

# EXPERT

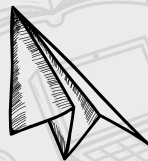
CA INTERMEDIATE - COST & MANAGEMENT ACCOUNTING

# MATERIAL

# COST

## CA VINOD REDDY

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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.

## 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.
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 matter etc.
4. Preparation of budgets concerning materials, supplies and equipment to ensure economy in purchase 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 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 a 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

### 1. PURCHASE OF MATERIALS:

#### A. Purchase Procedure:

- i. **Purchase Requisition** - It is a document initiated by the production, service, or stores department requesting purchase department to purchase the materials of required quantity, quality and describe mentioned in it. It also mentions the time when the material is needed.
- ii. **Identification of the suppliers** - The Purchase Department locates the sources of supply with the help of past experience, advertisements, tenders, industrial directories, etc. and will choose 2 to 3 suppliers after an analytical study of all of them.
- iii. **Placing a Purchase Order** - Once the selection of a supplier is done then an order for purchase of raw material is placed. It includes the description of material required, code nos. if any, quantity and quality of material required, expected time of delivery, rates, discounts, payment terms etc.
- iv. **Follow-up of purchase order** - Many times the follow-up of a purchase order becomes essential to ensure the timely delivery of material, quality of material, etc. Any disputes regarding the rates and discounts are also needed to be sorted out.

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## B. RECEIPT OF MATERIAL

### i. Receiving and Inspecting the Material -

Generally the material is received and inspected by the Inspection department. It prepares a 'Goods Receipts Note' (GRN) which contains the date, and time of delivery, quantity and quality of materials, Supplier's name, vehicle number delivering the material, freight paid, etc. Usually five copies are made of GRN.

1. Copy to the Supplier as an acknowledgement of the receipt of material,
2. Copy to accounts department for making the payment,
3. Copy to the department which initiated the purchase requisition,
4. Copy to the stores department and
5. One copy is retained by the inspection department.

ii. **Follow up for any disputes regarding quantity, quality or price of material is required after the receipt of material.**

## C. CENTRALISED VS DECENTRALISED PURCHASING

Centralised	Decentralized
<ol style="list-style-type: none"> <li>1. Avoids duplication of purchase procedure, or separate purchase.</li> <li>2. Economies of scale available.</li> <li>3. Standard procedures and norms adhered to.</li> <li>4. Purchase procedure is lengthy and costly.</li> <li>5. Lesser flexibility and motivation.</li> </ol>	<ol style="list-style-type: none"> <li>1. Purchase procedure is duplicated at each centre.</li> <li>2. Piecemeal purchases, hence higher costs.</li> <li>3. Lack of uniformity in procedures and norms.</li> <li>4. Fast purchase actions at lower admin. Cost.</li> <li>5. Greater flexibility and motivation.</li> </ol>

## D. STORES LAYOUT

The stores location and layout should be planned very carefully to keep material handling cost and wastage due to multiple handling to a minimum. For this the following factors may be considered:

1. Heavy stores and bulky stores should be stocked near to the user department.
2. Stores should be easily assessable to all departments.
3. Arrangements to be made of the bins and racks with proper numbering.

## 2. STORAGE, ISSUE AND CONSUMPTION:

### A. Classification and Coding of Materials

For the purpose of easy location, identification, and for convenience in storage and issues, each item of stores is given a distinct name and code number. This process is known as Classification and Codification of Materials.

Similar items are classified under subgroups and a number of such subgroups are classified under main or major groups. For example, different types of Nuts and Bolts may be classified under sub-head "Nut's and Bolt's" and under the main head "Spares". Classification of stores should be accompanied with a suitable system of codification. Codification is the procedure of assigning symbols, (numeric or alphabetic) for each item in accordance with a proper arrangement. Thus besides its name, an item of stores is also known by the symbol (i.e. code no.) allotted to it.

#### Advantages of Codification:

1. Easy identification of stores
2. Reduction in clerical work
3. Essential for mechanised accounting
4. Secrecy

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**Different methods of Codification:**

1. **Numeric** - Using numbers 0 to 9
2. **Alphabetic** - Using alphabets A to Z
3. **Alpha-Numeric** - Combination of the numbers and alphabets.

For example, The Pin code numbers given to different post offices is an example of numeric code system. The Sadashiv Peth post office is having a pin code "411 030", of which first digit 4 represents the State, whereas second and third digit represent the District, fourth digit represents the Taluka place and fifth and sixth digit represent the Area / Village where the post is located.

Another example can be given of colour shades. These shades are very difficult to explain in words and hence are allotted code numbers for the purpose of clarity. For example, "R-14" may represent the 14<sup>th</sup> shade in Red colour. It is an alphanumeric code.

**B. Material Requisition Note****Material Requisition**

As a fundamental rule, no material is issued from the store without a proper written-authority. Requests for issue of materials should be made to the storekeeper in the prescribed form signed by the authorised person. The document, which authorizes and records the issues of materials is known as Material Requisition. It is also called as Stores Requisition Note, Materials Demand Note or Material Authorisation Note etc.

Material Requisition generally includes the following information.

- a. Number and Date of Requisition,
- b. Department demanding the material,
- c. Particulars of materials
- d. Quantity Demanded,
- e. Unit Cost,
- f. Total Cost,
- g. Signature of the requesting authority; etc.

A specimen form of material requisition is given below:-

**ABC Co. Ltd. MATERIAL  
REQUISITION**

Production Order No.:

No.:

Standing Order No.:

Date:

Bill of Material No.:

Department:

Particulars	Code No.	Quantity	Cost	
			Rate ₹	Amount ₹

Issued and Authorized by	Received by	Bin Card posted by	Stores ledger posted by	Priced by
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**C. Bill of Materials:**

It is an itemized list of all materials required for a job, process or service. It gives the details of materials necessary to complete a job and the quantity of each item. Substitute materials that may be used when the original materials are not available, are also indicated in the bill of materials. It is also called as 'Specifications of Materials'.

It is prepared by the Production Planning Department, as soon as an order is received, with reference to the standardised specifications. It serves as an advance intimation to the Purchase department to make the purchases from time to time, so that the material can be kept ready at the time of manufacture or execution of a service order.

**Advantages of using Bill of Materials**

Use of "Bill of Materials", is advantageous to various departments in the following ways:

**1. To the Stores Department :**

- To provide a basis for preparing Materials Purchase Requisitions.
- To act as authorisation for issuing Total Material Requirement..
- To reduce paperwork and clerical activity in verification of each and every item of materials to be issued.

**2. To the Cost Accounts Department :**

- To prepare budgets or estimates of materials cost for jobs/processes/products.
- To compute materials cost variances, analyse reasons and hence control excess cost of material used.

**3. To the Production Control Department :**

- To control usage of materials.
- To save time otherwise spent in preparing separate requisitions of material.

**4. To the Engineering or Planning Department:** For record, reference and control purposes.**Difference between Bill of Material and Material Requisition Note**

Particulars	Bill of Materials	Materials Requisition
1. <u>Meaning</u>	It is a comprehensive list of materials with exact description and specifications required for a job or other production units.	It is a formal written demand / request, usually from the production department to stores for the supply of specified materials, stores etc.
2. <u>Information contents</u>	This provides information about required quantities and if there is any deviation from the standards, it can easily be detected.	It provides information on actual quantities of materials consumed by production departments.
3. <u>Origination</u>	It is prepared by the Engineering or Planning Department in a standard form.	It is prepared by production department and is further signed by the storekeeper for actual issue of materials.
4. <u>Purposes</u>	<ul style="list-style-type: none"> <li>➤ It acts as a single authorisation for the issue of all materials and stores items mentioned in it.</li> <li>➤ It provides an advance intimation to stores dept. about the requirement of the materials.</li> </ul>	<ul style="list-style-type: none"> <li>➤ It authorises store keeper to issue the requisitioned materials and record the same in bin card.</li> <li>➤ The purpose of materials requisition note is to draw material from the store by concerned departments.</li> </ul>

➤ It reduces paper work by serving as a work order to the production department and a document for computing the cost of materials for a particular job or work order to the cost department.

#### D. Material Transfer Note:

Sometimes excess material remaining on one job is transferred to another job directly without returning the material to the stores. When such material is transferred, a Material Transfer Note is prepared indicating the job number to which the materials are transferred. **This transaction does not affect the stores department and no entry is made in the stores ledgers.**

#### E. Material Return Note: (store debit Note, shop credit Note)

Where any surplus material is returned to stores a Material Return Note is prepared.

#### F. Bin Card:

A Bin Card is a quantitative record of receipts, issues and closing balances of the items of stores. Separate bin cards are maintained for each item of stores. They are placed in shelves or bins or are suitably hung up as convenient, alongside the materials in godowns. It provides a ready figure of stock of material in hand. It also facilitates physical verification of materials.

A specimen form of a bin card is given below -

#### ABC Co. Ltd. BIN CARD

Description:

Stores Code No.:

Location:

Unit of Measurement:

Maximum Level:

Minimum Level:

Reordering Level:

Danger Level:

Date	Particulars	Receipts	Issues	Balance

Date	Physical Stock Verification Record: Storekeeper	Verified by

Cardex system: All cards are kept at one place only

**G. Stock Control Cards:** It is also a quantitative record of inventory maintained by stores department for every item of material. In other words, it is a record which shows the overall inventory position in store. Recording includes receipt, issue, return, in hand and order given.

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#### H. Stores Ledger:

It is a record of all receipts, issues and balances of materials along with the rates and their values.

Separate ledger sheets are maintained in stores ledger for each item of material. The ledger sheets are generally in loose leaf form in binders to allow flexibility. It serves as a quantitative and value wise record of materials in stores. The specimen form of stores Ledger is given below:

**ABC Co. Ltd.**  
**STORES LEDGER**

Description:	Folio No.:
Stores Code No.:	Minimum Level:
Location:	Maximum Level:
Unit of Measurement:	Danger Level:
Normal Source of Supply:	Re-order Level:

Date	Particulars	Receipts			Issues			Balances		
		Qty.	Rate ₹	Amt.₹	Qty.	Rate ₹	Amt.₹	Qty.	Rate ₹	Amt.₹

**Verified with Bin Card:**

Date:	Storekeeper	Verified by
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**Advantages:**

Maintenance of bin cards along with the Stores ledger is sometimes considered to be a duplication of work.

It is however advantageous to retain both the sets of records, for the following reasons:

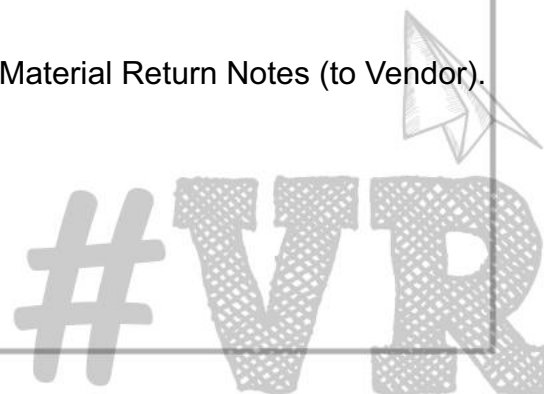
- a) Bin Cards are not accounting records. It is essential that these be located with the stores in the various godowns.
- b) Stores ledger is maintained centrally in the Cost Office from where consolidated information may be made available.
- c) Stores ledger constitutes a second check on the quantity recorded in bin cards.
- d) Frequent overall review of stores balances may be conveniently made with the help of the stores ledger.

**Priced stores ledger:**

- a. It is a ledger note book or 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.
- b. It is a subsidiary ledger to the main cost Ledger.
- c. It is generally maintained by the Cost Accounting Department.
- d. Receipts are posted from Goods Received Notes.
- e. Issues are posted on the basis of Materials Requisition Notes, Material Return Notes (to Vendor).

