimum consumption} \times \text{Minimum delivery period}) \\ & = 4,750 + 5,000 - (175 \times 4 \times 3) \\ & = 9,750 - 2,100 = 7,650 \text{ kgs.} \end{aligned}$$

**(iii) Re-order level of C**

$$\begin{aligned} & \text{Maximum delivery period} \times \text{Maximum usage} \\ & = 4 \times 225 \times 6 = 5,400 \text{ kgs.} \end{aligned}$$

OR

**Re-order level of C**

$$\begin{aligned} & = \text{Minimum stock of C} + [\text{Average rate of consumption} \times \text{Average time required to obtain fresh delivery}] \\ & = 2,000 + [(200 \times 6) \times 3] \text{ kgs.} \\ & = 5,600 \text{ kgs.} \end{aligned}$$

**(iv) Average stock level of A**

$$\begin{aligned} & = \text{Minimum stock level of A} + \frac{1}{2} \text{ Re-order quantity of A} \\ & = 4,000 + \frac{1}{2} \times 10,000 = 4,000 + 5,000 = 9,000 \text{ kgs.} \end{aligned}$$

OR

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Average Stock level of A

$$\frac{\text{Minimum stock level of A} + \text{Maximum stock level of A}}{2} \quad (\text{Refer to working note})$$

$$\frac{4,000 + 16,250}{2} = 10,125 \text{ kgs.}$$

Working note:

$$\begin{aligned} \text{Maximum stock of A} &= \text{ROL} + \text{ROQ} - (\text{Minimum consumption} \times \text{Minimum re-order period}) \\ &= 8,000 + 10,000 - [(175 \times 10) \times 1] \\ &= 16,250 \text{ kgs.} \end{aligned}$$

Illustration 10: (Evaluation of discount offer and EOQ)

(a) EXE Limited has received an offer of quantity discounts on its order of materials as under:

Price per tonne (₹)	Tonnes (Nos.)
1,200	Less than 500
1,180	500 and less than 1,000
1,160	1,000 and less than 2,000
1,140	2,000 and less than 3,000
1,120	3,000 and above.

The annual requirement for the material is 5,000 tonnes. The ordering cost per order is ₹ 1,200 and the stock holding cost is estimated at 20% of material cost per annum. You are required to compute the most economical purchase level.

(b) What will be your answer to the above question if there are no discounts offered and the price per tonne is ₹ 1,500?

Solution

(a)

Total annual requirement (A)	Order size (Tonne) (q)	No. of orders A/q	Cost of inventory A × Per tonne cost (₹)	Ordering cost A/q × ₹1200 (₹)	Carrying cost p.t.p.a 1/2 × q × 20% of cost p.t.(₹)	Total Cost (4+5+6) (₹)
1	2	3	4	5	6	7
5,000 tonne	400	12.5	60,00,000 (5,000 × ₹1200)	15,000	48,000 (200 × ₹ 240)	60,63,000
	500	10	59,00,000 (5,000 × ₹ 1180)	12,000	59,000 (250 × ₹ 236)	59,71,000

	1,000	5	58,00,000 (5,000×₹ 1160)	6,000	1,16,000 (500 × ₹ 232)	59,22,000
	2,000	2.5	57,00,000 (5,000×₹ 1140)	3,000	2,28,000 (1,000×₹228)	59,31,000
	3,000	1.666	56,00,000 (5,000×₹ 1120)	2,000	3,36,000 (1,500×₹224)	59,38,000

The above table shows that the total cost of 5,000 units including ordering and carrying cost is minimum (₹ 59,22,000) when the order size is 1,000 units. Hence the most economical purchase level is 1,000 units.

- (b) If there will be no discount offer then the purchase quantity should be equal to EOQ. The EOQ is as follows:

$$EOQ = \sqrt{\frac{2AO}{C}}$$

where A is the annual inventory requirement,  
O is the ordering cost per order and  
C is the carrying cost per unit per annum.

$$= \sqrt{\frac{2 \times 5,000 \text{ units} \times ₹ 1,200}{20\% \times ₹ 1,500}} = 200 \text{ units}$$

#### Illustration 11: (Calculation of Stock Levels and Danger level)

From the details given below, calculate:

- (i) Re-ordering level
- (ii) Maximum level
- (iii) Minimum level
- (iv) Danger level.

Re-ordering quantity is to be calculated on the basis of following information:

Cost of placing a purchase order is ₹ 20

Number of units to be purchased during the year is 5,000

Purchase price per unit inclusive of transportation cost is ₹ 50

Annual cost of storage per units is ₹ 5.

Details of lead time : Average- 10 days, Maximum- 15 days, Minimum- 5 days.

For emergency purchases- 4 days.

## 2.31 Cost Accounting

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*Rate of consumption : Average: 15 units per day,  
Maximum: 20 units per day.*

### Solution

#### Basic Data:

A	(Number of units to be purchased annually)	=	5,000 units
O	(Ordering cost per order)	=	₹ 20
C	(Annual cost of storage per unit)	=	₹ 5
	Purchase price per unit inclusive of transportation cost	=	₹ 50.

#### Computations:

- (i) **Re-ordering level** = Maximum usage per period × Maximum lead time  
(ROL) = 20 units per day × 15 days = 300 units
- (ii) **Maximum level** = ROL + ROQ – [Min. rate of consumption × Min. lead time]  
(Refer to working notes 1 and 2)  
= 300 units + 200 units – [10 units per day × 5 days] = 450 units
- (iii) **Minimum level** = ROL – Average rate of consumption × Average re-order-period  
= 300 units – (15 units per day × 10 days) = 150 units
- (iv) **Danger level** = Average consumption × Lead time for emergency purchases  
= 15 units per day × 4 days = 60 units

#### Working Notes:

1. Minimum rate of consumption per day

$$\text{Av. rate of consumption} = \frac{\text{Minimum rate of consumption} + \text{Maximum rate of consumption}}{2}$$

$$15 \text{ units per day} = \frac{X \text{ units/day} + 20 \text{ units per day}}{2} \text{ or } X = 10 \text{ units per day.}$$

2. Re-order Quantity (ROQ)

$$= \sqrt{\frac{2 \times 5,000 \text{ units} \times ₹ 20}{5}} = 200 \text{ units}$$

#### Illustration 12: (EOQ and calculation of minimum carrying cost)

*G. Ltd. produces a product which has a monthly demand of 4,000 units. The product requires a component X which is purchased at ₹ 20. For every finished product, one unit of component*

is required. The ordering cost is ₹ 120 per order and the holding cost is 10% p.a.

You are required to calculate:

- (i) Economic order quantity.
- (ii) If the minimum lot size to be supplied is 4,000 units, what is the extra cost, the company has to incur?
- (iii) What is the minimum carrying cost, the company has to incur?

### Solution

#### (a) (i) Economic order quantity:

$$\begin{aligned} A \text{ (Annual requirement or Component 'X')} &= 4,000 \text{ units per month} \times 12 \text{ months} \\ &= 48,000 \text{ units} \\ C \text{ (Purchase cost p.u.)} &= ₹ 20 \\ O \text{ (Ordering cost per order)} &= ₹ 120 \\ i \text{ (Holding cost)} &= 10\% \text{ per annum} \end{aligned}$$

$$\text{E.O.Q.} = \sqrt{\frac{2AO}{C_i}} = \sqrt{\frac{2 \times 48,000 \text{ units} \times ₹ 120}{10\% \text{ of } ₹ 20}} = 2,400 \text{ units}$$

#### (ii) Extra cost incurred by the company:

A. Total cost when order size is equal 4,000 units:

$$\begin{aligned} \text{Total cost} &= \text{Total ordering cost} + \text{Total carrying cost} \\ &= \frac{A}{Q} \times O + \frac{1}{2} Q (C_i) \\ &= \left( \frac{48,000 \text{ units}}{4,000 \text{ units}} \times ₹ 120 \right) + \left( \frac{1}{2} \times 4,000 \text{ units} \times 10\% \times ₹ 20 \right) \\ &= ₹ 1,440 + ₹ 4,000 = ₹ 5,440 \end{aligned}$$

B. Total cost when order size is equal EOQ i.e. 2,400 units:

$$\begin{aligned} \text{Total cost} &= \left( \frac{48,000 \text{ units}}{2,400 \text{ units}} \times ₹ 120 \right) + \left( \frac{1}{2} \times 2,400 \text{ units} \times 10\% \times ₹ 20 \right) \\ &= ₹ 2,400 + ₹ 2,400 = ₹ 4,800 \end{aligned}$$

$$\text{Extra cost that the company has to incur} = (A) - (B) = ₹ 5,440 - ₹ 4,800 = ₹ 640$$

#### (iii) Minimum carrying cost :

Carrying cost depends upon the size of the order. It will be minimum on the least order size. (In this part of the question the two order sizes are 2,400 units and 4,000

### 2.33 Cost Accounting

units. Here 2,400 units is the least of the two order sizes. At this order size carrying cost will be minimum.)

The minimum carrying cost in this case can be computed as under :

$$\text{Minimum carrying cost} = \frac{1}{2} \times 2,400 \text{ units} \times 10\% \times ₹ 20 = ₹ 2,400.$$

#### Illustration 13: (Calculation of Stock out Cost)

*M/s Tyrotubes trades in four wheeler tyres and tubes. It stocks sufficient quantity of tyres of almost every vehicle. In year end 20X1-X2, the report of sales manager revealed that M/s Tyrotubes experienced stock-out of tyres.*

*The stock-out data is as follows:*

<i>Stock-out of Tyres*</i>	<i>No. of times</i>
100	2
80	5
50	10
20	20
10	30
0	33

*M/s Tyrotubes loses ₹150 per unit due to stock-out and spends ₹ 50 per unit on carrying of inventory.*

*Determine optimum safest stock level.*

*\*Demand that could not be fulfilled due to insufficient stock of tyres.*

**Solution:**

#### Computation of Stock-out and Inventory carrying cost

Safety Stock Level (units) (1)	Stock-out (units) (2)	Probability (3)	Stock-out cost(₹) (4)=(2) x ₹150	Expected stock-out cost(₹) (5)=(3)x(4)	Inventory carrying cost (₹) (6)=(1)x₹50	Total cost (₹) (7)=(5)+(6)
100	0	0.00	0	0	5,000	5,000
80	20	0.02	3,000	60	4,000	4,060
50	50	0.02	7,500	150		
	30	0.05	4,500	225		
			12,000	375	2,500	2,875
20	80	0.02	12,000	240		
	60	0.05	9,000	450		
	30	0.10	4,500	450		

			25,500	1,140	1,000	2,140
10	90	0.02	13,500	270		
	70	0.05	10,500	525		
	40	0.10	6,000	600		
	10	0.20	1,500	300		
			31,500	1,695	500	2,195
0	100	0.02	15,000	300		2,700
	80	0.05	12,000	600		
	50	0.10	7,500	750		
	20	0.20	3,000	600		
	10	0.30	1,500	450		
			39,000	2,700	0	2,700

At safety stock level of 20 units, total cost is least i.e. ₹ 2,140.