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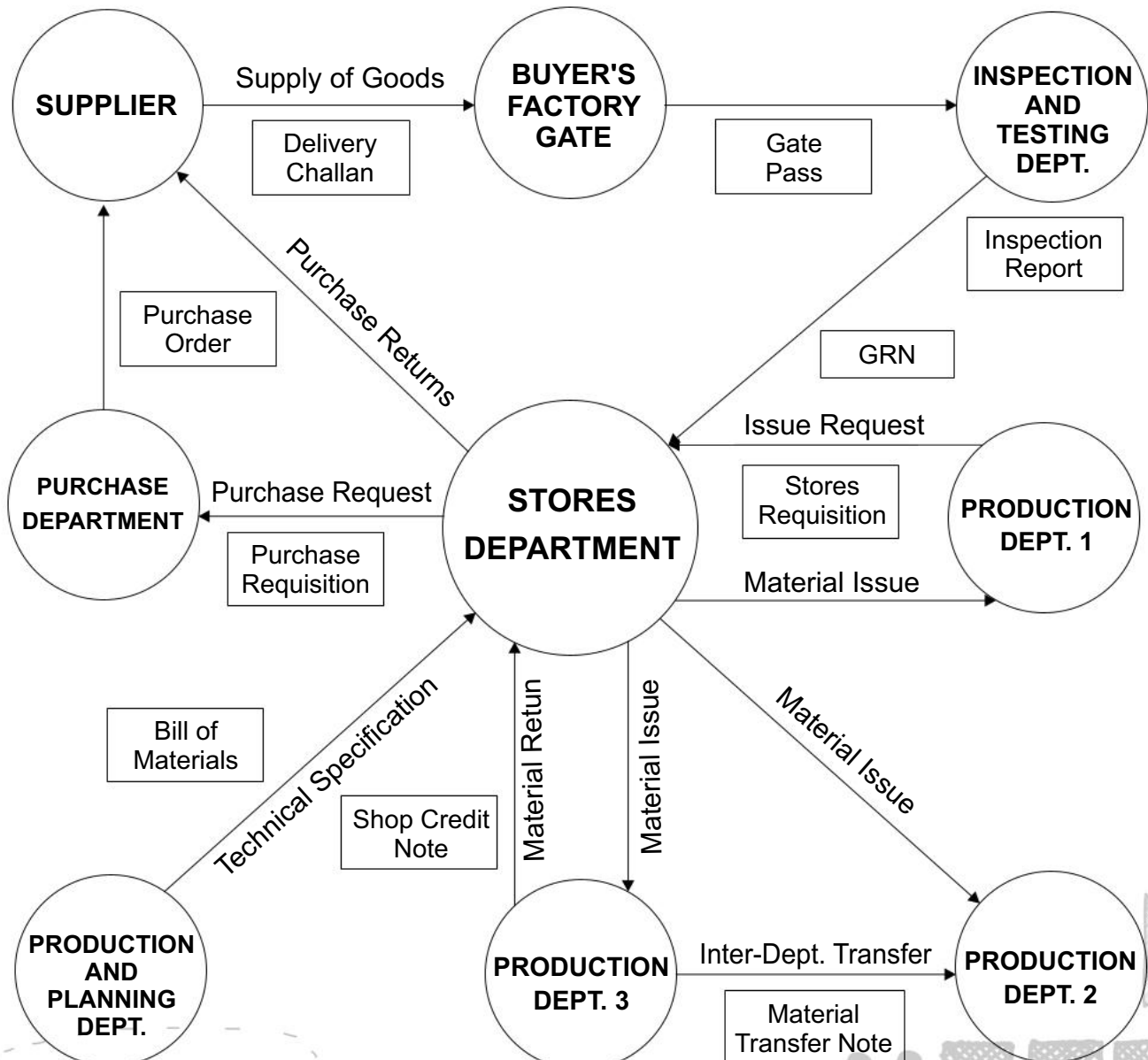
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**Distinguish between Bin Card and Stores Ledger**

Particulars	Bin Card	Stores Ledger
1. Maintained by	Store keeper	Cost Accounting Department
2. Nature	Stores Recording Document	Accounting Record
3. Contents	Quantitative only	Quantitative cum financial
4. Time of recording	At the time of transaction	After the transaction takes place
5. Source documents Used	Posted from material requisition slips Goods received notes etc.	Posted from material requisition slips Goods received notes etc.
6. Manner of posting	Each transaction is recorded individually.	Transactions are posted on periodic basis.

**DOCUMENTATION IN MATERIALS CONTROL**



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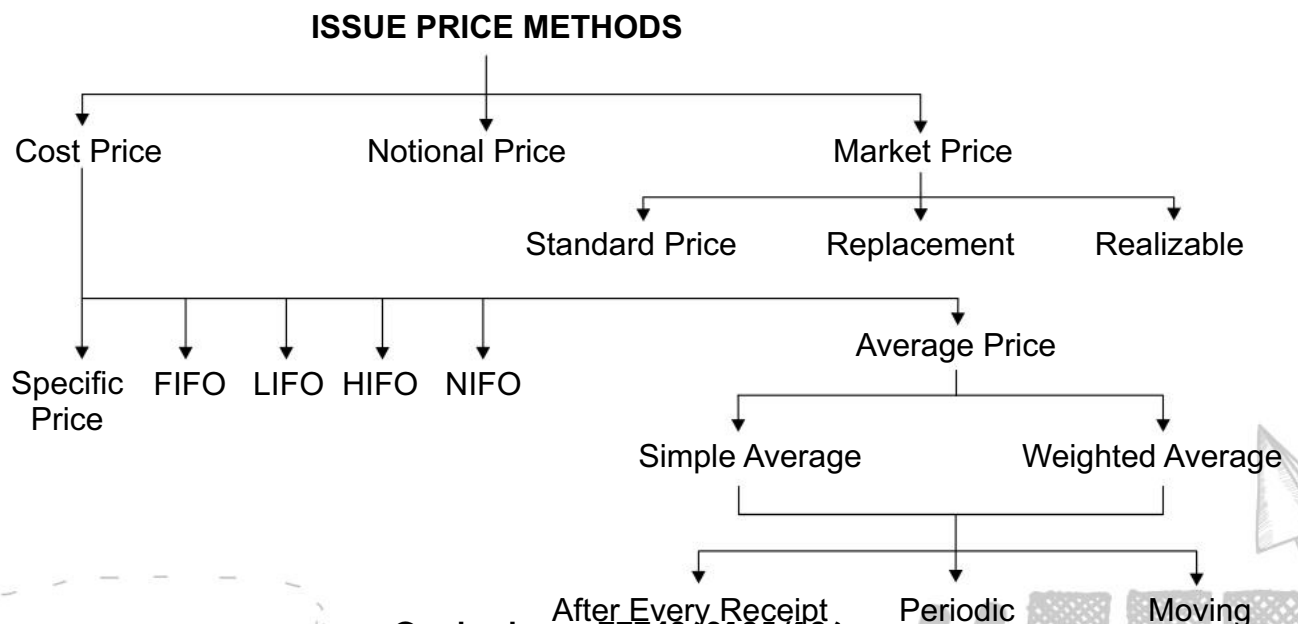
**DOCUMENTATION SUMMARY**

Name of Document	Prepared in	Copies to
Bill of Materials.	Engineering/ Planning Dept.	1. Stores; 2. Accounting; 3. Production Control
Purchase Requisition	Stores Department	1. Purchase; 2. Planning; 3. Accounting
Purchase Order	Purchase Department	1. Supplier; 2. Stores; 3. Inspection; 4. Accounting
Inspection Report cum Goods Received Note	Inspection & Receiving Department	1. Purchase; 2. Stores; 3. Accounting
Material Outward Return Note	Stores Department	1. Supplier; 2. Accounting
Materials Requisition Note	Production Department	1. Stores; 2. Accounting
Material Return Note / Shop Credit Note / Stores Debit Note	Production Department	1. Stores; 2. Accounting
Material Transfer Note	Production Department	1. Transferee Dept.; 2. Accounting

**Note:** In all the above cases the department preparing the document will retain one copy for file, record, reference, follow-up and control purposes.

**3. VALUATION AND ACCOUNTING OF MATERIALS****A. Different methods of Pricing Material Issues:**

The materials issued to production/service department must be charged to the respective department or to the respective production or service order. The price at which this material is charged varies from organisation to organisation depending upon the method of pricing which they choose. The following are the different methods of pricing material issues



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**Note:** Out of the above methods of pricing material issues, the cost price methods i.e. FIFO, LIFO and weighted Average Methods are popular and have a practical utility in the industry.

As per the Accounting Standard No. 2 on "Valuation of Inventories", issued by ICAI, it is recommended that the Historical Cost of inventories should normally be determined by using FIFO, or Average Cost formulae.

- i. **Specific Price Method:** Under this method, the specific price of materials issued to a particular job is charged to the job. This method is used where materials are purchased specifically for a job.
- ii. **First In First Out (FIFO):** Under this method, materials purchased first are to be issued first. Materials from the second lot will be issued only when the first lot is completely exhausted.
- iii. **Last In First Out (LIFO):** Under this method, materials that are purchased last are issued to the production first.
- iv. **Highest In First Out (HIFO):** Under this method, the highest priced materials are issued first, then the next highest and so on.
- v. **Next In First Out (NIFO):** Under this method, issues are valued at the price of the next purchase.
- vi. **Average Cost:** Under this method, the average cost of purchase is used. Different ways may be used for calculating the average- Simple Average and Weighted Average.
- vii. **Standard Price:** Under this method, standard price in respect of each type of material is fixed and all the issues are valued at standard price.
- viii. **Replacement Price:** Under this method, materials are issued at a price at which they are available in the market at the time of such issues.
- ix. **Realizable Price:** Under this method, material issues are priced at a value which the material would realize if sold in the market.
- x. **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.
- xi. **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.
- xii. **Base Stock Method:**
  - a. Under this method, a minimum quantity of stock is always valued at a fixed price based upon the earliest lot of materials. It is used as Base Stock or Reserve Stock to meet emergency consumption requirements.
  - b. The quantity in excess of the base stock may be valued using any of the above methods.
  - c. This is more a method of valuing inventory than a method of valuing issues since Base Stock is valued at earliest price and balance stock is valued using any of the above methods.
  - d. This method is not an independent method as it uses FIFO or LIFO or any other method. Its advantages and disadvantages therefore will depend upon the use of the other method viz., FIFO or LIFO.

### Pricing of Returns of Material:

Material returned back to the stores from any department is entered in the stores records only if they are returned in the original condition.

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**The materials returned can be valued at any of the following two methods**

1. At the same price at which it was previously issued and
2. At the current / latest price of issue available.

But, in the case of second method, excess or less credit may be given to the production order against which the material was previously issued. Therefore, this method is not much popular.

**Issue of Returned Material:**

The material returned back to the stores may be issued to any other department or production order. There are two methods of pricing this issue of returned material.

1. At the price at which it was returned back and
2. Assuming it as a fresh purchase, issue the same as per the method of pricing material issues normally followed by us.

In the above case also as far as possible, the first method should be adopted.

**B. Material Cost Price, Shortages etc**

- i. **Trade / Quantity Discount:** These discounts are to be deducted from the purchase price in arriving at the material cost price.
- ii. **Cash Discount:** This discount is given to the customer for making payment within a certain time. Since, this discount is purely of financial nature, it is not to be deducted for calculating material cost.
- iii. **Freight and carriage:** Freight and other transport charges incurred on incoming materials are to be treated as a part of cost. These include freight, insurance, duties, dock-charges, import duties etc.
- iv. **Subsidy/Grant/ Incentives:** Any subsidy/ grant/ incentive received from the Government or from other sources are deducted from the cost of purchase.
- v. **Road Tax / Toll Tax:** Road tax/ Toll tax if paid by the buyer then it is included with the cost of purchase.
- vi. **Integrated Goods and Service Tax (IGST):** Integrated Goods and Service Tax (IGST) is paid on inter-state supply of goods and provision of services and collected from the buyers. It is excluded from the cost of purchase if credit for the same is available. Unless mentioned specifically it should not form part of cost of purchase.
- vii. **State Goods and Service Tax (SGST):** State Goods and Service Tax (SGST) is paid on intra-state supply and collected from the buyers. It is excluded from the cost of purchase if credit for the same is available. Unless mentioned specifically it should not form part of cost of purchase.
- viii. **Central Goods and Service Tax (CGST):** Central Goods and Service Tax (CGST) is paid on manufacture and supply of goods and collected from the buyer. It is excluded from the cost of purchase if the input credit is available for the same. Unless mentioned specifically CGST is not added with the cost of purchase.
- ix. **Basic Custom Duty:** Basic Custom duty is paid on import of goods from outside India. It is added with the purchase cost.
- x. **Demurrage:** Demurrage is a penalty imposed by the transporter for delay in unloading or off-loading of materials. It is an abnormal cost and not included with cost of purchase.
- xi. **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 not included with cost of purchase.
- xii. **Penalty:** Penalty of any type is not included with the cost of purchase.

- xiii. Insurance charges:** Insurance charges are paid for protecting goods during transit. It is added with the cost of purchase.
- xiv. Commission or brokerage paid:** Commission or brokerage paid is added with the cost of purchase.
- xv. Value Added Tax:** It is to be excluded from the cost of materials and debited to a separate A/c like VAT A/c etc. and later on set off against VAT collected from sales. Same principle applies to any such taxes which are adjustable or refundable at a later stage.
- xvi. Cost of Container:**
- If the supplier does not charge separately for the containers, costs are not affected. But if such containers are sold the sale proceeds are credited to factory overheads.
  - Where the buyer has to pay for the containers and containers are not returnable, cost price of such containers should be added to the cost of materials. On disposal of these containers, the amount realised will be credited to factory overheads. Where the buyer has to pay for the containers but they are returnable at a price less than the price charged, the difference is to be added to the cost of materials. However, if they are returned at original price then material cost is not to be increased.
- xvii. Surpluses and deficiencies of Stock:** Physical stock may differ from stock as per Bin Card or Stock Ledger for several reasons, as follows:

Avoidable Reasons	Unavoidable Reasons
1. Posting errors 2. Excess / under issue 3. Theft and pilferage 4. Breakage due to mishandling	1. Evaporation, shrinkage etc. 2. Absorption of moisture 3. Breakage due to inherent property of material e.g. glass, eggs, crockery etc. 4. Purchase in one measure and issue in another type of measure.

The method of accounting adopted for adjustment depends on the nature of the surplus or deficiency. The normal surplus or deficiency is transferred to factory overhead A/c and the abnormal surplus or deficiency are charged to the Costing Profit And Loss A/c.

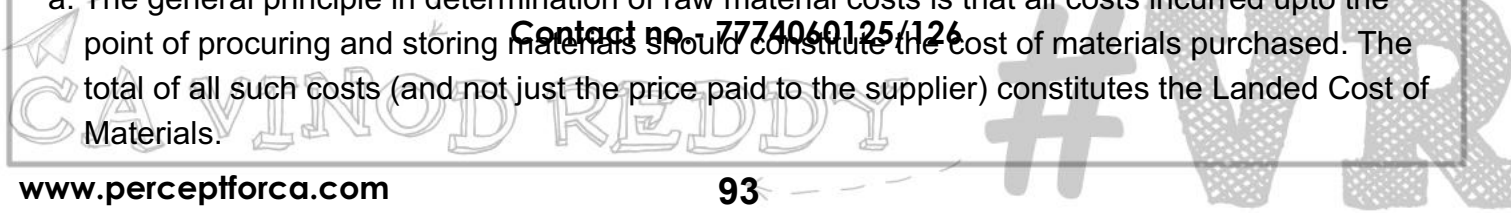
In case of normal loss an alternative treatment is to inflate the price per unit so as to cover normal loss.

**Example:** If 1000 Kgs of a chemical are purchased at ₹2 per kg and the normal loss due to evaporation is expected to be 2% then the inflated price per Kg. would be  $\frac{₹2000}{(1000 - 20)}$  i.e. ₹2.04 per Kg.

- xviii. Material Handling Cost:** The expenses involved in receiving, storing, issuing and handling materials is called as material handling cost. The two approaches for its treatment are:
- Landed Cost:** The material handling cost is included as part of total material cost by using a material handling rate based either on the cost or the weight of materials issued.
  - Overhead:** Material handling cost is considered as manufacturing overhead and charged to products based on percentage of raw material consumed or labour hour rate.

**xix. Landed Cost of Materials:**

- The general principle in determination of raw material costs is that all costs incurred upto the point of procuring and storing materials should constitute the cost of materials purchased. The total of all such costs (and not just the price paid to the supplier) constitutes the Landed Cost of Materials.



b. Landed Cost of materials consists of :

- Invoice Price net of trade discounts etc.
- Cost of Containers and Packing Charges
- Freight and Forwarding Charges
- Transit Insurance
- Duties and Taxes viz. sales tax, excise duty etc.

c. Necessary deductions and adjustments may be made for Credit allowed for return of containers, CENVAT credit, wherever applicable. The net cost of material purchased determined as above should be used for the entry of materials in the Priced Stores Ledger.

### C. Treatment of Waste, Scrap, Spoilage and Defective:

**1. Waste:** Is that portion of basic raw material lost in processing having no recoverable value. Waste may be visible or invisible. Normal waste is, absorbed in the cost of net output i.e. the unit price of material used is inflated, in such a way that total cost is recovered from smaller quantity.

**Example:** 1,000 kgs of coal is used costing ₹1.80 per kg, If the normal waste is 10%, the cost per kg of coal charged to production will be  $[1.80/(1000-100)] \times 1,000$

i.e. ₹2 per kg, Abnormal waste is transferred to the Costing Profit And Loss A/c.

**2. Scrap:** Is the incidental residue from certain type of manufactures, usually of small amounts and low value, recoverable without further processing.

**Scrap may be treated in cost accounts as follows:**

- i. When value of scrap is negligible no entry is passed i.e. the cost of scrap is borne by the good units. The sale of scrap is treated as other income in Profit and loss A/c.
- ii. Where the value of scrap is significant and cannot be identified with a particular job then sale of scrap is credited to factory overhead A/c i.e. factory overheads are reduced.
- iii. Where the value of scrap is significant and the scrap is identified with a particular job or process, the sale of scrap is credited to the respective job or process.
- iv. However, in case of abnormal scrap, Scrap A/c is charged with full cost of material, it is credited with a realisable value and the profit or loss on realization of scrap will be transferred to costing Profit and Loss A/c.

**3. Spoilage:** Refers to materials which are so badly damaged in manufacturing operation that they cannot be rectified economically and hence are removed from the process and disposed off. Normal spoilage cost are production costs and charged to the specific production order or charged to production overhead so that it is spread over all products. Any sale proceeds from spoilage are credited to the production order or production overhead A/c. Abnormal spoilage costs are charged to costing Profit and Loss A/c.

**4. Defectives:** Those units of output which do not meet quality requirements and / or have minor defects, but which can be rectified and turned out as good units by the application of additional material, labour or other service. Defectives may arise due to substandard materials, bad supervision, bad planning, poor workmanship, improper inspection etc. Defectives may be sold as inferior products (seconds) at lower prices. In case the defectives are rectified then the cost of rectification is added to the total production cost and absorbed by all units. If the defectives are not rectified and sold as seconds, the cost of good units will be:

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## Total Manufacturing Cost - Sale Value of Defectives Good Units Produced

**Losses due to Obsolescence:** Obsolescence mean the loss in the value of an asset due to its suppression i.e. outdated. In case of obsolescence, material held in stock is a total loss and should be immediately disposed off. Since this loss is abnormal in nature, the net loss after realisation is transferred directly to Costing Profit and Loss A/c.

#### 4. MANAGEMENT AND CONTROL OF INVENTORY

##### Material Control:

It has been defined by I.C.M.A. as "the function of ensuring that sufficient goods are retained in stock to meet all requirements without carrying unnecessarily large stocks."

**Inventory Control refers to the techniques of maintaining stocks at desired level with the aim of minimizing cost.**

##### A. Ordering Quantity:

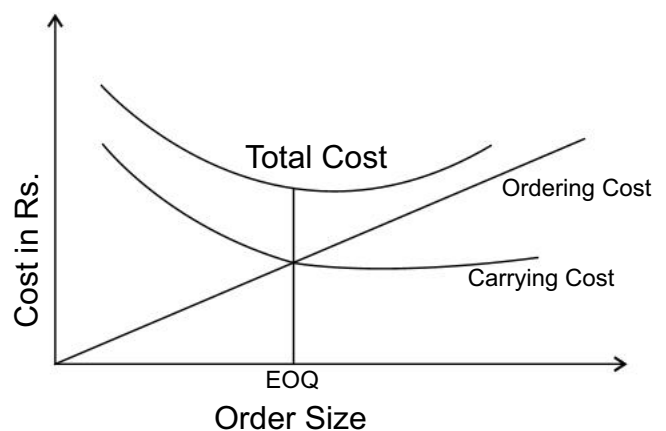
One of the main decisions to be taken by every organisation is how much of each item to buy at a time. Buying in large quantities implies higher inventory levels and therefore higher carrying cost.

On the other hand small orders would reduce the carrying costs of inventory but the ordering cost would increase. **Economic Order Quantity** may be defined as that level of inventory order that minimizes the total cost of inventory management. The formula for calculating Economic Order Quantity is as below:

$$EOQ = \sqrt{\frac{2 \times \text{Annual Usage} \times \text{Ordering Cost Per Order}}{\text{Cost of carrying inventory per unit p.a.}}}$$

Calculate EOQ and the number of purchase order to be placed in a year of material 'A' from following data -

Total annual consumption = 12000 units  
Purchase price of material 'A' = ₹ 1.00/unit  
Ordering Cost = ₹ 75.00 per order  
Cost of carrying Inventory = 20% per annum



##### Solution -

$$EOQ = \sqrt{\frac{2 \times 12000 \text{ units} \times \text{Rs.}75}{\text{Re. } 1.00 \times 20\%}} = 3000 \text{ units}$$

Therefore, Number of Purchase orders to be placed during the year is four. Let's cross verify this answer with the help of the following table:

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Table showing Cost of Inventory Management

Sr. No. 1	Order Size (Units) 2	No. of Orders p.a. 3	Ordering Cost p.a. @ ₹75 4	Average Inventory (Units) 5	Cost of carrying @ 0.20 (₹) 6	Total Cost (₹) 7=4+6
1.	12,000	1.00	75	6,000	1200	1275
2.	9,000	1.33	100	4,500	900	1000
3.	6,000	2.00	150	3,000	600	750
4.	3,000	4.00	300	1,500	300	600
5.	1,000	12.00	900	500	100	1000
6.	500	24.00	1800	250	50	1850

From the above table, it can be noticed that the total cost of inventory management is minimum when the order size is 3,000 units. At this point the ordering cost and carrying cost is equal at ₹300 each.

It may further be noticed that, as the order size decreases, the ordering cost is increasing but carrying cost is decreasing. On the other hand, when the order size is increasing, the ordering cost is decreasing, but carrying cost is increasing. The optimum point is one at which the ordering cost and carrying costs are equal and the total cost is minimum. It is graphically presented above.

### Assumptions underlying the computation of EOQ

Wilson's formula for computing the EOQ is based on the following assumptions:

- Annual Requirement of Raw Materials is pre-determined and fixed.
- Buying cost per order is proportional for every additional order. It is fixed and known in advance.
- Carrying cost per unit per annum is fixed and known in advance.
- Raw Materials are available uniformly throughout the year.
- Production Schedule is uniform throughout the year.
- Cost per unit of the raw material is constant. There are no discounts based on quantity purchased.
- Lead time is zero.
- Minimum stock level is zero.
- There are no transportation costs.

### B. Levels of Inventory:

For the purpose of inventory management and control, the Management fixes various levels of inventory namely, Maximum Level, Minimum Level, Ordering or Re-ordering level, Danger level, etc.

These levels are affected by the following three factors:

- Usage Rate:** It is the rate / speed of consumption of material by the production / service department.
- Lead Time:** It is the time gap required between placing on order and actual receipt of the material.
- Reorder Quantity:** It is the quantity of material to be ordered at each point of time. Generally it is the Economic Order Quantity.

- 1. Re-order Level:** It is the level of stock at which point an action for purchase of material is taken.

This level is fixed somewhere between maximum and minimum levels. Sufficient to meet the requirement of production till such time as the order materializes and supplies are delivered.

This level is calculated using the following formula -

**Reorder level = (Maximum Usage Rate x Maximum Lead Time)**

**Reorder level = Safety Stock + (Maximum Usage Rate x Maximum Reorder period) (with safety stock)**

**Significance:**

- The level at which the next purchase procedure must be initiated by preparing Purchase Requisition.
- The level to maintain sufficient stock cushion to meet most efficient production facilities and requirements.

**2. Minimum Level:** It is the quantity of material that must be maintained in hand at all times so that there is no stoppage of production due to non-availability of material. It is calculated as follows -

**Minimum Level = Reorder level - (Average usage rate x Average lead time)**

**Significance:**

- Lowest quantity of inventory to be maintained at all times to avoid stock-out situations
- Minimum or basic investment in raw materials inventory
- Level to follow-up on the status on the purchase requisition previously made at the Re-order level.

**3. Maximum Level:** This level indicates the maximum quantity of an item of material that can be held in stock at any time. The stock in hand is regulated in such a manner that normally it does not exceed this level. It is calculated with the help of the following formula -

**Maximum Level = Reorder level - (Minimum usage rate x minimum lead time) + Reorder Quantity**

**Significance:**

- Maximum or upper limit on investment in raw material inventory.
- Level beyond which raw materials should not be piled up.

**4. Average Level:** It is the quantity of stock which is held by the stores department on an average. It is calculated as follows -

**A. Average level = 1/2 (Minimum level + Maximum level)      OR**

**B. Average level = (Minimum level + 1/2 EOQ)**

**Significance:**

Arithmetic average of maximum and minimum used in determining value of stocks for:

- Stock insurance purposes
- Submission of stock Statements to Bank
- Preparation of interim financial statements

**5. Danger Level:** This is a level fixed usually below the minimum level. When the stock goes down to this level, an urgent action for purchase is taken. This level is fixed by the management on ad hoc basis.

**Danger Level = Average Consumption x Emergency Delivery Time**

**Significance:**

- Level at which stocks are issued only on "most expedient" basis.
- Urgent purchase action is to be initiated to avoid stock out situation.

- 6. 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.
- 7. Inventory Stock-Out:** Stock out said to be occurred when an inventory item could not be supplied due to insufficient stock in the store. The stock-out situation costs to the entity not only in financial terms but in non-financial terms also. Due to stock out an entity not only loses overheads costs and profit but reputation (goodwill) also due to non-fulfilment of commitment. Though it may not be a monetary loss in short term but in long term it could be a reason for financial loss.

### DISTINGUISH BETWEEN ROL & ROQ

Sr. No.	ROL	ROQ
1.	It is the stock level at which next purchase procedure should be initiated.	It is the quantity that should be placed in the purchase order.
2.	It answers the question when to purchase.	It answers the question what quantity to purchase.
3.	<b>Formula:</b> Max. Usage Rate x Max. Lead Time	$ROQ = EOQ = \frac{2AO}{C}$

### Main considerations for fixing the minimum stock level:

The main considerations for the fixation of minimum level of inventory are:

- Information about maximum consumption and maximum delivery period in respect of each item to determine its re-order level.
- Average rate of consumption for each inventory item.
- Average delivery period for each item. This period can be calculated by averaging the maximum and minimum period.

### Main considerations for fixing the maximum stock level:

The major points to be borne in mind while fixing the maximum stock level are:

- The fixation of maximum level of an inventory item requires information about its-re-order level. Hence Re-order level should be known and pre-determined.
- Knowledge about minimum consumption and minimum delivery period for each inventory item.
- Economic Ordering Quantity (EOQ) or the Re-Order Quantity should be known.
- Requirement of funds, storage space, nature of items and their price per unit are to be known.
- In the case of imported materials due to their irregular supply, the maximum level should be high, due to high lead-time.

### C. ABC Analysis:

This method of stores control is based on the concept of "**Management by exception**" or "**Selective Inventory Management**". It is an analytical method of material control that aims at concentrating efforts in those sectors where attention is needed most. It is also called as "**Always Best Control**" Method.'

Under this method, the total number of items of materials is classified into three categories namely A, B, and C according to their value, availability, importance, etc.

It is generally observed that a very less percentage of the total items (say 5 to 10%) account for a high percentage of the total value of materials consumed (say 60 to 70%). These items are classified under category 'A'. Similarly, the items which account for 15 to 20% of the total number of items may have 15 to 20% of the total value of materials, which are classified under category 'B'. The another set of items which are around 60 to 70% in terms of quantity may hardly account for 5 to 10% of the total value of materials consumed during the year, these are classified under category 'C'.