Working Note:

#### Computation of Probability of Stock-out

Stock-out (units)	100	80	50	20	10	0	Total
Nos. of times	2	5	10	20	30	33	100
Probability	0.02	0.05	0.10	0.20	0.30	0.33	1.00

#### Explanation:

Stock-out means the demand of an item that could not be fulfilled because of insufficient stock level.

Safety stock is the level of stock of any item which is maintained in excess of lead time consumption. It is kept as cushion against any unexpected demand for that item.

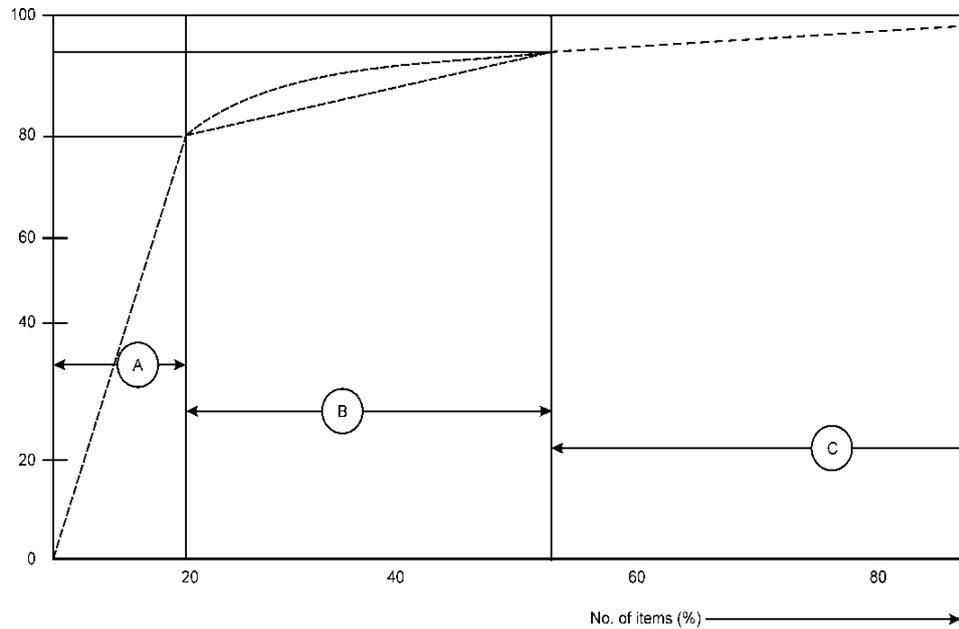
Safety stock level	Impact
100 units	Any unexpected demand upto 100 units can be met.
80 units	Stock out will only arise if unexpected demand will be for 100 units. In this case 20 units will remain unsatisfied. The probability of any unexpected demand for 100 units is 0.02.
50 units	Any unexpected demand beyond 50 units will be remain unsatisfied. If unexpected demand for 100 units arises (probability is 0.02) 50 units will be unsatisfied. Similarly if unexpected demand for 80 units arises (probability is 0.05), 30 units will be unsatisfied.
20 units	Any unexpected demand beyond 20 units will be remain unsatisfied. If unexpected demand for 100 units arises (probability is 0.02), 80 units will remain unsatisfied. If unexpected demand for 80 units arises (probability is 0.05), 60 units will remain unsatisfied. Similarly, when unexpected demand for 50 units arises (probability is 0.10), 30 units will remain unsatisfied.
10 units	Any unexpected demand beyond 10 units will be remain unsatisfied. If unexpected demand for 100 units arises (probability is 0.02), 90 units will remain unsatisfied. If unexpected demand for 80 units arises (probability is

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	0.05), 70 units will remain unsatisfied. If unexpected demand for 50 units arises (probability is 0.10), 40 units will remain unsatisfied. Similarly, when unexpected demand for 20 units arises (probability is 0.20), 10 units will remain unsatisfied.
0 unit	When no safety stock level is maintained, any unexpected demand cannot be satisfied. If unexpected demand for 100 units arises (probability is 0.02), 100 units will remain unsatisfied. If unexpected demand for 80 units arises (probability is 0.05), 80 units will remain unsatisfied. If unexpected demand for 50 units arises (probability is 0.10), 50 units will remain unsatisfied. If unexpected demand for 20 units arises (probability is 0.20), 20 units will remain unsatisfied. Similarly, unexpected demand for 10 units (probability is 0.30), 10 units will remain unsatisfied.

**2.6.2 Techniques of Inventory Control:** Depending on the type of organization and type of inventory specific inventory control techniques are adopted. Some of these are:

- (1) ABC Analysis: This system exercises discriminating control over different items of stores classified on the basis of the investment involved. Usually the items are divided into three categories according to their importance, namely, their value and frequency of replenishment during a period.
  - (i) 'A' Category of items consists of only a small percentage i.e., about 10% of the total items handled by the stores but require heavy investment about 70% of inventory value, because of their high prices or heavy requirement or both. Items under this category can be controlled effectively by using a regular system which ensures neither over-stocking nor shortage of materials for production. Such a system plans its total material requirements by making budgets. The stocks of materials are controlled by fixing certain levels like maximum level, minimum level and re-order level.
  - (ii) 'B' Category of items are relatively less important; they may be 20% of the total items of material handled by stores. The percentage of investment required is about 20% of the total investment in inventories. In the case these items, as the sum involved is moderate, the same degree of control as applied in 'A' category of items is not warranted. The orders for the items, belonging to this category may be placed after reviewing their situation periodically.
  - (iii) 'C' Category of items do not require much investment; it may be about 10% of total inventory value but they are nearly 70% of the total items handled by store. For these category of items, there is no need of exercising constant control. Orders for items in this group may be placed either after six months or once in a year, after ascertaining consumption requirements. In this case the objective is to economies on ordering and handling costs.



**Illustration 14: (Application of ABC inventory control system)**

A factory uses 4,000 varieties of inventory. In terms of inventory holding and inventory usage, the following information is compiled:

No. of varieties of inventory	%	% value of inventory holding (average)	% of inventory usage (in end-product)
3,875	96.875	20	5
110	2.750	30	10
15	0.375	50	85
4,000	100.000	100	100

Classify the items of inventory as per ABC analysis with reasons.

**Solution**

Classification of the items of inventory as per ABC analysis

1. 15 number of varieties of inventory items should be classified as 'A' category items because of the following reasons:
  - (i) Constitute 0.375% of total number of varieties of inventory handled by stores of factory, which is minimum as per given classification in the table.
  - (ii) 50% of total use value of inventory holding (average) which is maximum according to the given table.
  - (iii) Highest in consumption about 85% of inventory usage (in end-product).

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2. 110 number of varieties of inventory items should be classified as 'B' category items because of the following reasons:
  - (i) Constitute 2.750% of total number of varieties of inventory items handled by stores of factory.
  - (ii) Requires moderate investment of about 30% of total use value of inventory holding (average).
  - (iii) Moderate in consumption about 10% of inventory usage (in end-product).
3. 3,875 number of varieties of inventory items should be classified as 'C' category items because of the following reasons:
  - (i) Constitute 96.875% of total varieties of inventory items handled by stores of factory.
  - (ii) Requires about 20% of total use value of inventory holding (average).
  - (iii) Minimum inventory consumption *i.e.* about 5% of inventory usage (in end-product).

### Illustration 15: (Application of ABC in inventory control system)

From the following details, draw a plan of ABC selective control:

Item	Units	Unit cost (₹)
1	7,000	5.00
2	24,000	3.00
3	1,500	10.00
4	600	22.00
5	38,000	1.50
6	40,000	0.50
7	60,000	0.20
8	3,000	3.50
9	300	8.00
10	29,000	0.40
11	11,500	7.10
12	4,100	6.20

### Solution

#### Statement of Total Cost and Ranking

Item	Units	%of Total units	Unit cost (₹)	Total cost (₹)	%of Total cost	Ranking
1	7,000	3.1963	5.00	35,000	9.8378	4
2	24,000	10.9589	3.00	72,000	20.2378	2
3	1,500	0.6849	10.00	15,000	4.2162	7

4	600	0.2740	22.00	13,200	3.7103	8
5	38,000	17.3516	1.50	57,000	16.0216	3
6	40,000	18.2648	0.50	20,000	5.6216	6
7	60,000	27.3973	0.20	12,000	3.3730	9
8	3,000	1.3699	3.50	10,500	2.9513	11
9	300	0.1370	8.00	2,400	0.6746	12
10	29,000	13.2420	0.40	11,600	3.2605	10
11	11,500	5.2512	7.10	81,650	22.9502	1
12	4,100	1.8721	6.20	25,420	7.1451	5
	2,19,000	100		3,55,770	100	

Basis for selective control (Assumed)

₹ 50,000 & above	--	'A' items
₹ 15,000 to 50000	--	'B' items
Below ₹ 15,000	--	'C' items

On this basis, a plan of A B C selective control is given below:

Ranking	Item Nos.	% of Total units	Cost (₹)	% of Total Cost	Category
1	11	5.2512	81,650	22.9502	
2	2	10.9589	72,000	20.2378	
3	5	17.3516	57,000	16.0216	
<b>Total</b>	<b>3</b>	<b>33.5617</b>	<b>2,10,650</b>	<b>59.2096</b>	<b>A</b>
4	1	3.1963	35,000	9.8378	
5	12	1.8721	25,420	7.1451	
6	6	18.2648	20,000	5.6216	
7	3	0.6849	15,000	4.2162	
<b>Total</b>	<b>4</b>	<b>24.0181</b>	<b>95,420</b>	<b>26.8207</b>	<b>B</b>
8	4	0.2740	13,200	3.7103	
9	7	27.3973	12,000	3.3730	
10	10	13.2420	11,600	3.2605	
11	8	1.3699	10,500	2.9513	
12	9	0.1370	2,400	0.6746	
<b>Total</b>	<b>5</b>	<b>42.4202</b>	<b>49,700</b>	<b>13.9697</b>	<b>C</b>
<b>Grand Total</b>	<b>12</b>	<b>100</b>	<b>3,55,770</b>	<b>100</b>	

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- (1) **Advantages of ABC analysis:** The advantages of ABC analysis are the following :
- (i) *Continuity in production:* It ensures that, without there being any danger of interruption of production for want of materials or stores, minimum investment will be made in inventories of stocks of materials or stocks to be carried.
  - (ii) *Lower cost:* The cost of placing orders, receiving goods and maintaining stocks is minimised specially if the system is coupled with the determination of proper economic order quantities.
  - (iii) *Less attention required:* Management time is saved since attention need be paid only to some of the items rather than all the items as would be the case if the ABC system was not in operation.
  - (iv) *Systematic working:* With the introduction of the ABC system, much of the work connected with purchases can be systematized on a routine basis to be handled by subordinate staff.
- (2) **HML:** In this system inventory items are classified as high price, medium price and low cost items.
- (3) **VED:** Items are classified as vital, essential and desirable items under this system. This system is used particularly in spare parts inventory.
- (4) **FSN:** Items are classified as fast moving, slow moving and non-moving items.
- (5) **GOLF:** This system is based on sources of items. These are classified as Government supply, ordinary supply, local and foreign supply.
- (6) **SOS:** Items are classified as seasonal and off seasonal items.

**2.6.3 Two Bin System:** Under this system each bin is divided into two parts - one, smaller part, should stock the quantity equal to the minimum stock or even the re-ordering level, and the other to keep the remaining quantity. Issues are made out of the larger part; but as soon as it becomes necessary to use quantity out of the smaller part of the bin, fresh order is placed. "Two Bin System" is supplemental to the record of respective quantities on the bin card and the stores ledger card.

**2.6.4 Establishment of system of budgets:** To control investment in the inventories, it is necessary to know in advance about the inventories requirement during a specific period usually a year. The exact quantity of various types of inventories and the time when they would be required can be known by studying carefully production plans and production schedules. Based on this, inventories requirement budget can be prepared. Such a budget will discourage the unnecessary investment in inventories.

**2.6.5 Use of perpetual inventory records and continuous stock verification:** Perpetual inventory represents a system of records maintained by the stores department. It in fact comprises: (i) Bin Cards, and (ii) Stores Ledger.

The success of perpetual inventory depends upon the following:

- (a) The Stores Ledger—(showing quantities and amount of each item).

- (b) Stock Control cards (or Bin Cards).
- (c) Reconciling the quantity balances shown by (a) & (b) above.
- (d) Checking the physical balances of a number of items every day systematically and by rotation.
- (e) Explaining promptly the causes of discrepancies, if any, between physical balances and book figures.
- (f) Making corrective entries where called for after step (e) and
- (g) Removing the causes of the discrepancies referred to in step (e)

**Advantages of perpetual inventory:** The main advantages of perpetual inventory are as follows:

- (1) Physical stocks can be counted and book balances adjusted as and when desired without waiting for the entire stock-taking to be done.
- (2) Quick compilation of Profit and Loss Account (for interim period) due to prompt availability of stock figures.
- (3) Discrepancies are easily located and thus corrective action can be promptly taken to avoid their recurrence.
- (4) A systematic review of the perpetual inventory reveals the existence of surplus, dormant, obsolete and slow-moving materials, so that remedial measures may be taken in time.
- (5) Fixation of the various stock levels and checking of actual balances in hand with these levels assist the Store keeper in maintaining stocks within limits and in initiating purchase requisitions for correct quantity at the proper time.

**Continuous Stock Verification** – The checking of physical inventory is an essential feature of every sound system of material control. Such a checking may be periodical or continuous. Moreover, in the case of periodical checking there is the problem of finding an adequately trained contingent. It is likely to be drawn from different departments where stock-taking is not the normal work and they are apt to discharge such temporary duties somewhat perfunctorily. The element of surprise, that is essential for effective control is wholly absent in the system. Then if there are stock discrepancies, they remain undetected until the end of the period. Often, the discrepancies are not corrected.

The system of continuous stock-taking consists of counting and verifying the number of items daily throughout the year so that during the year all items of stores are covered three or four times. The stock verifiers are independent of the stores, and the stores staffs have no foreknowledge as to the particular items that would be checked on any particular day. But it must be seen that each item is checked a number of times in a year.

**Advantages of continuous stock-taking:** The advantages of continuous stock-taking are:

- 1. Closure of normal functioning is not necessary.

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2. Stock discrepancies are likely to be brought to the notice and corrected much earlier than under the annual stock-taking system.
3. The system generally has a sobering influence on the stores staff because of the element of surprise present therein.
4. The movement of stores items can be watched more closely by the stores auditor so that chances of obsolescence buying are reduced.
5. Final Accounts can be ready quickly. Interim accounts are possible quite conveniently.

**Disadvantages:** Annual stock-taking, however, has certain inherent shortcomings which tend to detract from the usefulness of such physical verification. For instance, since all the items have to be covered in a given number of days, either the production department has to be shut down during those days to enable thorough checking of stock or else the verification must be of limited character.

**2.6.7 Review of slow and non-moving items:** Sometimes, due to high value of slow moving and non-moving raw materials, it appears that the concern has blocked huge sum of money unnecessarily in raw materials. To overcome this problem, it is necessary to dispose-off these as early as possible or make arrangements for their exchange with the inventories required by the concern. Besides this no new requisition should be made for the purchase of slow moving items, till the existing stock is exhausted. Computation of inventory turnover ratio may help in identifying slow moving items.

### 2.6.8 Use of control ratios

(i) **Input Output Ratio:** Inventory control can also be exercised by the use of input output ratio analysis. Input-output ratio is the ratio of the quantity of input of material to production and the standard material content of the actual output.

This type of ratio analysis enables comparison of actual consumption and standard consumption, thus indicating whether the usage of material is favourable or adverse.

(ii) **Inventory Turnover Ratio:** Computation of inventory turnover ratios for different items of material and comparison of the turnover rates provides a useful guidance for measuring inventory performance. High inventory turnover ratio indicates that the material in the question is a fast moving one. A low turnover ratio indicates over-investment and locking up of the working capital in inventories. Inventory turnover ratio may be calculated by using the following formulae:-

$$\begin{aligned} \text{Inventory Turnover Ratio} &= \frac{\text{Cost of materials consumed during the period}}{\text{Cost of average stock held during the period}} \\ \text{Average stock} &= 1/2 (\text{opening stock} + \text{closing stock}) \\ \text{Average no. of days of Inventory holding} &= \frac{360 \text{ days/12 months}}{\text{Inventory Turnover Ratio}} \end{aligned}$$

By comparing the number of days in the case of two different materials, it is possible to know which is fast moving and which is slow moving. On this basis, attempt should be made to reduce the amount of capital locked up, and prevent over-stocking of the slow moving items.

#### Illustration 16: (Calculation of inventory turnover ratio)

The following data are available in respect of material X for the year ended 31st March, 20X1.

	(₹)
Opening stock	90,000
Purchases during the year	2,70,000
Closing stock	1,10,000

Calculate:

- (i) Inventory turnover ratio, and
- (ii) The number of days for which the average inventory is held.

#### Solution

Inventory turnover ratio

$$\begin{aligned} \text{(Refer to working note)} &= \frac{\text{Cost of stock of raw material consumed}}{\text{Average stock of raw material}} \\ &= \frac{\text{₹ } 2,50,000}{\text{₹ } 1,00,000} = 2.5 \end{aligned}$$

Average number of days for which

$$\text{the average inventory is held} = \frac{365}{\text{Inventory turnover ratio}} = \frac{365 \text{ days}}{2.5} = 146 \text{ days}$$

#### Working Note:

	(₹)
Opening stock of raw material	90,000
Add: Material purchases during the year	2,70,000
Less: Closing stock of raw material	<u>1,10,000</u>
Cost of stock of raw material consumed	<u>2,50,000</u>

#### Illustration 17: (Calculation of inventory turnover ratio)

From the following data for the year ended 31st December, 20X1, calculate the inventory turnover ratio of the two items and put forward your comments on them.

	Material A (₹)	Material B(₹)
Opening stock 1.1.20X1	10,000	9,000
Purchase during the year	52,000	27,000
Closing stock 31.12.20X1	6,000	11,000

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### Solution

First of all it is necessary to find out the material consumed:

Cost of materials consumed	Material A (₹)	Material B (₹)
Opening stock	10,000	9,000
Add: Purchases	<u>52,000</u>	<u>27,000</u>
	62,000	36,000
Less: Closing stock	<u>6,000</u>	<u>11,000</u>
Materials consumed	<u>56,000</u>	<u>25,000</u>
Average inventory: (Opening Stock + Closing Stock) ÷ 2	8,000	10,000
Inventory Turnover ratio: (Consumption ÷ Average inventory)	7 times	2.5 times
Inventory Turnover (Number of Days in a year/IT ratio)	52 days	146 days

Comments: Material A is moving faster than Material B.