Once the total number of items is grouped under these three categories, the management can now focus their attention more on category 'A' items and relatively low on category 'B' and 'C' items. An example of ABC Analysis can be given as follows:

Category	Number of items	% of total no. of items	Total Annual Usage Value ₹	% of the total value
A	300	6%	5,60,000	70%
B	1,500	30%	1,60,000	20%
C	3,200	64%	80,000	10%
<b>Total</b>	<b>5,000</b>	<b>100%</b>	<b>8,00,000</b>	<b>100%</b>

#### Advantages of ABC Analysis:

The advantages of ABC analysis are:

- a. **Smooth flow:** ABC analysis ensures that minimum investment will be made in inventories of stocks of materials or stocks to be carried, without any danger of interruption of production for want of materials or stores requirement.
- b. **Cost Savings:** The cost of placing orders, receiving goods and maintaining stocks is minimized, specially if the system is coupled with the determination of proper economic order quantities.
- c. **Control by exception:** Management time is saved since attention need be paid only to some of the items rather than all the items.
- d. **Standardization of work:** 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.

#### D. Perpetual Inventory and Continuous Stock Taking:

The system of material control while it is in storage on a continuous basis is known as "**Perpetual Inventory System**". In this case, the balance of materials in hand can be noted at any point of time.

The two main functions of the perpetual inventory system are:

- a. Recording store receipts and issue so as to determine at any time the stock in hand, in quantity or value or both, without the need for physical count of stock.
- b. Continuous verification of the physical stock with reference, to the balance recorded in the stores records, at any frequency, as convenient for the management.

**Perpetual Inventory System is therefore comprised of :**

- i. Bin Cards
- ii. Stores Ledger and
- iii. Continuous Stock-taking.

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**Periodic Stock Verification:**

This is another system of stock verification in which the entire stock is verified all at a time at periodic intervals, usually once a year. It is advantageous to have the stock verification at the close of the annual accounting period so as to facilitate valuation of stores for preparation of the final accounts. An alternative practice is to arrange the verification in such a manner that it coincides with a slack period of business activity. Periodic stock taking usually necessitates the shut down of the factory and it should therefore be completed as quickly as possible.

Stock may also be verified at intervals of less than a year if so desired by the management, but it will prove to be too expensive. Periodic Stock Verification is however necessary for stores that do not find place in the perpetual inventory records. Such as work-in-progress, consumable stores and components drawn from stores but not fully utilized, finished goods, Capital assets, loose tools and spares lying in the shops, measuring devices and tools in the custody of inspection staff, etc. Sometimes management prefer to have annual stock-taking for selected items in addition to continuous stock verification to have a double check.

**Advantages of Continuous Stock Taking over Periodic Stock Verification:**

- a. Physical stocks can be counted and book balances adjusted whenever desired without waiting for the entire stock taking.
- b. Prompt availability of stock figures enables quick compilation of Profit and Loss Account for interim periods.
- c. Discrepancies are easily located and thus corrective action can be promptly taken to avoid their recurrence. Continuous checking of stores also fixes responsibilities and has a moral check on the staff. This lessens the risk of loss, pilferage, theft, etc.
- d. Fixation of the various levels and check of actual balances in hand with those levels assist the store keeper in maintaining the stocks within limits and helps in initiating purchase requisitions for correct quantity at the proper time.
- e. Correct stock figures are readily available for insurance purpose and for seeking financial limits against stocks from banks.
- f. A systematic review of perpetual inventory reveals the existence of surplus, dormant, obsolete and slow-moving materials so that remedial measures may be taken on time.

In spite of its various advantages, the perpetual inventory system has some limitations as well. Unless the bin cards and the stores ledger are kept up-to-date, effective control cannot be exercised and the work of continuous stock-taking is hampered. The necessity for an agreement between the bin cards and stores ledger balances further increases the problem.

**E. Vital, Essential, Desirable (VED):** Generally, this classification is done for spare parts which are used for production.

**(i) Vital:** Items are classified as vital when its unavailability can interrupt the production process and cause a production loss. Items under this category are strictly controlled by setting re-order level.

**(ii) Essential:** Items under this category are essential but not vital. The unavailability may cause sub standardisation and loss of efficiency in production process. Items under this category are reviewed periodically and gets the second priority.

**(iii) Desirable:** Items under this category are optional in nature, unavailability does not cause any production or efficiency loss. **Contact no.- 7774060125/126**

**F. High Cost, Medium Cost, Low Cost (HML) Inventory:** Under this system, inventory is classified on the basis of the cost of an individual item, unlike ABC analysis where inventories are classified on the basis of overall value of inventory. A range of cost is used to classify the inventory items into the three categories. High Cost inventories are given more priority for control, whereas Medium cost and Low cost items are comparatively given lesser priority.

### G. Two Bin System:

Under this system each bin is divided into two parts: One, the smaller one to stock the quantity equal to the minimum stock or even the reordering level and the other to keep the remaining quantity. Issues are made out of the larger portion but as soon as it becomes necessary to use quantity out of the smaller portion fresh order is placed.

### H. Control Ratios:

**i. Input Output Ratio:** It is the ratio of quantity of input of material to Output units. This ratio enables comparison of actual consumption with standard consumption.

**ii. Inventory Turnover Ratio =** 
$$\frac{\text{Cost of material consumed during the period}}{\text{Average stock held during the period}}$$

$$\text{Average Stock} = (\text{Opening stock} + \text{Closing Stock}) / 2$$

This ratio is useful for finding fast moving and slow moving items.

### I. Just in Time (JIT) Purchases:

Just in time (JIT) purchases means the purchase of goods or materials such that delivery immediately precedes their use. The advantages of JIT purchases are:

- 1. Cost savings:** JIT purchases results in cost savings. The costs of stock out, inventory carrying, materials handling and breakage are reduced.
- 2. Cost of consumption:** Due to frequent purchases of raw materials, its issue price will be equal to the replacement price. The method of pricing for valuing material issues will be realistic to current costs.
- 3. Supplier co-ordination:** Suppliers of raw materials co-operate with the company and supply requisite quantity of goods or materials for which order is placed just before the start of production.
- 4. Materials management:** Goods spend less time in warehouses or on store shelves before they are exhausted. Risk of obsolescence is thereby reduced.

### J. Slow and Non moving items:

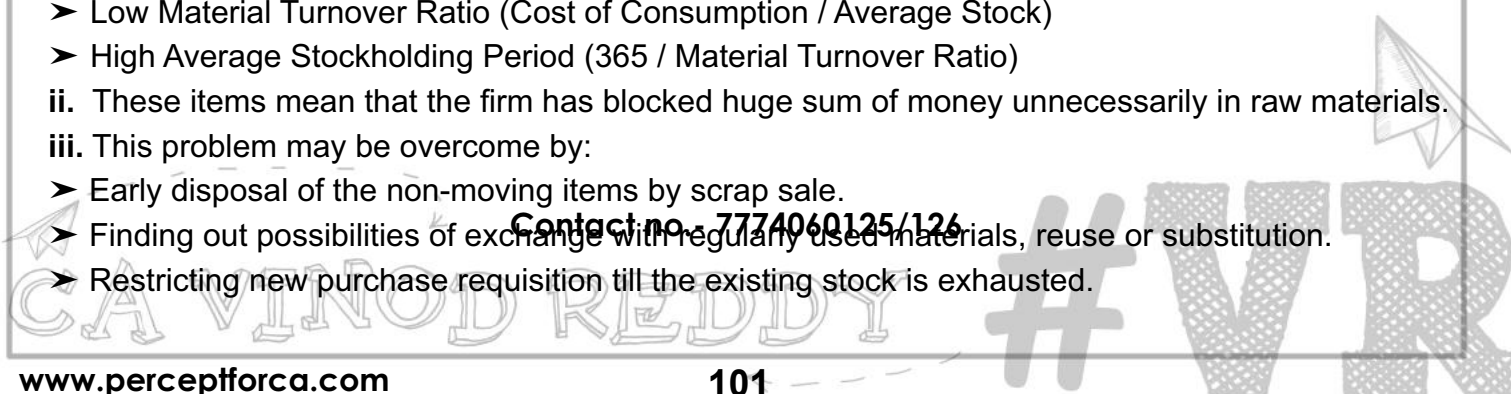
**i.** Slow and non-moving items are identified by reference to the following indicators:

- Stock Levels always near Maximum Level or much above Re-order Level.
- Low Material Turnover Ratio (Cost of Consumption / Average Stock)
- High Average Stockholding Period (365 / Material Turnover Ratio)

**ii.** These items mean that the firm has blocked huge sum of money unnecessarily in raw materials.

**iii.** This problem may be overcome by:

- Early disposal of the non-moving items by scrap sale.
- Finding out possibilities of exchange with regularly used materials, reuse or substitution.
- Restricting new purchase requisition till the existing stock is exhausted.



### TREATMENT FOR NORMAL AND ABNORMAL LOSS OF MATERIALS

At the time of physical verification of stocks, discrepancies may be found between physical stock shown in the bin card and book stock shown in the stores ledger. These discrepancies are in the form of shortages or losses.

For accounting purposes, the loss is classified into Normal or Unavoidable and Abnormal Losses.

#### Normal Loss:

- a. Based on past data, a standard percentage of normal shortage or loss is set.
- b. Cost of Normal Loss should be **treated as regular cost.**
- c. The cost of Normal Loss may be accounted under any of the following methods:
  - > As Direct Materials - by inflating the issue price; or
  - > As Overheads.

**Example:** Suppose 100 kgs of material are bought at ₹9 per kg. The normal storage loss is 10%. Hence total materials cost of ₹9 x 100 = ₹900 may be distributed over net quantity (100 - 10% = 90 kgs.).

Hence Price per kg for Costing purposes will be ₹900 divided by 90 kgs. = ₹10 per kg. Alternatively, cost of 10 kgs x ₹9 = ₹90 may be treated as Production Overheads.

#### Abnormal Loss :

- a. It is the excess of actual loss over the normal loss. (Above Normal = Abnormal)
- b. Cost of Abnormal materials shortage is a loss and should be **charged to the costing Profit and Loss Account.**
- c. If the losses or surpluses arise from errors in documentation, posting etc., they are not abnormal. Such errors should be rectified through appropriate adjustment entries.

**Important Note:** The above treatment of Normal Loss and Abnormal Loss is common in the entire subject of Costing.

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## MULTIPLE CHOICE QUESTIONS

- 1.** Direct Material is a
 

a. Fixed cost	b. Variable cost
c. Semi-variable cost	d. None of the above
- 2.** In the manufacturing industries, the most important element of cost is
 

a. Material cost	b. Labour cost
c. Overheads cost	d. None of the above
- 3.** Which of the following is considered to be the normal loss of material
  - a. Loss due to accident
  - b. Pilferage
  - c. Loss due to breaking of bulk
  - d. Loss due to careless handling of material
- 4.** In which of the following methods of pricing, the cost of production of goods lags behind the current economic value?
 

a. FIFO	b. LIFO
c. Weighted Average	d. None of the above
- 5.** Continuous stock taking is a part of
 

a. Annual stock taking	b. Perpetual inventory system
c. ABC Analysis	d. None of the above
- 6.** In which of the following methods, issues of material are priced at pre-determined rates?
 

a. Specific price method	b. Standard price method
c. Replacement price method	d. None of the above
- 7.** When material prices fluctuate widely, the following method of pricing gives absurd results
 

a. Simple average method	b. Weighted average method
c. Moving price method	d. Inflated price method
- 8.** When prices fluctuate widely, the following method will smooth out the effect of fluctuation
 

a. Simple average method	b. Weighted average method
c. FIFO	d. LIFO
- 9.** Lead time is 5 weeks, average weekly consumption is 28 units, what should be the reorder level ?
 

a. 120 units	b. 130 units	c. 140 units	d. 150 units
--------------	--------------	--------------	--------------
- 10.** Price per units ₹150, annual consumption 2,000 units, ordering cost ₹300 per order and carrying cost is 20%. What should be the EOQ?
 

a. 150 units	b. 200 units	c. 225 units	d. None of the above
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11. Bin Card is maintained by
- Accounts department
  - Costing department
  - Stores department
  - None of the above
12. Stores Ledger contains
- Details of the price of raw material lying in the Bin
  - Details of the price and quantity of raw material lying in the Bin
  - Details of the quantity of raw material lying in the Bin
  - None of the above
13. Which of the following assumptions hold true for the calculation of EOQ
- Anticipated usage of material in units is known
  - Cost per unit of material is constant
  - Ordering cost per order is fixed
  - All the above
14. Which of the following is an example of Selective Inventory Management
- EOQ
  - Perpetual inventory system
  - ABC Analysis
  - All the above
15. An item wise list of all materials required for a job is known as
- Material Requisition
  - Purchase Requisition
  - Goods Receipt Note
  - Bill of Material
16. Usually \_\_\_\_\_ copies of GRN are made.
- 2
  - 3
  - 4
  - 5
17. The document which authorizes and records the issues of material is known as -
- Material Requisition
  - Purchase Requisition
  - Goods Receipt Note
  - Bill of Material
18. Material Requisition Note is also called as -
- Material Demand Note
  - Material Authorization Note
  - Stores Requisition Note
  - All of the above
19. A \_\_\_\_\_ is a quantitative record of receipts, issues and closing balances of the items of stores.
- Material Requisition
  - Purchase Requisition
  - Goods Receipt Note
  - Bin Card
20. \_\_\_\_\_ is a method under which materials are issued at price at which they are available in the market.
- Replacement Price
  - Realisable Price
  - Specific Price
  - None of the above

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21. \_\_\_\_\_ is a method under which materials are issued at price at which they would realise if sold in the market.
- a. Replacement Price                      b. Realisable Price  
c. Specific Price                              d. Standard Price
22. Landed cost of material consists of -
- a. Invoice Price                              b. Transit Insurance  
c. Freight and Forwarding charges.      d. All of the above
23. \_\_\_\_\_ is the incidental residue from certain type of manufactures.
- a. Waste                                      b. Scrap  
c. Spoilage                                  d. Defectives
24. \_\_\_\_\_ are the units of output which do not meet quality requirements and / or have minor defects, but which can be rectified.
- a. Waste                      b. Scrap                      c. Spoilage                      d. Defectives
25. \_\_\_\_\_ means the loss in the value of an asset due to its suppression i.e. outdation.
- a. Waste                      b. Obsolescence                      c. Spoilage                      d. Defectives
26. \_\_\_\_\_ refers to the techniques of maintaining stocks at desired level with the aim of minimizing the cost.
- a. Inventory Control                      b. EOQ  
c. Perpetual inventory system                      d. ABC Analysis
27. \_\_\_\_\_ may be defined as that level of inventory order that minimizes the total cost of inventory management.
- a. Inventory Control                      b. EOQ  
c. Perpetual inventory system                      d. ABC Analysis
28. \_\_\_\_\_ is the quantity that should be placed in the purchase order.
- a. ROQ                                      b. EOQ  
c. Both (a) & (b)                              d. None of the above
29. The system of material control while it is in storage on a continuous basis is known as -
- a. Inventory Control                      b. EOQ  
c. Perpetual inventory system                      d. ABC Analysis
30. Perpetual Inventory System is comprised of -
- a. Bin Cards                                      b. Stores Ledger  
c. Continuous Stock-taking                      d. All of the above

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## MATERIAL COST

① Generally material constitute major portion of total cost of production in a manufacturing concern.