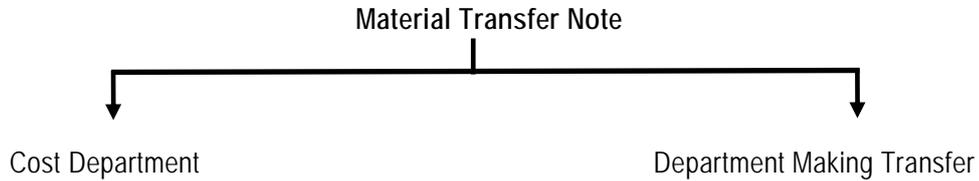
## 2.7 Material Issue Procedure

Issue of material must not be made except under properly authorised requisition slip; usually it is the foreman of a department who has the authority to draw materials from the store. Issue of material must be made on the basis of first in first out, that is, out of the earliest lot on hand. If care is not exercised in this regard, quality of earliest lot of material may deteriorate for having been kept for a long period.

*Material Requisition Note:* It is the voucher of the authority as regards issue of materials for use in the factory or in any of its departments. After receipt of material requisition slip store keeper ensures that requisition is properly authorized and requisitioned quantity is within the quantity specified in bill of materials. After satisfied with the documents, store keeper issue materials and keep one copy of based materials and record the transaction in the records maintained by the stores department.

*Transfer of Material:* The surplus material arising on a job or other units of production may sometime be unsuitable for transfer to Stores because of its bulk, heavy weight, brittleness or some such reason. It may, however, be possible to find some alternative use for such materials by transferring it to some other job instead of returning it to the Store Room.

It must be stressed that generally transfer of material from one job to another is irregular, if not improper, in so far it is not conducive to correct allocation and control of material cost of jobs or other units of production. It is only in the circumstances envisaged above that such direct transfer should be made, at the time of material transfer a material transfer note should be made in duplicate, the disposition of the copies of this note being are as follows :



No copy is required for the Store as no entry in the stores records would be called for. The Cost Department would use its copy for the purpose of making the necessary entries in the cost ledger accounts for the jobs affected.

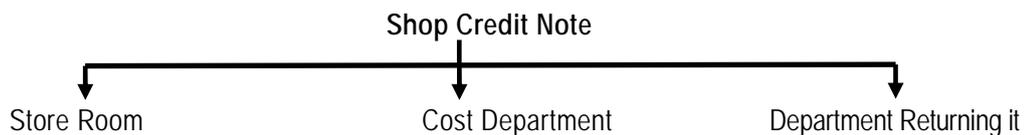
The form of the Material Transfer Note is shown below:

Material Transfer Note				
From Job No. ....		No. ....		
To Job No. ....		Date .....		
Item No.	Particulars	Rate ₹	Amount ₹	
<i>Transferred by</i>		<i>Received by .....</i> <i>Job Ledger Clerk</i>		

*Return of Material:* Sometimes, it is not possible before hand to make any precise estimate of the material requirements or units of production. Besides, at times due to some technical or other difficulty, it is not practicable to measure exactly the quantity of material required by a department. In either case, material may have to be issued from stores in bulk, often in excess of the actual quantity required. Where such a condition exists, it is of the utmost importance from the point of view of materials control that any surplus material left over on the completion of a job should be promptly hand over to the storekeeper for safe and proper custody.

Unless this is done, the surplus material may be misappropriated or misapplied to some purpose, other than that for which it was intended. The material cost of the job against which the excess material was originally drawn in that case, would be overstated unless the job is given credit for the surplus arising thereon.

The surplus material, when it is returned to the storeroom, should be accompanied by a document known either as a Shop Credit Note or alternatively as a Stores Debit Note. This document should be made out, by the department returning the surplus material and it should be in triplicate to be used as follows:



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The form of Shop Credit Note is given below:

### Shop Credit Note

Job No. ....			No. ....	
Department .....			Date .....	
Item No.	Particulars	Qty.	Rate	Amount
Store-keeper	S.L. Clerk		Foreman of the Returning	Department

## 2.8 Valuation of Material Issues

Materials issued from stores should be priced at the value at which they are carried in stock. But there can be a situation where the material may have been purchased at different times and at different prices with varying discounts, taxes etc. Because of this the problem arises as to how the material issues to production are to be valued. There are several methods for tackling this situation. The cost accountant should select the proper method based on following factors:

1. The frequency of purchases, price fluctuations and its range.
2. The frequency of issue of materials, relative quantity etc.
3. Nature of cost accounting system.
4. The nature of business and type of production process.
5. Management policy relating to valuation of closing stock.

Several methods of pricing material issues have been evolved in an attempt to satisfactorily answer the problem. These methods may be grouped and explained as follows:

### 2.8.1 Cost Price Methods:

- (a) Specific price method.
- (b) First-in First-out method.
- (c) Last-in-First-out method.
- (d) Base stock method.

### 2.8.2 Average Price Methods:

- (e) Simple average price method.
- (f) Weighted average price method.
- (g) Periodic simple average price method.
- (h) Periodic weighted average price method.

- (i) Moving simple average price method.
- (j) Moving weighted average price method.

**2.8.3 Market Price Methods:**

- (k) Replacement price method.
- (l) Realisable price method.

**2.8.4 Notional Price Methods:**

- (m) Standard price method.
- (n) Inflated price methods.
- (o) Re-use Price Method.

We may now briefly discuss all the above methods:

**(a) Specific Price Method**

Meaning	Suitability
This method is useful, specially when materials are purchased for a specific job or work order, and as such these materials are issued subsequently to that specific job or work order at the price at which they were purchased.	To use this method, it is necessary to store each lot of material separately and maintain its separate account.

Advantages and disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• The cost of materials issued for production purposes to specific jobs represent actual and correct costs.</li> </ul>	<ul style="list-style-type: none"> <li>• This method is difficult to operate, specially when purchases and issues are numerous.</li> </ul>
<ul style="list-style-type: none"> <li>• This method is best suited for non-standard and specific products.</li> </ul>	

**(b) First-in-First out Method (FIFO)**

Meaning	Suitability
It is a method of pricing the issues of materials, in the order in which they are purchased. In other words, the materials are issued in the order in which they arrive in the store or the items longest in stock are issued first. Thus each issue of material only recovers the purchase price which does not reflect the current market price.	This method is considered suitable in times of falling price because the material cost charged to production will be high while the replacement cost of materials will be low. But, in the case of rising prices, if this method is adopted, the charge to production will be low as compared to the replacement cost of materials. Consequently, it would be difficult to purchase the same volume of material (as in the current period) in future without having additional capital resources.

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### Advantages and disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>It is simple to understand and easy to operate.</li> </ul>	<ul style="list-style-type: none"> <li>If the prices fluctuate frequently, this method may lead to clerical error.</li> </ul>
<ul style="list-style-type: none"> <li>Material cost charged to production represents actual cost with which the cost of production should have been charged.</li> </ul>	<ul style="list-style-type: none"> <li>Since each issue of material to production is related to a specific purchase price, the costs charged to the same job are likely to show a variation from period to period.</li> </ul>
<ul style="list-style-type: none"> <li>In the case of falling prices, the use of this method gives better results.</li> </ul>	<ul style="list-style-type: none"> <li>In the case of rising prices, the real profits of the concern being low, they may be inadequate to meet the concern's demand to purchase raw materials at the ruling price.</li> </ul>
<ul style="list-style-type: none"> <li>Closing stock of material will be represented very closely at current market price.</li> </ul>	

The application of FIFO method is illustrated below:

### Material Received and Issued

Lot No.	Date	Quantity Kg.	Lot No.	Rate (₹)	Amount (₹)
1.	July 3	600		1.00	600.00
2.	July 13	800		1.20	960.00
3.	July 23	600		0.90	540.00
4.	August 5	400		1.10	440.00
5.	August 6	1200		0.80	960.00
	July 8		400 Kgs. out of (1)	1.00	400.00
	July 12		200 Kgs. out of (1)	1.00	200.00
	July 22		600 Kgs. out of (2)	1.20	720.00
	July 25		200 Kgs. out of (2)	1.20	240.00
			200 Kgs. out of (3)	0.90	180.00
	August 8		400 Kgs. out of (3)	0.90	360.00
			400 Kgs. out of (4)	1.10	440.00
			200 Kgs. out of (5)	0.80	160.00

The stock in hand after 8th August will be 1,000 Kgs. This will be out of lot number (5) and its value will be ₹ 800, *i.e.*, @ ₹ 0.80 per Kg.

## (c) Last-in-First out method (LIFO)

Meaning	Suitability
It is a method of pricing the issues of materials. This method is based on the assumption that the items of the last batch (lot) purchased are the first to be issued. Therefore, under this method the prices of the last batch (lot) are used for pricing the issues, until it is exhausted, and so on. If however, the quantity of issue is more than the quantity of the latest lot than earlier (lot) and its price will also be taken into consideration.	During inflationary period or period of rising prices, the use of LIFO would help to ensure that the cost of production determined on the above basis is approximately the current one. This method is also useful specially when there is a feeling that due to the use of FIFO or average methods, the profits shown and tax paid are too high.

## Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>The cost of materials issued will be either nearer to and or will reflect the current market price. Thus, the cost of goods produced will be related to the trend of the market price of materials. Such a trend in price of materials enables the matching of cost of production with current sales revenues.</li> </ul>	<ul style="list-style-type: none"> <li>Calculation under LIFO system becomes complicated and cumbersome when frequent purchases are made at highly fluctuating rates.</li> </ul>
<ul style="list-style-type: none"> <li>The use of the method during the period of rising prices does not reflect undue high profit in the income statement as it was under the first-in-first-out or average method. In fact, the profit shown here is relatively lower because the cost of production takes into account the rising trend of material prices.</li> </ul>	<ul style="list-style-type: none"> <li>Costs of different similar batches of production carried on at the same time may differ a great deal.</li> </ul>
<ul style="list-style-type: none"> <li>In the case of falling prices profit tends to rise due to lower material cost, yet the finished products appear to be more competitive and are at market price.</li> </ul>	<ul style="list-style-type: none"> <li>In time of falling prices, there will be need for writing off stock value considerably to stick to the principle of stock valuation, i.e., the cost or the market price whichever is lower.</li> </ul>
<ul style="list-style-type: none"> <li>Over a period, the use of LIFO helps to iron out the fluctuations in profits.</li> </ul>	<ul style="list-style-type: none"> <li>This method of valuation of material is not acceptable to the income tax authorities.</li> </ul>

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- In the period of inflation LIFO will tend to show the correct profit and thus avoid paying undue taxes to some extent.