∴ proper care & control is required in

← purchase of raw material

↓ storage of raw material

→ Issue of raw material

② Direct material cost is included in prime cost, whereas indirect material cost is included overhead cost. material cost is divided in 2 parts : i) Direct materials. ii) Indirect materials.

Direct materials are those materials which enter in to & forms the part of product which includes:

i) material specifically required to complete the job or process

ii) All materials transferred from one process to another process

indirect materials are the materials which are not directly traceable to finished product such as consumable stores, lubricating oil, grease, fuel oil etc

③ This grouping of material cost in to direct material & indirect material is based on materiality of cost, sometime direct cost may be of such a small value that cost of maintaining records is more than cost of material itself, in such cases material cost is conveniently classified as indirect material cost.

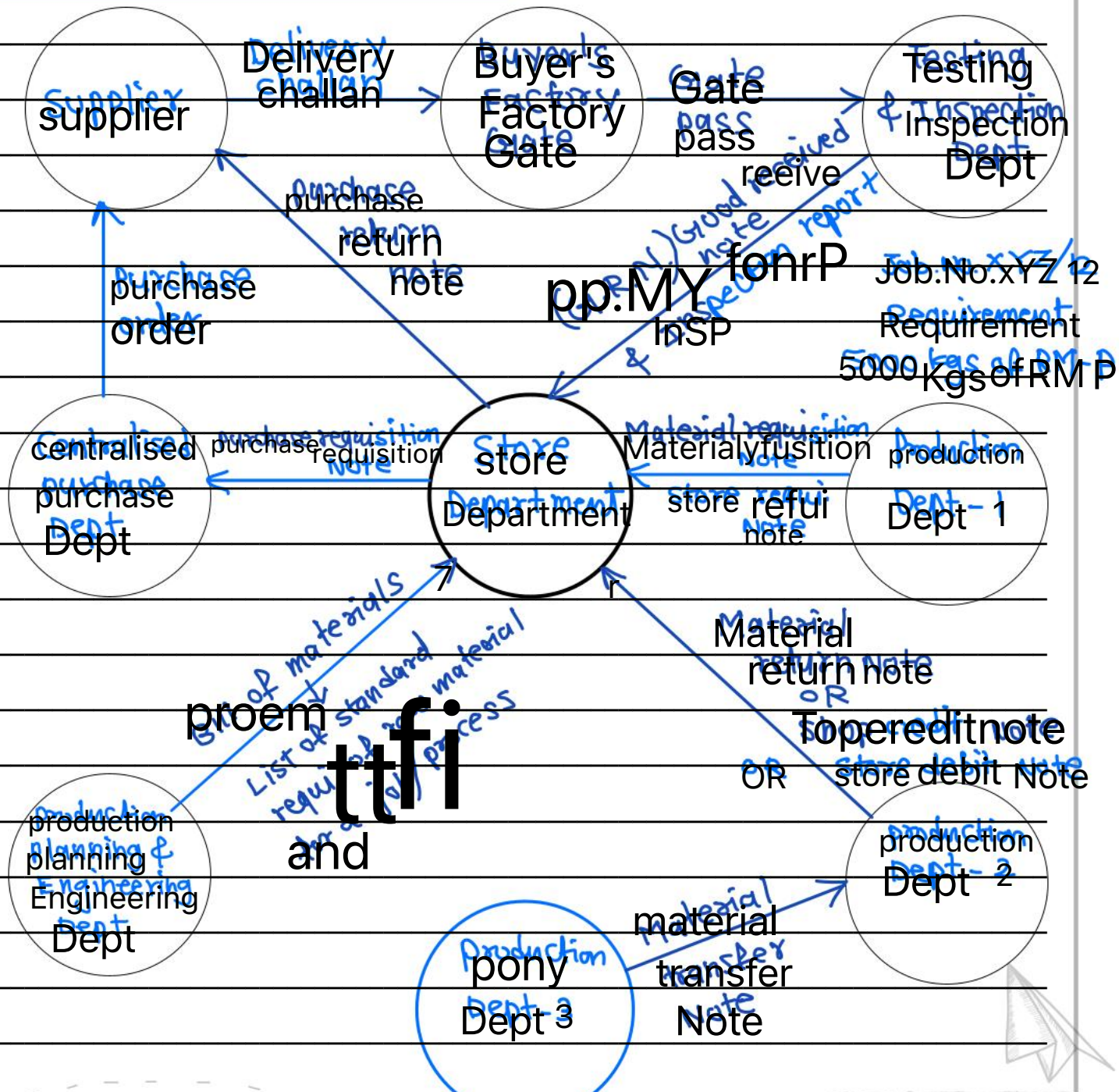
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Purchase Procedure

Decentralised purchase procedure

Centralised purchase procedure

Centralised Purchased Procedure :



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copy of every document will go to Accounts Dept.

Five Copies of GRN to :

1. Store Dept
2. Supplier
3. Accounts Dept
4. Dept who initiated the purchase process
5. retained by testing & Insp. dept.

**Question :**

What is difference between Centralised and Decentralised Purchase Procedure?

centralised purchase procedure	Decentralised purchase procedure
① Duplication of work is avoided	① There is lot of duplication of work
② Economies of scale (i.e. advantage of discount for bulk buying) are available	② Economies of scale (Benefits of Bulk buying in terms of discount) are not available because of piece-meal buying
③ Time consuming, Lengthy, Expensive.	③ Faster purchases can be made at low admin. cost
④ There is uniformity in purchases. standardised procedure & norms are involved	④ No standardised procedure, no uniformity, No standardised norms & procedure.
⑤ Lesser Flexibility & Lesser motivation to divisional managers	⑤ Greater Flexibility & motivation to divisional managers

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## Question :

Write a short note on ABC Analysis?

① ABC analysis is also known as a tool for 'selective inventory management' or 'Management by exception'. It is an analytical method for material control that aims at concentrating the efforts in those sectors where attention is needed most. Sometimes it is called as Always best control (ABC)

② under this method raw materials are divided in 3 categories

category	% of Total volume of raw materials (approx)	% of Total value of raw material (approx)
A	5-10%	60-70%
B	15-20%	15-20%
C	60-70%	5-10%

once raw materials are divided in these 3 categories, Management now can focus their attention more on category-A & thereafter relatively low on B and then C-category.

③ This ABC analysis is based on pareto analysis (80:20 rule)

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**Question 1 :**

From the following information calculate the Average Value per item if a stores has 6,000 items of consumption and a yearly consumption of ₹12,00,000.

Class	% of Total No. of items	% of the Total Value
A	10	70
B	20	20
C	70	10
Total	100	100

Statement showing calculation of Avg value per item

class	% of total no. of items	Total No of items (Y)	% of Total value	Total value (₹) (X)	Avg value per item (X/Y)
A	10%	600	70%	8,40,000	1,400.00
B	20%	1,200	20%	2,40,000	200.00
C	70%	4,200	10%	1,20,000	28.57
Total	100%	6,000		12,00,000	

**Question 2 :**

From the following information calculate Total Value per Item and percentage of the Total Value, if the store has 5,000 items of consumption.

Class	% of Total No. of items	Average Value per Item
A	9	₹4,000
B	24	₹300
C	67	₹40

Statement showing calculation of Total value for each class & % of total value

class	% of Total no. of items	Total No of items (X)	Avg value per item (₹) (Y)	Total value (₹) (X.Y)	% of total value
A	9%	450 (5000 x 9%)	4,000	18,00,000	78.47% (18,00,000 / 2299,000) x 100
B	24%	1,200 (5000 x 24%)	300	3,60,000	15.69% (3,60,000 / 2299,000) x 100
C	67%	3,350 (5000 x 67%)	40	1,34,000	5.84% (1,34,000 / 2299,000) x 100
Total	100%	5,000	110	22,99,000	100%

## Question :

Write a short note on VED Analysis?

(V - Vital, E - Essential, D - Desirable)

① VED analysis is tool used for material control.

Generally classification of spare parts used for production is done with the help of VED analysis.

② As per VED analysis, spare parts are divided in 3 categories :

i) Vital : items are classified as vital when its unavailability can interrupt the production process & cause production loss. Items under this category should be strictly monitored by setting re-order level

ii) Essential : items this category are essential but not vital. unavailability of these items can cause sub-standard production or production inefficiency. These are second priority items.

iii) Desirable : items in this category are optional in nature. unavailability of these items neither cause production loss, nor sub-standard production, inefficiency in production.

## Question :

Write a short note on HML Analysis ?

- ① under this system, inventory is classified on the basis of cost of an individual unit of raw material, unlike ABC analysis where inventory is classified on the basis of overall value & volume.
- ② A range of cost is used to classify the inventory items into 3 categories namely High cost, medium cost & Low cost

example

price p.u. (₹)	category
0 - 20	Low cost
20 - 80	medium cost
80 - above	High cost

- ③ High cost inventories are given priority for control whereas medium cost & Low cost inventories are comparatively given lesser priority.

## Question :

Write a short note on Store Layout ?

- ① The stores location and layout should be planned very carefully in order to keep material handling cost & loss, wastage due to multiple handing at a minimum level.
- ② Following point should be considering while deciding store location & layout
- store Dept should be easily accessible to all depts
  - Heavy bulky stores should be kept near user Dept.
  - raw material should be arranged in Bins, racks, Drawers etc after proper classification & codification.

## Question :

Write a note on Classification and Codification of Materials?

- ① For the purpose of easy location, identification & convenience in storage & issue each item of stores is given distinct name & code number. This process is known as classification & codification of raw materials.
- ② similar items are classified under sub-groups & number of such sub-groups are classified under main groups.
- ③ Advantages of codification : i) Easy identification ii) reduction in clerical work iii) Easy for accounting iv) secrecy
- ④ Types of codes : i) Alphabetic ii) Numeric iii) Alpha-numeric

## Question :

Write down the difference between Bin Card & Store Ledger?

Bin-card	Store Ledger
It is a quantitative record of raw materials	It is quantitative & financial record of raw materials
updated by store keeper	updated by cost-accountant
It is updated at the time of every transaction	Transactions are posted periodically in store ledger
It is a store recording document	It is an accounting record
Each transaction is recorded individually	Transactions are posted periodically
source documents	source documents

**Question :**

Five Methods of issue/pricing of raw materials?

1. First in First out method (FIFO)
2. Last in First out method (LIFO)
3. Weighted avg (after every receipt) method
4. Weighted avg (at the end of the period) method
5. simple avg method

**Question 3 :**

At the beginning of October, 2020, Quality Brush Company had in stock 10,000 brushes valued at ₹10 each. Further, purchases were made during the month as follows -

- 7<sup>th</sup> October, 4,000 Brushes @ ₹12.50
- 14<sup>th</sup> October, 6,000 Brushes @ ₹15.00
- 24<sup>th</sup> October, 8,000 Brushes @ ₹16.50

Issues to shop floor were as follows -

- 16<sup>th</sup> October, 16,000 Brushes
- 28<sup>th</sup> October, 10,000 Brushes

You are required to prepare a store ledger card for the month of October using:

- (a) First-in-First-Out principle;
- (b) Weighted Average (after every receipt) method and
- (c) Last-in-First-Out principle
- (d) Weighted Average (at the end of the month)

**Quality Brush Company**

**Store - Ledger card for the month of October - 2020**

by using:

① **First in First out method**

Date	Particulars	Receipts			Issue			Balance		
		Qty (Units)	Rate (₹)	Amt (₹)	Qty (Units)	Rate (₹)	Amt (₹)	Qty (Units)	Rate (₹)	Amt (₹)
1 Oct 2020	opening stock							10,000	10	1,00,000
7	purchases	4,000	12.50	50,000				10,000	10	1,00,000
14	purchases	6,000	15.00	90,000				4,000	12.50	50,000
16	Issue				10,000	10	1,00,000			
28	Issue				4,000	12.50	50,000			
					2,000	15.00	30,000			
							588			

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24	purchases	8000	16.50	1,32,000				4000	15.00	60,000
								8000	16.50	1,32,000
28	Issue				4000	15.00	60,000			
					6000	16.50	99,000	2000	16.50	33,000
	<b>Total</b>	<b>18,000</b>		<b>2,72,000</b>	<b>26,000</b>		<b>3,39,000</b>			
31	closing stock							2000	16.50	33,000

② Last in First out method (LIFO)

Date	Particulars	Receipts			Issue			Balance		
		Qty (Units)	Rate (₹)	Amt (₹)	Qty (Units)	Rate (₹)	Amt (₹)	Qty (Units)	Rate (₹)	Amt (₹)
1	opening stock							18,000	10	1,80,000
7	purchases	4,000	12.50	50,000				18,000	10	1,80,000
								4,000	12.50	50,000
14	purchases	6,000	15.00	90,000				10,000	10	1,00,000
								4,000	12.50	50,000
								6,000	15.00	90,000
16	Issue				6,000	15.00	90,000	4,000	10	40,000
					4,000	12.50	50,000			
					6,000	10.00	60,000			
24	purchases	8000	16.50	1,32,000				4000	10	40,000
								8000	16.50	1,32,000
28	Issue				8,000	16.50	1,32,000	2,000	10	20,000
					2,000	10	20,000			
	<b>Total</b>	<b>18,000</b>		<b>2,72,000</b>	<b>26,000</b>		<b>3,52,000</b>			
31	closing stock							2,000	10	20,000

③ Weighted avg (after every receipt) method

Date	Particulars	Receipts			Issue			Balance		
		Qty (Units)	Rate (₹)	Amt (₹)	Qty (Units)	Rate (₹)	Amt (₹)	Qty (units)	Rate (₹)	Amt (₹)
1	opening stock							10,000	10	100,000
7	purchases	4,000	12.50	50,000				14,000	10.714	150,000
14	purchases	6,000	15.00	90,000				20,000	12.00	240,000
16	Issue				16,000	12.00	1,92,000	4,000	12.00	48,000
24	purchases	8,000	16.50	1,32,000				12,000	15.00	180,000
28	Issue				10,000	15.00	1,50,000	2,000	15.00	30,000
	Total	18,000		2,72,000	26,000		3,42,000			
31	closing stock							2,000	15.00	30,000

x	w	wx
10	10,000	1,00,000
12.50	4,000	50,000
	14,000	1,50,000

① weighted avg =  $\frac{\sum wx}{\sum w} = \frac{1,50,000}{95} = 10.7142$

④ Weighted Avg (at the end of the month) method

Date	Particulars	Receipts			Issue			Balance		
		Qty (units)	Rate (₹)	Amt	Qty (units)	Rate (₹)	Amt	Qty (units)	Rate (₹)	Amt
1	opening stock							10,000	10	1,00,000
7	purchases	4,000	12.50	50,000				14,000		1,50,000
14	purchases	6,000	15.00	90,000				20,000		2,90,000
16	Issue				16,000	13.2857	2,12,571	4,000		27,429
24	Purchases	8,000	16.50	1,32,000				12,000		1,59,929
28	Issue				10,000	13.2857	1,32,857	2,000		26,572
	Total	18,000		2,72,000	26,000					
31	closing stock							2,000		26,572

Rate of issue to be used for pricing all the issues during the month

$$= \frac{(Q_1 R_1 + Q_2 R_2 + Q_3 R_3 + \dots + Q_n R_n)}{Q_1 + Q_2 + Q_3 + \dots + Q_n}$$

$$= \frac{(10,000 \times ₹10) + (4,000 \times ₹12.50) + (6,000 \times ₹15) + (8,000 \times ₹16.50)}{(10,000 + 4,000 + 6,000 + 8,000) \text{ units}}$$

$$= \frac{(₹ 3,72,000)}{28,000 \text{ units}} = ₹ 13.2857$$

This rate will be used for pricing all the issues during the month

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i.e. Accounting will be kept pending till end of the month

Question 4 :

AT Ltd., furnished the following store transactions for September, 2025:

Date Sep.	Particulars	Units	Rate ₹ / Unit
1	Opening balance	25	5.50
4	Issued Req.No.85	8	
6	Receipt from B and Co, GRN NO. 26	50	5.75
7	Issued Req.No.97	12	
10	Returns to B and Co.	10	5.75
12	Issues Req. No.108	15	
13	Issue Req. No.110	20	
15	Receipts from M and Co, GRN No. 33	25	6.10
17	Issues Req.No.121	10	
19	Received replacement from B and Co. GRN No.38	10	
20	Returned from dept. material of M&Co. MRN No.4 (Req.121)	5	
22	Tranf. from Job 182 to Job 187 in department MTR No.4	5	
26	Issues Req. No.146	10	
29	Transfer from Dept. A to Dept. B MTN No.10	5	
30	Shortage in stock taking	2	

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

①

AT Limited

store Ledger card by FIFO method for the month of september - 2025

Date sept 2025	Particulars	Receipts			Issue			Balance		
		Qty (units)	Rate (₹)	Amt (₹)	Qty (units)	Rate (₹)	Amt (₹)	Qty (units)	Rate (₹)	Amt (₹)
1	opening stock						25	5.50	137.50	
4	Issue M.Reg.No.85				8	5.50	44	17	5.50	93.50
6	Receipts from B & Co (supplier) (GRN NO.26)	50	5.75	287.50				17	5.50	93.50
								50	5.75	287.50
7	Issue M.Reg.No.97				12	5.50	66	5	5.50	27.50
								50	5.75	287.50
				118						

10	Purchase returns to B & W.				10	5.75	57.50	5	5.50	27.50	
								40	559	338	
12	Issue (Fftp.T 108)				5	5.50	27.50				
					10	559	57.50	30	5.75	172.50	
13	Issue (Fftp.T 110)				20	5.75	115	10	5.75	57.50	
15	Receipts from M & W supplier (GRN NO 33)	25	6.10	152.50				10	5.75	57.50	
								25	6.10	152.50	
17	Issue (Frito.ni)				10	5.75	57.50	25	6.10	152.50	
19	received repl from B & W. (GRN NO 38)	10	5.75	57.50				25	6.10	152.50	
								10	5.75	57.50	
20	Material returns from Dept (MRN NO 4)		5.75	28.75				25	6.10	152.50	
								10	5.75	57.50	
								5	5.75	28.75	
26	Issue (Matereg Note NO 146)				10	6.10	61.00	15	6.10	91.50	
								10	5.75	57.50	
								5	5.75	28.75	
30	Shortage in stock taking debited to Factory				2	6.10	12.20	13	6.10	79.30	
								10	5.75	57.50	
								5	5.75	28.75	

Notes & assumptions

- Material returned to B & W. on 10<sup>th</sup> sept 2025 has been shown at the price at which it was originally purchased on 6<sup>th</sup> sept. 2025.
- Replacement of material received from B & W. on 19<sup>th</sup> sept 2025 has been treated as fresh purchase at the same rate of ₹ 5.75 p.us.
- Material transferred from one production Dept to another production Dept or one job to another job in same production Dept will be not be recorded in store ledger as it is neither a receipt nor an issue for store dept.

④ In the absence of any specific information, shortage in stock taking is assumed as normal loss, hence debited to factory on A/c.

Normal Loss of materials can be treated as under

Inflated the cost p.H. of remaining good units OR Normal Loss can be debited to Factory OH a/c

∴ Normal loss becomes part of cost of production whereas

Abnormal loss will not increase cost of production of any of the job but it reduces profit of the company as it is directly debited to costing P & L A/c

**Question 5 :**

The following information is provided by SUNRISE INDUSTRIES for the first fortnight of April, 2020.

Stock on 1.4.2020, 100 units at ₹5 per unit.

Purchases -	05.4.2020	300 units at ₹6
	08.4.2020	500 units at ₹7
	12.4.2020	600 units at ₹8
Issues -	06.4.2020	250 units
	10.4.2020	400 units
	14.4.2020	500 units

Calculate, using LIFO methods of pricing issues -

- i. The value of materials consumed during the period.
- ii. The value of stock of materials on 15.4.2020

**SUN-RISE INDUSTRIES**

Store Ledger card by LIFO method for first fortnight of April-2020

Date	Particulars	Receipts			Issue			Balance		
		Qty (Units)	Rate (₹)	Amt	Qty (Units)	Rate (₹)	Amt	Qty (units)	Rate (₹)	Amt
1 April 2020	opening stock							100	5	500
5	purchases	300	6	1,800				100	5	500
								300	6	1,800
6	Issue				250	6	1,500	100	5	500
								50	6	300
8	purchases	500	7	3,500				100	5	500
								50	6	300
								500	7	3,500
10	Issue				400	7	2,800	100	5	500
								50	6	300
								100	7	700
12	purchases	600	8	4,800				100	5	500
								50	6	300
								100	7	700
								600	8	4,800
14	Issue				500	8	4,000	100	5	500
								50	6	300
								100	7	700
								100	8	800
	Total	1,400		10,300	1,150		8,300	100	5	500
	closing stock							50	6	300
								100	7	700
								100	8	800

$$\therefore \text{value of materials consumed during the period} = ₹ 8,300$$

$$\begin{aligned} \text{Closing stock value as on 15.4.2020} &= ₹ 500 + ₹ 2300 + ₹ 700 + ₹ 800 \\ &= ₹ 2300 \end{aligned}$$

**Question 6 :**

Shriram Enterprises requires a special raw material 'ZED'. The following particulars were collected for the year 2020 -

- Monthly requirement for ZED is 250 units
- Cost of placing order ₹100
- Annual carrying cost per unit ₹15
- Normal usage 50 units per week
- Minimum usage 25 units per week
- Maximum usage 75 units per week
- Re-order period 4 to 6 weeks.

Compute from the above

- Re-order Quantity (Economic order quantity)
- Re-order Level
- Minimum Level
- Maximum Level
- Average Stock Level

### ① calculation of Economic order Quantity (EOQ i.e. ROQ)

$$= \sqrt{\frac{2 \times \text{Annual requirement of ZED} \times \text{ordering cost per order}}{\text{carrying cost p.u.p.a.}}}$$

$$= \sqrt{\frac{2 \times (250 \text{ units} \times 12 \text{ months}) \times ₹ 100}{₹ 15}}$$

$$= 200 \text{ units}$$

### ② Re-order Level (ROL)

$$= \left( \frac{\text{Maximum usage}}{\text{rate}} \times \text{Maximum Lead time} \right)$$

$$= \frac{75 \text{ units per week} \times 6 \text{ weeks}}{1} = 450 \text{ units}$$

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③ Minimum Level

$$= \text{ROL} - (\text{Avg usage rate} \times \text{Avg lead time})$$

$$= 450 \text{ units} - (50 \text{ units} \times 5 \text{ weeks}) = 200 \text{ units}$$

④ Maximum Level

$$= \text{ROL} - (\text{Min. usage rate} \times \text{Min lead time}) + \text{ROQ}$$

$$= 450 \text{ units} - (25 \text{ units} \times 4 \text{ weeks}) + 200 \text{ units}$$

$$= 550 \text{ units}$$

⑤ Average stock Level

$$\text{i) } = \frac{(\text{Minimum Level} + \text{Maximum Level})}{2} = \frac{200 \text{ units} + 550 \text{ units}}{2}$$

$$= 375 \text{ units}$$

(OR)

$$\text{ii) } = \text{Minimum Level} + \left( \frac{\text{ROQ}}{2} \right)$$

$$= 200 \text{ units} + \left( \frac{200 \text{ units}}{2} \right)$$

$$= 300 \text{ units}$$

## Question 7 :

The following data relating to inventory costs have been established for ABC Ltd.

- Order must be placed in multiples of 100 units.
- Requirement for the year are 3,00,000 units.
- The purchase price per unit is ₹3.
- Carrying cost is 25% of the purchase price of goods.
- Cost per order placed is ₹20.
- Desired safety stock is 10,000 units, this amount is on hand initially.
- Three days are required for delivery.

Calculate -

- E.O.Q
- How many orders should the company place each year?
- At what inventory level should an order be placed?

$$\text{Min. Lead} = \text{Avg lead} = \text{Maximum} \\ \text{Time} = 9.1m = 1 \text{ minime} = 3 \text{ days}$$

### ① calculation of Economic order quantity (Eoq)

$$E.O.Q = \sqrt{\frac{2 \times \text{Annual requirement of raw material} \times \text{ordering cost per order}}{\text{raw material carrying cost p.u.pae}}}$$

$$= \sqrt{\frac{2 \times 3,00,000 \text{ units} \times ₹20}{₹3 \times 25\%}} = 4,000 \text{ units}$$

### ② No. of orders to be placed in a year

$$= \left( \frac{\text{Annual requirement of raw material}}{\text{order size}} \right)$$

$$= \left( \frac{3,00,000 \text{ units}}{4,000 \text{ units per order}} \right) = 75 \text{ orders}$$

### ③ Inventory level at which new order should be place (i.e. Re-order Level) (with safety stock)

$$= (\text{Avg usage rate} \times \text{Avg lead time}) + \text{safety stock}$$

$$= \left( \frac{3,00,000 \text{ units}}{300 \text{ days}} \times 3 \text{ days} \right) + 10,000 \text{ units}$$

$$= (1000 \text{ units per day} \times 3 \text{ days}) + 10,000 \text{ units}$$

$$= 13,000 \text{ units}$$

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Note : ① It is assumed that there are 300 working days in a year.