*It may be noted that Last in First out (LIFO) is not permitted under Accounting Standard (AS)-2: Valuation of Inventories. However for the purpose of academic knowledge LIFO method is included in this Study Material.*

### (d) Base Stock Method

Meaning	Suitability
Minimum quantity of stock under this method is always held at a fixed price as reserve in the stock, to meet a state of emergency, if it arises. This minimum stock is known as base stock and is valued at a price at which the first lot of materials is received and remains unaffected by subsequent price fluctuations.	This method of valuing inventory than a method of valuing issues because, with the base of stock valued at the original cost some other method of valuing issues should be adopted. The quantity in excess of the base stock may be valued either on the FIFO or LIFO basis. This method is not an independent method as it uses FIFO or LIFO. Its advantages and disadvantages therefore will depend upon the use of the other method viz., FIFO or LIFO.

### Illustration 18: (Treatment of shortage in stock taking)

'AT' Ltd. furnishes the following store transactions for September, 2011 :

1-9-11	Opening balance	25 units value ₹ 162.50
4-9-11	Issues Req. No. 85	8 units
6-9-11	Receipts from B & Co. GRN No. 26	50 units @ ₹ 5.75 per unit
7-9-11	Issues Req. No. 97	12 units
10-9-11	Return to B & Co.	10 units
12-9-11	Issues Req. No. 108	15 units
13-9-11	Issues Req. No. 110	20 units
15-9-11	Receipts from M & Co. GRN. No. 33	25 units @ ₹ 6.10 per unit
17-9-11	Issues Req. No. 121	10 units
19-9-11	Received replacement from B & Co. GRN No. 38	10 units
20-9-11	Returned from department, material of M & Co. MRR No. 4	5 units
22-9-11	Transfer from Job 182 to Job 187 in the	

	<i>dept. MTR 6</i>	<i>5 units</i>
<i>26-9-11</i>	<i>Issues Req. No. 146</i>	<i>10 units</i>
<i>29-9-11</i>	<i>Transfer from Dept. "A" to Dept. "B" MTR 10</i>	<i>5 units</i>
<i>30-9-11</i>	<i>Shortage in stock taking</i>	<i>2 units</i>

*Write up the priced stores ledger on FIFO method and discuss how would you treat the shortage in stock taking.*

**Solution**

**Working Notes:**

1. The material received as replacement from vendor is treated as fresh supply.
2. In the absence of information the price of the material received from within on 20-9-11 has been taken as the price of the earlier issue made on 17-9-11. In FIFO method physical flow of the material is irrelevant for pricing the issues.
3. The issue of material on 26-9-11 is made out of the material received from within.
4. The entries for transfer of material from one job and department to other on 22-9-11 and 29-9-11 are book entries for adjusting the cost of respective jobs and as such they have not been shown in the stores ledger account.
5. The material found short as a result of stock taking has been written off.

Solution :

Stores Ledger of AT Ltd. for the month of September, 2011 (FIFO Method)

Date	GRN No.	Qty. Units	RECEIPT			ISSUE			BALANCE		
			Rate (₹)	Amount (₹)	Requisition No.	Qty. Units	Rate (₹)	Amount (₹)	Qty. Units	Rate (₹)	Amount (₹)
1	2	3	4	5	6	7	8	9	10	11	12
1-9-11	—	—	—	—	—	—	—	—	25	6.50	162.50
4-9-11	—	—	—	—	85	8	6.50	52	17	6.50	110.50
6-9-11	26	50	5.75	287.50	—	—	—	—	17	6.50	398.00
7-9-11	—	—	—	—	97	12	6.50	78	5	5.75	320.00
10-9-11	—	—	—	—	Nil	10	5.75	57.50	5	6.50	262.00
12-9-11	—	—	—	—	108	5	6.50	90	30	5.75	172.50
13-9-11	—	—	—	—	110	10	5.75	115	10	5.75	57.50
15-9-11	33	25	6.10	152.50	—	—	—	—	10	5.75	210.00
17-9-11	—	—	—	—	121	10	5.75	57.50	25	6.10	152.50
19-9-11	38	10	5.75	57.50	—	—	—	—	25	6.10	210.00
20-9-11	4	5	5.75	28.75	—	—	—	—	10	5.75	258.75
26-9-11	—	—	—	—	146	5	5.75	59.25	5	6.10	179.50
30-9-11	—	—	—	—	Shortage	2	6.10	12.20	18	6.10	167.30

**Illustration 19: (Calculation of value of materials consumed and stock)**

The following information is provided by Sunrise Industries for the fortnight of April, 2011:

Material Exe :

Stock on 1-4-2011 100 units at ₹ 5 per unit.

Purchases

5-4-11	300 units	at ₹ 6
8-4-11	500 units	at ₹ 7
12-4-11	600 units	at ₹ 8

Issues

6-4-11	250 units
10-4-11	400 units
14-4-11	500 units

Required :

(A) Calculate using FIFO and LIFO methods of pricing issues :

- (a) the value of materials consumed during the period  
(b) the value of stock of materials on 15-4-11.

(B) Explain why the figures in (a) and (b) in part A of this question are different under the two methods of pricing of material issues used. You need not draw up the Stores Ledgers.

**Solution**

(A) (a) Value of Material Exe consumed during the period  
1-4-11 to 15-4-11 by using FIFO method.

Date	Description Units	Qty. (Units)	Rate (₹)	Amount (₹)
1-4-11	Opening balance	100	5	500
5-4-11	Purchased	300	6	1,800
6-4-11	Issued	100	5}	1,400
		150	6}	
8-4-11	Purchased	500	7	3,500
10-4-11	Issued	150	6}	2,650
		250	7}	
12-4-11	Purchased	600	8	4,800
14-4-11	Issued	250	7}	3,750
		250	8}	
15-4-11	Balance	350	8	2,800

## 2.53 Cost Accounting

Total value of material Exe consumed during the period under FIFO method comes to (₹ 1,400 + ₹ 2,650 + ₹ 3,750) ₹ 7,800 and balance on 15-4-11 is of ₹ 2,800.

### Value of Material Exe consumed during the period 1-4-11 to 15-4-11 by using LIFO method

Date	Description	Qty. (Units)	Rate (₹)	Amount (₹)
1-4-11	Opening balance	100	5	500
5-4-11	Purchased	300	6	1,800
6-4-11	Issued	250	6	1,500
8-4-11	Purchased	500	7	3,500
10-4-11	Issued	400	7	2,800
12-4-11	Purchased	600	8	4,800
14-4-11	Issued	500	8	4,000
15-4-11	Balance	350	—	2,300*

Total value of material Exe issued under LIFO method comes to (₹ 1,500 + ₹ 2,800 + ₹ 4,000) ₹ 8,300.

\*The balance 350 units on 15-4-11 of ₹ 2,300, relates to opening balance on 1-4-11 and purchases made on 5-4-11, 8-4-11 and 12-4-11. (100 units @ ₹ 5, 50 units @ ₹ 6, 100 units @ ₹ 7 and 100 units @ ₹ 8).

(b) As shown in (a) above, the value of stock of materials on 15-4-11:

Under FIFO method ₹ 2,800

Under LIFO method ₹ 2,300

(B) Total value of material Exe issued to production under FIFO and LIFO methods comes to ₹ 7,800 and ₹ 8,300 respectively. The value of closing stock of material Exe on 15-4-11 under FIFO and LIFO methods comes to ₹ 2,800 and ₹ 2,300 respectively.

*The reasons for the difference of ₹ 500 (₹ 8,300 – ₹ 7,800) as shown by the following table in the value of material Exe, issued to production under FIFO and LIFO are as follows:*

Date	Quantity Issued	Value FIFO	Total	Value LIFO	Total
	(Units)	(₹)	(₹)	(₹)	(₹)
6-4-11	250	1,400		1,500	
10-4-11	400	2,650		2,800	
14-4-11	500	3,750	7,800	4,000	8,300

1. On 6-4-11, 250 units were issued to production. Under FIFO their value comes to ₹ 1,400 (100 units × ₹ 5 + 150 units × ₹ 6) and under LIFO ₹ 1,500 (250 × ₹ 6). Hence, ₹ 100 was more charged to production under LIFO.

2. On 10-4-11, 400 units were issued to production. Under FIFO their value comes to ₹ 2,650 (150 × ₹ 6 + 250 × ₹ 7) and under LIFO ₹ 2,800 (400 × ₹ 7). Hence, ₹ 150 was more charged to production under LIFO.
3. On 14-4-11, 500 units were issued to production. Under FIFO their value comes to ₹ 3,750 (250 × ₹ 7 + 250 × ₹ 8) and under LIFO ₹ 4,000 (500 × ₹ 8). Hence, ₹ 250 was more charged to production under LIFO.

Thus the total excess amount charged to production under LIFO comes to ₹ 500.

The reasons for the difference of ₹ 500 (₹ 2,800 – ₹ 2,300) in the value of 350 units of Closing Stock of material Exe under FIFO and LIFO are as follows :

1. In the case of FIFO, all the 350 units of the closing stock belongs to the purchase of material made on 12-4-11, whereas under LIFO these units were from opening balance and purchases made on 5-4-11, 8-4-11 and 12-4-11.
2. Due to different purchase price paid by the concern on different days of purchase, the value of closing stock differed under FIFO and LIFO. Under FIFO 350 units of closing stock were valued @ ₹ 8 p.u. Whereas under LIFO first 100 units were valued @ ₹ 5 p.u., next 50 units @ ₹ 6 p.u., next 100 units @ ₹ 7 p.u. and last 100 units @ ₹ 8 p.u.

Thus under FIFO, the value of closing stock increased by ₹ 500.

#### Illustration 20: (Methods of pricing of materials)

The following transactions in respect of material Y occurred during the six months ended 30th June, 2011:

Month	Purchase (units)	Price per unit (₹)	Issued units
January	200	25	Nil
February	300	24	250
March	425	26	300
April	475	23	550
May	500	25	800
June	600	20	400

Required :

- (a) The Chief Accountant argues that the value of closing stock remains the same no matter which method of pricing of material issues is used. Do you agree? Why or why not? Detailed stores ledgers are not required.
- (b) When and why would you recommend the LIFO method of pricing material issues?