**Question 8 :**

From the following transactions extracted from the books of accounts of a manufacturing concern as on 31.8.2025, calculate using:

1. FIFO
  2. LIFO
  3. Simple Average Cost
  4. Periodical Weighted Average Cost Method (end of month)
  5. Weighted Average Method (After every receipt)
- a. consumption value of raw materials during the month and  
b. value of closing stock as on 31.8.2025

Aug. 2020	Particulars	Quantity in units	Rate per Unit (₹)
1.	Opening Stock	300	9.70
2.	Purchases	250	9.80
11.	Issue	400	
15.	Purchase	300	10.05
20.	Issue	210	
25.	Purchase	150	10.30
29.	Issue	100	

Store Ledger card for the month of  
August - 2025 by  
August

① First in First out method

Date	Particulars	Receipts			Issues			Balance		
		units	Rate	Amount	units	Rate	Amount	units	Rate	Amount
1	opening stock							300	9.70	2,910
2	purchases	250	9.80	2,450				300	9.70	2,910
								250	9.80	2,450
11	Issue				300	9.70	2,910	150	9.80	1,470
					388	9.80	3,818			
15	purchases	300	10.05	3,015				150	9.80	1,470
								300	10.05	3,015
20	Issue				150	9.80	1,470	240	10.05	2,412
					188	10.05	1,889			
25	purchases	150	10.30	1,545				240	10.05	2,412
								398	10.30	4,095
29	Issue				100	10.05	1,005	140	10.05	1,407
								150	10.30	1,545
	<b>Total</b>	<b>700</b>		<b>7,010</b>	<b>710</b>		<b>6,968</b>			
31	closing stock							140	10.05	1,407
								150	10.30	1,545

## ② Last in First out method

Date	Particulars	Receipts			Issues			Balance		
		units	Rate	Amount	units	Rate	Amount	units	Rate	Amount
Ingrs			REF	Argent		(₹)	(₹)		(₹)	(₹)
1	opening stock							300	9.70	2,910
2	purchases	250	9.80	2,450				300	9.70	2,910
								250	9.80	2,450
11	Issue				250	9.80	2,450			
					750	9.70	1,955	150	9.70	1,455
15	purchases	300	10.05	3,015				150	9.70	1,455
								300	10.05	3,015
20	Issue				210	10.05	2,110.50	150	9.70	1,455
								90	10.05	904.50
25	purchases	150	10.30	1,545				150	9.70	1,455
								90	10.05	904.50
								150	10.30	1,545
29	Issue				100	10.30	1,030	150	9.70	1,455
								90	10.05	904.50
								50	10.30	515
	Total	700		7,010	710		7,045.50			
31	closing stock						7,095.50	150	9.70	1,455
								90	10.05	904.50
								98	10.30	550

## ③ Weighted Avg method (After every receipt)

Date	Particulars	Receipts			Issues			Balance		
		units	Rate	Amount	units	Rate	Amount	units	Rate	Amount
Ingrs			RIF	Amount	units	Rate	Amount	units	RO	Ageynt
1	opening stock							300	9.70	2,910
2	purchases	250	9.80	2,450				550	9.745	5,360
11	Issue				400	9.745	3,898	150	9.745	1,462
15	purchases	300	10.05	3,015				450	9.94	4,477
20	Issue				210	9.948	2,089	240	9.99	2,388
25	purchases	150	10.30	1,545				390	10.085	3,933
29	Issue				100	10.085	1,008	290	10.085	2,925
	Total	700		7,010	710		6,995			
31	closing stock							290	10.085	2,925

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④ Weighted Avg method (At the end of month)

Date	Particulars	Receipts			Issues			Balance		
		units	Rate	Amount	units	Rate	Amount	units	Rate	Amount
Aug-25	opening stock		₹ 9.70	2,100				300	₹ 9.70	2,910
2	purchases	250	9.80	2,450				550		5,360
11	Issue				400	9.92	3,968	150		1,392
15	purchases	300	10.05	3,015				450		4,407
20	Issue				210	9.92	2,083	240		2,324
25	purchases	150	10.30	1,545				390		3,869
29	Issue				100	9.92	992	290		2,877
	Total	700		7,010	710		7,043			
31	closing stock							290		2,877

working note i) weighted avg calculated at the end of the month

$$= \left( \frac{Q_1 R_1 + Q_2 R_2 + Q_3 R_3 + \dots + Q_n R_n}{Q_1 + Q_2 + Q_3 + \dots + Q_n} \right)$$

$$= \left[ \frac{(300 \text{ units} \times ₹ 9.70) + (250 \text{ units} \times ₹ 9.80) + (300 \text{ units} \times ₹ 10.05) + (150 \text{ units} \times ₹ 10.30)}{(300 + 250 + 300 + 150) \text{ units}} \right]$$

$$= \left( \frac{₹ 9,920}{1,000 \text{ units}} \right) = ₹ 9.92 \text{ p.u.s.}$$

Note : In simple avg method, while deciding rate of issue only previous 2 purchase rates are considered. This method is not useful in practical life as it gives absurd results.

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# ⑤ simple avg. method

Date	Particulars	Receipts			Issues			Balance	
		units	Rate (₹)	Amount (₹)	units	Rate (₹)	Amount (₹)	units	Rate (₹)
1	opening stock						300	9.70	2,910
2	purchases	250	9.80	2,450			550		5,360
11	Issue				400	9.75	3,900	150	1,660
15	purchases	300	10.05	3,015			450		4,975
20	Issue				210	9.925	2,084	240	2,391
25	purchases	150	10.30	1,545			390		3,936
29	Issue				100	10.175	1,018	290	2,918
	Total	700		7,010	710		7,002		
31	closing stock						290		2,918

①  $\left( \frac{9.70 + 9.80}{2} \right)$     ②  $\left( \frac{10.05 + 9.80}{2} \right)$     ③  $\left( \frac{10.30 + 10.05}{2} \right)$

## Question 9 :

Find the optimum order quantity (q) for a product for which the price breaks are as follows -

Quantity (q)	Price/unit
$0 < q < 100$	20
$100 \leq q < 200$	18
$200 \leq q$	16

The yearly demand for the products is 600 units. The storage is 15% of the unit cost of the product and the cost of ordering is ₹30 per order.

Statement showing calculation of Total inventory management cost for each order size

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order size (units)	purchase price p.u. (₹)	Total purchase cost for the year (₹)	carrying cost p.u.p.ae (₹)	Avg. stock (units)	Total carrying cost for the year (₹)	Number of orders to be placed in a year	Total ordering cost for the year (₹)	Total inventory management cost for the year (₹)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Adhoc	Given	$= 600 \times 6$	$= 6 \times 151$	$= (9/2)$	$= (1 \times 9)$	$= (600/9)$	$= 30 \times 9$	$= C \times P \times H$
50	20	12,000	3.00	25	75	12	360	12,435
100	18	10,800	2.70	50	135	6	180	11,115
150	18	10,800	2.70	75	202.50	4	120	11,122.50
200	16	9,600	2.40	100	240	3	90	9,930
300	16	9,600	2.40	150	360	2	60	10,020
600	16	9,600	2.40	300	720	1	30	10,350

From above table, It is clear that optimum order size should be 200 units as it results in Minimum total inventory management cost of ₹ 9,930/-

## Question 10:

The following information is extracted from the Stores Ledger of Material X :-

	Opening Stock	Nil
	Purchases:	
Jan. 1		100 @ ₹1 per unit
Jan.20		100 @ ₹2 per unit
	issues:	
Jan.22		60 for Job W16
Jan.23		60 for Job W17

Compute 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 W16, Job W17 and closing stock under the methods aforesaid and discuss from different points of view which method you would prefer.

① Statement showing material cost allocated to Job W16, Job W17 and valuation of closing stock

Method of pairing the issue	Material cost allocated to		value of closing stock
	Job - W16	Job - W17	
First in First out method (FIFO)	$(60 \text{ units} \times ₹1)$ = ₹60	$(40 \text{ units} \times ₹1) + (20 \text{ units} \times ₹2)$ = ₹80	$(80 \text{ units} \times ₹2)$ = ₹160
Last in First out method (LIFO)	$(60 \text{ units} \times ₹2)$ = ₹120	$(40 \text{ units} \times ₹1) + (20 \text{ units} \times ₹1)$ = ₹60	$(80 \text{ units} \times ₹1)$ = ₹80
Weighted avg method	$(60 \text{ units} \times ₹1.50)$ = ₹90	$(60 \text{ units} \times ₹1.50)$ = ₹90	$(80 \text{ units} \times ₹1.50)$ = ₹120

② In this example, there are only 2 purchases.

In purchases on 20<sup>th</sup> Jan price has increased by 100% as compared to purchase price on 1<sup>st</sup> Jan.

These 2 transactions are insufficient to analyse the trend. (i.e. these 2 transactions are not enough to say, there is increasing price trend)

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As we are not able to establish the trend and there is major fluctuation in price p.u., we recommend weighted method in order to smoothen effect of fluctuation in prices.

**Question 11:**

The following transactions in respect of material Y occurred during the six months ended 30<sup>th</sup> June, 2021 -

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 materials issue?

① In this question,

$$\left[ \begin{array}{l} \text{Total purchase quantity} \\ \text{in first 5 months (Jan to May)} \end{array} \right] = \left[ \begin{array}{l} \text{Total quantity issued} \\ \text{in first 5 months} \end{array} \right] = 1900 \text{ units}$$

∴ closing stock at the end of May = 0 units

(PIS Note that there is no opening stock January)

There are 600 units purchased @ ₹ 20 p.c. in the month of June. As closing stock of May month was zero, whatever quantity issued in the month of June is only out of purchases made in June irrespective of method of pricing the issues, and closing stock of June will be 200 units valued at ₹ 20 p.c. = ₹ 4,000/

∴ In this example value of closing stock remains same i.e. ₹ 4,000/ irrespective of method of pricing the issues.

② However statement made by chief accountant can not be always correct as value of closing stock changes/differs as per the method of pricing the issues.

③ value of closing stock should be lower, keeping in mind this objective

In case of	We recommend
Increasing price trends	LIFO method
Decreasing price trends	FIFO method
Fluctuating prices	Weighted avg

in order to smoothen the effect of fluctuating prices.

even AS-2 recommends that stock should be valued at cost or NRV whichever is lower.

**Question 12:**

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

Raw Material	Usage/unit of product (Kgs)	Re-order Quantity (Kgs)	Price Per Kg.	Reorder Period (weeks)		
				Minimum	Average	Maximum
A	10	10,000	0.10	1	2	3
B	4	5,000	0.30	3	4	5
C	6	10,000	0.15	2	3	4

Weekly production varies from 175 to 225 units, averaging 200 units of the said product.

Calculate all the Inventory Levels for Raw Material A, B and C.

① calculation of usage rates for all 3 raw materials

Raw materials	A	B	C
usage rate			
Ⓐ Minimum usage rate	1,750 kgs $(175 \text{ units} \times 10 \text{ kg})$	700 kg $(175 \text{ units} \times 4 \text{ kg})$	1,050 kgs $(175 \text{ units} \times 6 \text{ kg})$
Ⓑ Avg usage rate	2,000 kg $(200 \text{ units} \times 10 \text{ kg})$	800 kg $(200 \text{ units} \times 4 \text{ kg})$	1,200 kgs $(200 \text{ units} \times 6 \text{ kg})$
Ⓒ Maximum usage rate	2,250 kgs $(225 \text{ units} \times 10 \text{ kg})$	900 kgs $(225 \text{ units} \times 4 \text{ kg})$	1,350 kgs $(225 \text{ units} \times 6 \text{ kg})$

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## ② calculation of various inventory Levels

Inventory Levels	Raw Materials		
	A	B	C
① Re-order Level $= \left( \frac{\text{Maximum usage}}{\text{rate}} \times \text{lead time} \right)$	6,750 kgs $(2250 \times 3)$	4,500 kg $(900 \times 5)$	5,400 kgs $(1350 \times 4)$
② Maximum Level $= \text{ROL} - \left( \frac{\text{Min. usage}}{\text{rate}} \times \text{Min. lead time} \right) + \text{ROQ}$	$6750 - (1750 \times 1)$ 109 ps 1,100	$4500 - (700 \times 3)$ 1450 ps 1,131	$5400 - (1050 \times 2)$ + 10,000
③ Minimum Level $= \text{ROL} - \left( \frac{\text{Avg usage}}{\text{rate}} \times \text{Avg. lead time} \right)$	$6750 - (2000 \times 2)$ 2,750 kgs	$4500 - (800 \times 2)$ 1,300 kgs	$5400 - (1200 \times 3)$ 1,800 kgs
④ Average Level (Formula-1) $= \frac{\text{Minimum Level} + \text{Max. Level}}{2}$	$\frac{2750 + 15000}{2}$ 8,875 kgs	$\frac{1300 + 7400}{2}$ 4,350 kg	$\frac{1800 + 13300}{2}$ 7,550 kgs
⑤ Average Level (Formula-2) $= \text{Minimum Level} + \left( \frac{\text{ROQ}}{2} \right)$	$2750 + \frac{10000}{2}$ 7,750 kgs	$1300 + \frac{5000}{2}$ 3,800 kg	$1800 + \frac{10000}{2}$ 6,800 kgs

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Question 13:

(IMP)  
IMP

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

Price per ton	Tons
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.

most economic purchase quantity means order size that minimizes Total inventory mgmt cost for the year.

The annual requirement for the material is 5,000 tons. 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 quantity.