**Solution**

- (a) The Closing Stock at the end of six months period *i.e.*, on 30th June, 2011 will be 200 units, whereas up to the end of May 2011, total purchases coincide with the total issues *i.e.*, 1,900 units. It means that at the end of May 2011, there was no closing stock. In the month of June 2011, 600 units were purchased out of which 400 units were issued. Since there was only one purchase and one issue in the month of June, 2011 and there was no opening stock on 1st June 2011, the Closing Stock of 200 units is to be valued at ₹ 20 per unit.

In view of this, the argument of the Chief Accountant appears to be correct. Where there is only one purchase and one issue in a month with no opening stock, the method of pricing of material issues becomes irrelevant. Therefore, in the given case one should agree with the argument of the Chief Accountant that the value of Closing Stock remains the same no matter which method of pricing the issue is used.

It may, however, be noted that the argument of Chief Accountant would not stand if one finds the value of the Closing Stock at the end of each month.

- (b) LIFO method has an edge over FIFO or any other method of pricing material issues due to the following advantages:
- (i) The cost of the materials issued will be either nearer or will reflect the current market price. Thus, the cost of goods produced will be related to the trend of the market price of materials. Such a trend in price of materials enables the matching of cost of production with current sales revenues.
  - (ii) The use of the method during the period of rising prices does not reflect undue high profit in the income statement, as it was under the first-in-first-out or average method. In fact, the profit shown here is relatively lower because the cost of production takes into account the rising trend of material prices.
  - (iii) In the case of falling prices, profit tends to rise due to lower material cost, yet the finished products appear to be more competitive and are at market price.
  - (iv) During the period of inflation, LIFO will tend to show the correct profit and thus, avoid paying undue taxes to some extent.

**(e) Simple Average Price Method**

Meaning	Suitability
Under this method, materials issued are valued at average price, which is calculated by dividing the total of all units rate by the number of unit rate.	<ol style="list-style-type: none"> <li>1. When the materials are received in uniform lots of similar quantity, otherwise, it will give wrong results.</li> <li>2. When purchase prices do not fluctuate considerably.</li> </ol>

$$\text{Material issue price} = \frac{\text{Total of unit prices of each purchase}}{\text{Total number of purchases}}$$

**Advantage:**

1. It is simple to understand and easy to operate.

**Disadvantages:**

1. Materials issue cost does not represent actual cost price. Since the materials are issued at a price obtained by averaging cost prices, a profit or loss may arise from such type of pricing.
2. In case the prices of material fluctuate considerably, this method will give incorrect results.
3. The prices of materials issues used are determined by averaging prices of purchases without giving consideration to the quantity. Such a price determination is unscientific.

**(f) Weighted Average Price Method**

Meaning	Suitability
This method gives due weights to quantities purchased and the purchase price, while, determining the issue price. The average issue price here is calculated by dividing the total cost of materials in the stock by total quantity of materials prior to each issue.	This method is useful in case where quality of material purchased under different lot varies

**Advantages and Disadvantages:**

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• It smoothens the price fluctuations if at all it is there due to material purchases.</li> </ul>	<ul style="list-style-type: none"> <li>• Material cost does not represent actual cost price and therefore, a profit or loss will arise out of such a pricing method.</li> </ul>
<ul style="list-style-type: none"> <li>• Issue prices need not be calculated for each issue unless new lot of materials is received.</li> </ul>	<ul style="list-style-type: none"> <li>• It may be difficult to compute since every men lot received would require re-computation of issue prices.</li> </ul>

**(g) Periodic Simple Average Price Method**

Meaning	Suitability
This method is similar to Simple Average Price Method except that the average price	When both quality and rate are different in different lot.

## 2.57 Cost Accounting

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is calculated at the end of the concerned period. In other words, the price paid during the period for different lots of materials purchased are added up and the total is divided by the number of purchases made during the period. The rate so computed is then used to price all the issues made during the period, and also for valuing the closing inventory of the period.	
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### Advantages and Disadvantages:

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• It is simple to operate, as it avoids calculation of issue price after every receipt.</li></ul>	<ul style="list-style-type: none"><li>• This method cannot be applied in jobbing industry where each individual job order is to be priced at each stage of its completion.</li></ul>
<ul style="list-style-type: none"><li>• This method can usefully be employed in costing continuous processes where each individual order is absorbed into the general cost of producing large quantities of articles.</li></ul>	<ul style="list-style-type: none"><li>• This method is unscientific as it does not take into consideration the quantities purchased at different prices.</li></ul>
	<ul style="list-style-type: none"><li>• This method also suffers from all those disadvantages of simple average cost method.</li></ul>

### (h) Periodic Weighted Average Price Method

**Meaning:** This method is like weighted average price method, except that the calculations of issue prices are made periodically (say, a month). The rate so arrived is used for the issues made during that period and also for valuing the inventory at the end of the period.

#### **Advantage:**

1. This method is superior to the periodic simple average price method as it takes into account the quantities also.
2. It overcomes or evens out the effect of fluctuations.
3. In addition to above, the method also possesses all the advantages of the simple weighted average price method.

#### **Disadvantage:**

This method is not suitable for job costing because each job is to be priced at each stage of completion.

**(i) Moving Simple Average Price Method**

**Meaning:** Under this method, the rate for material issues is determined by dividing the total of the periodic simple average prices of a given number of periods by the numbers of periods. For determining the moving simple average price, it is necessary to fix up first period to be taken for determining the average.

**Advantage:** *This method evens out price fluctuations over a longer period, thus stabilising the charges to work-in-progress. Thus the cost of production will be stable to a significant extent.*

**Disadvantage:** A profit or loss arises by the use of moving simple average cost.

**(j) Moving Weighted Average Price Method**

**Meaning:** Under this method, the issue, rate is calculated by dividing the total of the periodic weighted average price of a given number of periods by the number of periods.

**(k) Replacement Price Method**

Meaning	Suitability
Replacement price is defined as the price at which it is possible to purchase an item, identical to that which is being replaced or revalued. Under this method, materials issued are valued at the replacement cost of the items. This method pre-supposes the determination of the replacement cost of materials at the time of each issue; viz., the cost at which identical materials could be currently purchased. The product cost under this method is at current market price, which is the main objective of the replacement price method.	This method is useful to determine true cost of production and to value material issues in periods of rising prices, because the cost of material considered in cost of production would be able to replace the materials at the increased price.

**Advantage:** Product cost reflects the current market prices and it can be compared with the selling price.

**Disadvantage:** The use of the method requires the determination of market price of material before each issue of material. Such a requirement creates problems.

**(l) Realisable Price Method**

**Meaning:** Realisable price means a price at which the material to be issued can be sold in the market. This price may be more or may be less than the cost price at which it was originally purchased. Like replacement price method, the stores ledger would show profit or loss in this method too.

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(m) **Standard Price Method:** Under this method, materials are priced at some predetermined rate or standard price irrespective of the actual purchase cost of the materials. Standard cost is usually fixed after taking into consideration the following factors:

- (i) Current prices,
- (ii) Anticipated market trends, and
- (iii) Discount available and transport charges etc.

Standard prices are fixed for each material and the requisitions are priced at the standard price. This method is useful for controlling material cost and determining the efficiency of purchase department. In the case of highly fluctuating prices of materials, it is difficult to fix their standard cost on long-term basis.

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• The use of the standard price method simplifies the task of valuing issues of materials.</li></ul>	<ul style="list-style-type: none"><li>• The use of standard price does not reflect the market price and thus results in a profit or loss.</li></ul>
<ul style="list-style-type: none"><li>• It facilitates the control of material cost and the task of judging the efficiency of purchase department.</li></ul>	<ul style="list-style-type: none"><li>• The fixation of standard price becomes difficult when prices fluctuate frequently</li></ul>
<ul style="list-style-type: none"><li>• It reduces the clerical work.</li></ul>	

### Illustration 21: (Evaluation of different methods)

The following information is extracted from the Stores Ledger:

Material X

Opening Stock Nil

Purchases :

Jan. 1 100 @ ₹ 1 per unit

Jan. 20 100 @ ₹ 2 per unit

Issues :

Jan. 22 60 for Job W 16

Jan. 23 60 for Job W 17

Complete the receipts and issues valuation by adopting the First-In-First-Out, Last-In-First-Out and the Weighted Average Method. Tabulate the values allocated to Job W 16, Job W 17 and the closing stock under the methods aforesaid and discuss from different points of view which method you would prefer.

### **Solution**

From the point of view of cost of material charged to each job, it is minimum under FIFO and maximum under LIFO (Refer to Tables). During the period of rising prices, the use of FIFO give rise to high profits and that of LIFO low profits. In the case of weighted average there is no significant adverse or favourable effect on the cost of material as well as on profits.

From the point of view of valuation of closing stock it is apparent from the above statement that it is maximum under FIFO, moderate under weighted average and minimum under LIFO.

It is clear from the Tables that the use of weighted average evens out the fluctuations in the prices. Under this method, the cost of materials issued to the jobs and the cost of material in hands reflects greater uniformity than under FIFO and LIFO. Thus from different points of view, weighted average method is preferred over LIFO and FIFO.

Statement of receipts and issues by adopting First-in-First-Out Method

Date	Particulars	Receipts			Issues			Balance		
		Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)
Jan. 1	Purchase	100	1	100	—	—	—	100	1	100
Jan. 20	Purchase	100	2	200	—	—	—	100	1	100
					60	1	60	100	2	200
Jan. 22	Issue to Job W 16	—	—	—	40	1	40	40	1	40
					20	2	40	100	2	200
Jan. 23	Issue to Job W 17	—	—	—	40	1	40	80	2	160
					20	2	40			

Statement of receipts and issues by adopting Last-in-First-Out method

Date	Particulars	Receipts			Issues			Balance		
		Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)
Jan. 1	Purchase	100	1	100	—	—	—	100	1	100
Jan. 20	Purchase	100	2	200	—	—	—	100	1	100
					60	2	120	100	2	200
Jan. 22	Issue to Job W 16	—	—	—	40	2	80	40	1	40
					20	1	20	80	2	160
Jan. 23	Issue to Job W 17	—	—	—	40	2	80	80	1	80
					20	1	20			

Statement of Receipt and Issues by adopting Weighted Average method

Date	Particulars	Receipts			Issues			Balance	
		Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)
Jan. 1	Purchase	100	1	100	—	—	100	1	100
Jan. 20	Purchase	100	2	200	—	—	200	1.50	300
Jan. 22	Issue to Job W 16	—	—	—	60	1.50	90	1.50	210
Jan. 23	Issue to Job W 17	—	—	—	60	1.50	90	1.50	120

Statement of Material Values allocated to Job W 16, Job W 17 and Closing Stock, under aforesaid methods

	FIFO (₹)	LIFO (₹)	Weighted Average (₹)
Material for Job W 16	60	120	90
Material for Job W 17	80	100	90
Closing Stock	160	80	120
	300	300	300

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(n) **Inflated Price Method:** In case material suffers loss in weight due to natural or climatic factors, *e.g.*, evaporation, the issue price of the material is inflated to cover up the losses.

(o) **Re-use Price Method:** When materials are rejected and returned to the stores or a processed material is put to some other use, then for the purpose it is meant, then such materials are priced at a rate quite different from the price paid for them originally. There is no final procedure for valuing use of material.

## 2.9 Valuation of Returns & Shortages

**2.9.1 Valuation of Materials Returned to the Vendor:** Materials which do not meet quantity, dimensional and other specifications and are considered to be unfit for production are usually returned to the vendor. These materials can be returned to the vendor before they are sent to the stores. In case materials reach store and are noticed to be of sub-standard quality, then also they can be returned to vendor. The price of the materials to be returned to vendor should include its invoice price plus freight, receiving and handling charges etc. *Strictly speaking, the materials returned to vendor should be returned at the stores ledger price and not at invoice price.* But in practice invoice price is only considered, the gap between the invoice price and stores ledger price is charged as overhead. In Stores ledger the defective or sub-standard materials are shown in the issue column at the rate shown in the ledger, and the difference between issue price and invoice cost is debited to an inventory adjustment account.

**2.9.2 Valuation of Materials Returned to Stores:** When materials requisitioned for a specific job or work-in progress are found to be in excess of the requirement or are unsuitable for the purpose, they are returned to the stores. There are two ways of treating such returns.

- (1) Such returns are entered in the receipt column at the price at which they were originally issued, and the materials are kept in suspense, to be issued at the same price against the next requisition.
- (2) Include the materials in stock as if they were fresh purchases at the original issue price.

**2.9.3 Valuation of Shortages during Physical Verification:** Materials found short during physical verification should be entered in the issue column and valued at the rate as per the method adopted, *i.e.*, FIFO or any other.

## 2.10 Selection of Pricing Method

No hard and fast rule or procedure has been laid down to select a method of pricing issues of material. However, the ultimate choice of a method of selection may be based on the following considerations.

- (a) The method of costing used and the policy of management.
- (b) The frequency of purchases and issues.
- (c) The extent of price fluctuations.
- (d) The extent of work involved in recording, issuing and pricing materials.
- (e) Whether cost of materials used should reflect current or historical conditions?

## 2.11. Treatment of Normal and Abnormal Loss of Materials

Whichever method may be adopted for pricing materials, certain differences between the book balance and the value of physical stock are bound to occur. These differences, which may be a gain or loss, should be transferred to Inventory Adjustment Account pending investigation. If, upon investigation, they are regarded as normal, they should be transferred to Overhead Control Account; if abnormal, they should be written off to the Costing Profit and Loss Account.

## 2.12. Accounting and control of waste, scrap, spoilage and defectives

### 2.12.1 Waste

Meaning	Treatment	Control
The portion of basic raw materials lost in processing having no recoverable value. Waste may be visible - remnants of basic raw materials - or invisible; <i>e.g.</i> , disappearance of basic raw materials through evaporation, smoke etc. Shrinkage of material due to natural causes may also be a form of a material wastage.	<p><b><i>In Case of Normal Wastage:</i></b> Normal waste is absorbed in the cost of net output.</p> <p><b><i>In Case of Abnormal Wastage:</i></b> The abnormal waste is transferred to the Costing Profit and Loss Account.</p>	<p>For effective control of waste, normal allowances for yield and waste should be made from past experience, technical factors and special features of the material process and product.</p> <p>Actual yield and waste should be compared with anticipated figures and appropriate actions should be taken where necessary. Responsibility should be fixed on purchasing, storage, maintenance, production and inspection staff to maintain standards.</p> <p>A systematic procedure for feedback of achievement against laid down standards should be established.</p>

### 2.12.2 Scrap

Meaning	Treatment	Control
It has been defined as the incidental residue from cer-	Scrap may be treated in cost accounts in the following	Control of scrap really means the maximum

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<p>tain types of manufacture, usually of small amount and low value, recoverable without further processing.</p>	<p>ways:-</p> <p><b>(i) When the scrap value is negligible:</b> It may be excluded from costs. In other words, the cost of scrap is borne by good units and income from scrap is treated as other income.</p> <p><b>(ii) When the scrap value is not identifiable to a particular process or job:</b> The sales value of scrap net of selling and distribution cost, is deducted from overhead to reduce the overhead rate. A variation of this method is to deduct the net realisable value from material cost.</p> <p><b>(iii) When scrap is identifiable with a particular job or process and its value is significant:</b> The scrap account should be charged with full cost. The credit is given to the job or process concerned. The profit or loss in the scrap account, on realisation, will be transferred to the Costing Profit and Loss Account.</p>	<p>effective utilisation of raw material. Scrap control does not, therefore, start in the production department; it starts from the stage of product designing. Thus the most suitable type of materials, the right type of equipment and personnel would help in getting maximum quantity of finished product from a given raw material.</p> <p>A standard allowance for scrap should be fixed and actual scrap should be collected, recorded and reported indicating the cost centre responsible for it.</p> <p>A periodical scrap report would serve the purpose where two or more departments or cost centres are responsible for the scrap; the reports should be routed through the departments concerned.</p>
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### 2.12.3 Spoilage

Meaning	Treatment	Control
<p>It is the term used for materials which are badly damaged in manufacturing operations, and they cannot be rectified economically and hence taken out of process to be disposed of in some manner without further</p>	<p><b><i>In case of normal spoilage</i></b> Normal spoilage (i.e., which is inherent in the operation) costs are included in costs either charging the loss due to spoilage to the production order or by charging it to</p>	<p>To control spoilage, allowance for normal spoilage should be fixed and actual spoilage should be compared with standard set.</p> <p>A systematic procedure of reporting would help</p>

processing.	<p>production overhead so that it is spread over all products. Any value realised from spoilage is credited to production order or production overhead account, as the case may be.</p> <p><b><i>In case of abnormal spoilage</i></b></p> <p>The cost of abnormal spoilage (i.e., arising out of causes not inherent in manufacturing process) is charged to the Costing Profit and Loss Account. When spoiled work is the result of rigid specification, the cost of spoiled work is absorbed by good production while the cost of disposal is charged to production overhead.</p>	<p>control over spoilage. A spoilage report should highlight the normal and abnormal spoilage, the department responsible, the causes of spoilage and the corrective action taken, if any.</p>
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#### 2.12.4 Defectives

Meaning	Treatment	Control
<p>It signifies those units or portions of production which can be rectified and turned out as good units by the application of additional material, labour or other service.</p> <p>Defectives arise due to sub-standard materials, bad-supervision, bad-planning, poor workmanship, inadequate-equipment and careless inspection. To some extent, defectives may be unavoidable but usually,</p>	<p>The possible ways of treatment are as below:</p> <p>(i) Defectives that are considered inherent in the process and are identified as normal can be recovered by using the following methods:</p> <p>(a) <i>Charged to good products</i> - The loss is absorbed by good units. This method is used when 'seconds' have a normal value and defectives rectified into 'seconds' or 'first' are normal;</p>	<p>When defectives are found, the Inspector will make out the Defective Work Report, giving particulars of the department, process or job, defective units, normal and abnormal defectives, cost of rectification etc.</p> <p>On receipt of the defective Work Report, it may be decided to rectify the defective work; all costs of rectification are collected against the rectification</p>

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<p>with proper care it should be possible to avoid defect in the goods produced.</p>	<p>(b) <i>Charged to general overheads</i> - When the defectives caused in one department are reflected only on further processing, the rework costs are charged to general overheads;</p> <p>(c) <i>Charged to the department overheads</i> - If the department responsible for defectives can be identified then the rectification costs should be charged to that department;</p> <p>(d) <i>Charged to Costing Profit and Loss Account</i> - If defectives are abnormal and are due to causes beyond the control of organisation, the rework cost should be charged to Costing Profit and Loss Accounts.</p> <p>(ii) Where defectives are easily identifiable with specific jobs, the work costs are debited to the job.</p>	<p>work order, precaution will be taken to see that number of defectives is within normal limits.</p>
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**Reclamation of loss from defective units** - In the case of articles that have been spoiled, it is necessary to take steps to reclaim as much of the loss as possible. For this purpose:

- (i) All defective units should be sent to a place fixed for the purpose;
- (ii) These should be dismantled;
- (iii) Goods and serviceable parts should be separated and taken into stock;
- (iv) Parts which can be made serviceable by further work should be separated and sent to the workshop for the purpose and taken into stock after the defects have been removed; and

- (v) Parts which cannot be made serviceable should be collected in one place for being melted or sold.

Printed forms should be used to record quantities for all purposes aforementioned.

#### Difference between Waste and Scrap

Waste	Scrap
1. It is connected with raw material or inputs to the production process.	1. It is connected with output
2. Waste of materials may be visible or invisible.	2. Scraps are generally identifiable and has physical substance.
3. Generally waste has no recoverable value.	3. Scraps are termed as by-products and has small recoverable value.

#### Difference between Scrap and Defectives

Scrap	Defectives
1. It is loss connected with output	1. This type of loss connected with the output but it can be in the input as well.
2. Scraps are not intended but cannot be eliminated due to nature of material or process itself.	2. Defectives also are not intended but can be eliminated through proper control.
3. Generally scraps are not used or rectified.	3. Defectives can be used after rectification.
4. Scraps have insignificant recoverable value.	4. Defectives are sold at lower value from that of good one.

**Distinction between spoilage and defectives:** The difference between spoilage and defectives is that while spoilage cannot be repaired or reconditioned, defectives can be rectified and transferred, either back to standard production or to seconds.

The problem of accounting for defective work is the problem of accounting of the costs of rectification or rework.

#### 2.12.5 Obsolescence

Meaning	Treatment	Control
Obsolescence is defined as "the loss in the intrinsic value of an asset due to its supersession".	Materials may become obsolete under any of the following circumstances: (i) where it is a spare part or a component of a	Losses due to obsolescence can be minimised through careful forethought and reduced stocking of spares, etc. Stores records should be

	<p>machinery used in manufacture and that machinery becomes obsolete ;</p> <p>(ii) where it is used in the manufacture of a product which has become obsolete ;</p> <p>(iii) where the material itself is replaced by another material due to either improved quality or fall in price.</p> <p>In all three cases, the value of the obsolete material held in stock is a total loss and immediate steps should be taken to dispose it off at the best available price. The loss arising out of obsolete materials on abnormal loss does not form part of the cost of manufacture.</p>	<p>continuously gone through to see whether any item is likely to become obsolete. There will be such likelihood if an item has not been used for a long time. (This does not apply to spare parts of machines still in use).</p>
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### 2.13 Consumption of Materials

Any product that is manufactured in a firm entails consumption of resources like material, labour etc. The management for planning and control must know the cost of using these resources in manufacturing. The consumption of materials takes place say when the material is used in the manufacture of the product.

It is important to note that the amount of materials consumed in a period by a cost object need not be equal to the amount of material available with the concern. For example, during any period the total of raw material stock available for use in production may not be equal to the amount of materials actually consumed and assigned to the cost object of the production. The difference between the material available and material consumed represents the stock of material at the end of the period.

**2.13.1 Identification of Materials:** For the identification of consumption of materials with products of cost centres the followings points should be noted:

1. It is required that the concern should follow coding system for all materials so that each material is identified by unique code number.

2. It is required that each product of a cost centre should be given a unique code number so that the direct material issued for production of particular product of a cost centre can be collected against the code number of that product.

However, it may not be possible to allocate all materials directly to individual product of a cost centre e.g. maintenance materials, inspection and testing materials etc. The consumption of these materials are collected for cost centre and then charged to individual product by adopting suitable overhead absorption rate of cost centre.

$$\text{Overhead absorption rate of cost centre} = \frac{\text{Cost for cost centre}}{\text{Base relating to cost centre}} \\ \text{(e.g. labour hrs. or machine hrs.)}$$

3. Each issue of materials should be recorded. One way of doing this is to use a material requisition note. This note shows the details of materials issued for product of cost centre and the cost centre which is to be charged with cost of materials.
4. A material return note is required for recording the excess materials returned to the store. This note is required to ensure that original product of cost centre is credited with the cost of material which was not used and that the stock records are updated.
5. A material transfer note is required for recording the transfer of materials from one product of cost centre to other or from one cost centre to other cost centre.
6. The cost of materials issued would be determined according to stock valuation method used.

**2.13.2 Monitoring Consumption of Materials:** For monitoring consumption of materials a storekeeper should periodically analyse the various material requisitions, material return notes and material transfer notes. Based on this analysis, a material abstract or material issue analysis sheet is prepared, which shows at a glance the value of material consumed in manufacturing each product. This statement is also useful for ascertaining the cost of material issued for each product.

#### Format of Material Abstract

Week Ending.....

Material requisition or Transfer Note or Returned Note No.	Amount		Product Nos.					Total for Product	Overheads (Indirect Material charged)
	(₹)	(₹)	101 (₹)	102 (₹)	103 (₹)	104 (₹)	105 (₹)		
	—	—	—	—	—	—	—	—	—
<b>Total</b>									

The material abstract statement serves a useful purpose. It in fact shows the amount of

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material to be debited to various products & overheads. The total amount of stores debited to various products & overheads should be the same as the total value of stores issued in any period.

**2.13.3. Basis for consumption entries in Financial Accounts:** Every manufacturing organisation assigns material costs to products for two purposes.

Firstly, for external financial accounting requirements, in order to allocate the material costs incurred during the period between cost of goods produced and inventories; secondly to provide useful information for managerial decision making requirements. In order to meet external financial accounting requirements, it may not be necessary to accurately trace material costs to individual products.

Some products costs may be overstated and others may be understated but this may not matter for financial accounting purposes as long as total of individual materials costs

transactions are recorded i.e., transactions between cost centre within the firm are recorded in a manner that facilitates analysis of costs for assigning them to cost units.

The consumption entries in financial accounts are made on the basis of total cost of purchases of materials after adjustment for opening and closing stock of materials. The stock of materials is taken at cost or net realisable value whichever is less.

### 2.14 Summary

- **Material Control:** *It is the systematic control over the procurement, storage and usage of materials to maintain even flow of materials and avoiding at the same time excessive investment in inventories.*
- **Material Requisition Note:** *Document used to authorize and record the issue of materials from store.*
- **Purchase Requisition Note:** *Document is prepared by the storekeeper to initiate the process of purchases.*
- **Purchase Order:** *It is a written request to the supplier to supply certain specified materials at specified rates and within a specified period.*
- **Material received note:** *This document is prepared by receiving department which unpacks the goods received and verify the quantities and other details.*
- **Material Transfer Note:** *This document is prepared when the material is transferred from one department to another.*
- **Material Return Note:** *It is a document given with the goods being returned from Factory back to the stores.*
- **Bin Card:** *A prime entry record of the quantity of stocks, kept on in/out/balance, held in designated storage areas.*

- **Stores Ledger:** A ledger containing a separate account for each item of material and component stocked in store giving details of the receipts, issues and balance both in terms of quantity and value.
- **Techniques of Inventory control:**

<i>Techniques</i>	<i>Description</i>
<i>Setting of various stock levels.</i>	<p><b>Minimum Level:</b> It is the minimum quantity, which must be retained in stock  <math>ROL - (Avg. \text{ consumption} \times Avg. \text{ Lead time})</math></p> <p><b>Maximum Level:</b> It is the maximum limit upon which stock can be stored at any time  <math>ROL + ROQ - (Min \text{ consumption} \times Min \text{ Lead Time})</math></p> <p><b>Re order Level:</b> It is the level, when reached the order needs to be placed  <math>Maximum \text{ lead time} \times Maximum \text{ Usage}</math>  Or  <math>Minimum \text{ level} + (Average \text{ rate of consumption} \times Average \text{ time to obtain fresh supplies}).</math></p> <p><b>Average Inventory Level</b> = <math>Minimum \text{ level} + 1/2 \text{ Re-order quantity}</math>  Or  <math>= \frac{Maximum \text{ level} + Minimum \text{ level}}{2}</math></p> <p><b>Danger Level:</b> level where normal issue of materials is stopped, and only emergency materials are issued.  <math>Danger \text{ level} = Average \text{ consumption} \times Lead \text{ time for emergency purchases}</math></p>
<i>ABC analysis</i>	<p>Items are classified into the following categories:</p> <p><b>A Category:</b> Quantity less than 10 % but value more than 70 %</p> <p><b>B Category:</b> Quantity less than 20 % but value about 20 %</p> <p><b>C Category:</b> Quantity about 70 % but value less than 10%</p>
<i>Two bin system.</i>	<p>If one bin items exhausts, new order is placed and till the mean time quantity from the other bin is purchased.</p>
<i>Establishment of system of budgets.</i>	<p>The exact quantity of various types of inventories and the time when they would be required can be ascertained in advance by preparing budgets.</p>
<i>Use of perpetual inventory records and continuous stock verification.</i>	<p>Continuous stock checking is done by taking different sections of the store in rotation</p>
<i>Determination of economic order quantity</i>	<p>It is the calculation of optimum level quantity which minimizes the total cost of Ordering and Delivery Cost and Carrying Cost</p>

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	$EOQ = \sqrt{\frac{2AO}{C}}$ <p>Carrying Cost: <math>\frac{EOQ \times \text{Carrying cost per unit}}{2}</math></p> <p>Ordering Cost: <math>\frac{A \times \text{Cost per order}}{EOQ}</math></p> <p>No. of Orders: <math>\frac{\text{Annual Usage}}{EOQ}</math></p>
<b>Review of slow and non-moving items.</b>	Disposing of as early as possible slow moving items, in return with items needed for production to avoid unnecessary blockage of resources.
<b>Use of control ratios</b>	<p>Input output ratio: It is the ratio of the quantity of input of material to production and the standard material content of the actual output.</p> <p>Inventory turnover ratio:</p> $\frac{\text{Cost of materials consumed during the period}}{\text{Cost of average stock held during the period}}$ <p>Average stock = <math>\frac{1}{2} (\text{opening stock} + \text{closing stock})</math></p>

- **Valuation of Material Issues**

**First-in First-out method:** The materials received first are to be issued first when material requisition is received. Materials left as closing stock will be at the price of latest purchases.

**Last-in First-out method:** The materials purchased last are to be issued first when material requisition is received. Closing stock is valued at the oldest stock price.

**Simple Average Method:**  $\text{Material Issue Price} = \frac{\text{Total of unit price of each purchase}}{\text{Total Nos of Purchases}}$

**Weighted Average Price Method:** This method gives due weightage to quantities purchased and the purchase price to determine the issue price.

$\text{Weighted Average Price} = \frac{\text{Total cost of materials in stock}}{\text{Total quantity of materials}}$

- **Various Material Losses**

(a) **Wastage:** Portion of basic raw material lost in processing having no recoverable value

(b) **Scrap:** The incidental material residue coming out of certain manufacturing operations having low recoverable value.

(c) **Spoilage:** Goods damaged beyond rectification to be sold without further processing.

(d) **Defectives:** Goods which can be rectified and turned out as good units by the application of additional labour or other services.