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

① Statement showing calculation of Total inventory management cost for each order size (Adhoc basis)

Order size	purchase price per ton (₹)	Total purchase cost for the year (₹)	No. of orders to be placed in a year	Total ordering cost for the year (₹)	carrying cost p.u.p.a. (₹)	Avg stock (tons)	Total carry cost for the year (₹)	Total inv. mgmt cost for the year (₹)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
(Adhoc)	(Given)	$= 5000 \times 6$	$= 5000 / 9$	$= 1200 \times 4$	$= 6 \times 20\%$	$= (9/2)$	$= f \times g$	$= c + h$
250	1200	60,00,000	20	24,000	240	125	30,000	60,54,000
500	1180	59,00,000	10	12,100	236	250	59,000	59,71,000
1000	1160	58,00,000	5	6,000	232	500	1,26,000	59,22,000
2000	1140	57,00,000	2.50	3,000	228	1000	2,28,000	59,31,000
2500	1140	57,00,000	2	2,400	228	1250	2,85,000	59,87,400
3000	1120	56,00,000	1.6666	2,000	224	1500	3,36,000	59,38,000
5000	1120	56,00,000	1	1,200	224	2500	5,60,000	61,20,000

optimum order size = 1000 tons, as it results in minimum Total inventory management cost of ₹59,22,000/

② If there are no discounts and price per ton is ₹1500, irrespective of order size then in order to calculate optimum order size, we can use formula of Economic order Quantity (EOQ)

i.  $EOQ = \sqrt{\frac{240}{C}}$  where  
 A = Annual requi of raw material = 5000 tons  
 O = ordering cost per order = ₹1200  
 C = carrying wstp u.P.g. = IE  $500 \times 20\%$

i.  $EOQ = \sqrt{\frac{2 \times 5000 \times 1200}{300}} = 23001$   
 = 200 tons

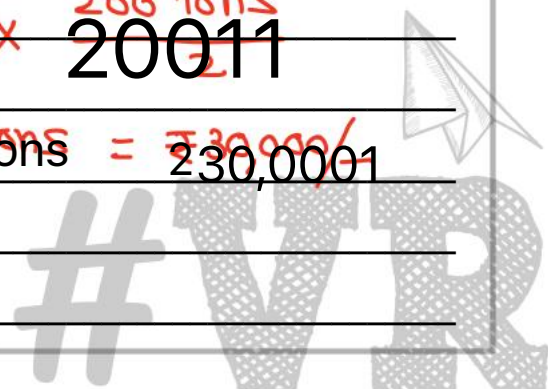
cross-check : we know that, if company follows the policy of EOQ then Total ordering cost for the year is same as Total carrying cost for the year, Let's

cross-check

Total ordering cost for the year = ordering cost per order  $\times$   $\left( \frac{\text{Annual requi of raw mate}}{\text{order size}} \right)$   
 =  $21200 \times \left( \frac{5000 \text{ tons}}{588.55} \right) = 21200 \times 25 \text{ orders} = ₹30,000/$

Total carrying wst for the year = carrying cost P u.P.ae.  $\times$  order size  
 =  $(51500 \times 20\%) \times 200 \text{ tons} = ₹300 \times 100 \text{ tons} = ₹30,000/$

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**Question 14:**

The particulars relating to the import of sealing ring made by AB & Co. during December, 2021 are given as below

$$C.I.F. = \text{cost insurance Freight}$$

- (a) Sealing Ring - 1,000 pieces invoiced @ \$ 2.00 C.I.F., Bombay Port;
- (b) Customs duty was paid @ 100% on invoice value (Which was converted to Indian Currency by adopting an Exchange rate of ₹45.20 per \$ );
- (c) Clearing charges - ₹1,800 for the entire consignment; and
- (d) Freight charges - ₹1,400 for transporting the consignment from Bombay Port to Factory premises.

It was found on inspection that 100 pieces of the above material were broken and, therefore rejected. There is no scrap value for the rejected part. No refund for the broken material would be admissible as per the terms of contract. The management decided to treat 60 pieces as normal loss and the rest 40 pieces as abnormal loss. The entire quantity of 900 pieces was issued to production. State briefly how the value of 100 pieces rejected in inspection will be treated in cost.

**Calculate:-**

- (a) Total cost of material; and
- (b) Unit cost of material issued to production.

**① Statement showing calculation of Landed cost**

particulars	Amount (₹)
(a) purchase cost (cost insurance Freight i.e. C.I.F. value) of 1000 sealing rings (1000 sealing rings × \$ 2 × ₹45.20)	90,400
(b) custom duty (a × 100%)	90,400
(c) clearing charges	1,800
(d) Freight charges	1,900
(e) Total landed cost of 1000 sealing rings (a+b+c+d)	1,84,000
(f) cost of abnormal loss to be debited to costing P & L A/c $\left( \frac{₹1,84,000}{1000} \times 40 \text{ units} \right)$	7,360
(g) Balance cost (e - f)	1,76,640
(h) cost p.e.s. of material issued to production $\left( \frac{₹1,76,640}{900 \text{ units}} \right)$	196.26666

**Question 15:**

IP Ltd. manufacture a special products and also follows the policy of EOQ for one of it's components. The details are as follows:

Purchase price per component	₹ 200
Cost of placing an order	₹ 100
Annual carrying cost per unit	10% of purchase price
<b>Total cost of carrying and ordering p.a.</b>	<b>₹ 4,000</b>

The company has been offered a discount of 2% on the price of the component, provided that the lot size is 2,000 components at a time.

You are required to:-

- (a) Compute EOQ.
- (b) Advise whether the quantity offer can be accepted or not? (Assume that the inventory carrying cost does not vary according to discount policy).
- (c) Would your advice differ if the company is offered 5% discount on a single order. (Assume that the inventory carrying cost does not vary according to discount policy).

① It is given that

$$\left( \begin{matrix} \text{Total ordering cost} \\ \text{for the year} \end{matrix} + \begin{matrix} \text{Total carrying cost} \\ \text{for the year} \end{matrix} \right) = ₹ 4,000$$

when company follows policy of EOQ then,

$$\left[ \begin{matrix} \text{Total ordering cost} \\ \text{for the year} \end{matrix} \right] = \left[ \begin{matrix} \text{Total carrying cost} \\ \text{for the year} \end{matrix} \right]$$

$$\therefore \begin{matrix} \text{Total ordering cost} \\ \text{for the year} \end{matrix} = \begin{matrix} \text{Total carrying cost} \\ \text{for the year} \end{matrix} = ₹ 4,000 = ₹ 2,000$$

$$\text{② Total carrying cost for the year} = \begin{matrix} \text{carrying cost} \\ \text{p.u.p.a.} \end{matrix} \times \text{Avg stock}$$

$$₹ 2000 = (₹ 200 \times 10\%) \times \left( \frac{\text{ordersize i.e. EOQ}}{2} \right)$$

$$\therefore ₹ 2000 = ₹ 20 \times \frac{\text{EOQ}}{2}$$

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$$\text{EOQ} = \text{Economic order Quantity} = 200 \text{ units}$$

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

Total ordering cost for the year = ₹ 2000

$$200 = \sqrt{\frac{2A \times ₹100}{₹2000 \times 10\%}} \quad \text{OR}$$

$$₹100 \times (\text{No. of orders to be placed in a year}) = ₹ 2000$$

$$200 = \sqrt{\frac{200A}{20}}$$

$$(\text{No. of orders to be placed in a year}) = 20$$

$$200 = \sqrt{10A}$$

∴ A = Annual requi. of raw material = 20 × 200 unit = 4000

$$40,000 = 10A$$

$$A = 4,000 \text{ units}$$

O = ordering cost per order, c = carrying cost p.u.p.a.

### 4 Evaluation of proposals of Quantity discounts

particulars	order size		
	200 units (EOQ)	2,000 units	4,000 units
a) purchase price p.u. (₹)	200	196 (200 - 2%)	190 (200 - 5%)
b) Total purchase cost for the year (₹)	8,00,000	7,84,000	7,60,000
c) No. of orders to be placed in a year in a year = (4000/order size)	20 orders (4000/200)	2 orders (4000/2000)	1 order (4000/4000)
d) Total ordering cost for the year (ex ₹100) (₹)	2,000	200	100
e) carrying cost p.u.p.a. (imp)	20.00 (200.00%)	20.00	20.00
f) Avg stock = order size / 2	100 units	1,000 units	2,000 units
g) Total carrying cost for the year (₹)	2,000	20,000	40,000
h) Total inventory management cost (₹) (bt dtg)	8,04,000	8,04,200	8,00,100
i) whether to accept the offer of quantity discount?		No	Yes

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## Question 16:

About 50 items are required every day for a machine. A fixed cost of ₹50 per order is incurred for placing an order. The Inventory carrying cost per item amounts to ₹ 0.02 per day. The lead period is 32 days.

Compute:-

- (i) Economic order quantity.
- (ii) Re-order level.

### ① Calculation of Economic order quantity (EOQ)

$$EOQ = \sqrt{\frac{2 \times \text{Annual requirement of raw material} \times \text{ordering cost per order}}{\text{carrying cost p.u.p.a.}}}$$

$$= \sqrt{\frac{2 \times (50 \text{ items per day} \times 300 \text{ days}) \times ₹ 50}{(₹ 0.02 \times 300 \text{ days})}}$$

$$= \sqrt{\frac{2 \times 15000 \text{ items} \times ₹ 50}{₹ 6}} = 500 \text{ items}$$

### ② Re-order level

$$= (\text{Maximum usage rate} \times \text{Maximum leadtime})$$

$$= (50 \text{ items per day} \times 32 \text{ days})$$

$$= 1600 \text{ items}$$

Note: It is assumed there are 300 working days in a year. Also given carrying cost of ₹ 0.02 is assumed to be per unit per working day.

**Question 17:**

Globe Ltd. produces a product which has a monthly demand of 2,000 units. The product requires a component X which is purchased at ₹20. For every finished product, two units 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?

① Calculation of Economic order quantity (E.O.Q.)

$$EOQ = \sqrt{\frac{2 \times \text{Annual requi. of raw material} \times \text{ordering cost per order}}{\text{carrying cost p.u.p.a.}}}$$

$$= \sqrt{\frac{2 \times (2000 \text{ units} \times 2 \text{ compo p 4} \times 12 \text{ months}) \times ₹ 120}{₹ 20 \times 10\%}}$$

$$= \sqrt{\frac{2 \times 48000 \text{ components} \times ₹ 120}{₹ 2}} = 2400 \text{ components}$$

② calculation of Extra cost company has to incur if order size is 4000 components instead of 2400 components

particulars	order size	
	2400 units (E.O.Q)	4000 units
Ⓐ No of orders to be placed in a year	20 orders $= (48000/2400)$	12 orders $= (48000/4000)$
Ⓑ Total ordering cost for the year (₹) $(9 \times 120)$	2,400	1,440
Ⓒ Avg stock = order sizes	1200 units	2000 units
Ⓓ Total carrying wst for the year (₹) $(9 \times 2)$	2,400	4,000
Ⓔ Total Relevant ordering & carrying cost for the year (₹) (btd)	4,800	5,440
Ⓕ Extra cost		640 $(5440 - 4800)$

$$\begin{aligned} \textcircled{3} \text{ Minimum carrying cost, the company has to incur} \\ &= \text{Total carrying cost when FIFO model is followed} \\ &= ₹24001 \end{aligned}$$

**Question 18:**

The following data are available in respect of material X for the year ended 31<sup>st</sup> March, 2025.

Particulars	₹
Opening stock	90,000
Purchases during the year	2,70,000
Closing Stock	1,10,000

Calculate:

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

① calculation of inventory turnover ratio for material - X

$$\begin{aligned} &= \left[ \frac{\text{cost of raw material consumed during the year}}{\text{Avg stock held during the year}} \right] \\ &= \left[ \frac{(\text{op stock} + \text{purchases} - \text{cl. stock})}{\text{op stock} + \text{cl. stock}} \right] = \left[ \frac{(\text{₹}90,000 + \text{₹}2,70,000 - \text{₹}1,10,000)}{(\text{₹}90,000 + \text{₹}1,10,000)} \right] \\ &= \left[ \frac{\text{₹}2,50,000}{\text{₹}2,00,000} \right] = 2.50 \text{ times} \end{aligned}$$

② The number of days for avg. inventory is held

$$= \left( \frac{365 \text{ days}}{\text{Inventory turnover ratio}} \right) = \left( \frac{365}{2.50} \right)$$

$$= 146 \text{ days}$$

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## Question 19:

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

Particulars	₹
Chemical A: 10,000 lbs at ₹10 per lb.	1,00,000
Chemical B: 8,000 lbs. at ₹13 per lb.	1,04,000
Sales tax @ 10%	20,400
Railway freight	3,840
Total cost	2,28,240

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

Statement showing calculation of rate per lb for each chemical

particulars	chemical-A	chemical-B
a) purchase cost (E)	1,00,000	1,04,000
b) sales tax (ax 10%) (E)	10,000	10,900
c) Railway freight apportioned in the ratio of quantity 10,000 : 8,000 = 5 : 4 (E)	2,133.33 (3840 × 5/9)	1,706.667 (3840 × 4/9)
d) Total landed cost (at btc) (E)	1,12,133.33	1,16,106.667
e) Quantity purchased (lbs)	10,000	8,000
f) shortage due to normal breakage (lbs)	500	320
g) Balance quantity (e-f)	9,500	7,680
h) provision for further deterioration (g × 2%)	190	153.60
i) Effective Quantity (lbs) (g-h)	9,310	7,526.40
j) Rate per lb (d/i) (E)	12.04	15.43

## Question 20:

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:

Invoice	₹
200 units Part No. A 32 @ ₹5	1,000.00
(-) 20% discount	200.00
Balance cost	800.00
(+) Goods & Service Tax @18%	144.00
Subtotal	944.00
(+) Packing charges (5 non-returnable boxes)	50.00
Total	994.00

## Notes:

- (i) A 2 percent discount will be given for payment in 30 days.  
(ii) Documents required for claiming GST credit are enclosed

(Trade discount is given for Bulk buying & cash)  
discount is given for prompt payment cashy

statement showing calculation of price p.u. at which 200 units of part A-32 will enter the store ledger card

particulars	Amount (₹)
(a) Basic cost (200 units of part A-32 X ₹5)	1,000
(b) Trade discount (20%)	200
(c) Net cost (a-b)	800
(d) packing charges of 5 non-returnable boxes	50
(e) Total cost of 200 units of part A-32 (Std) (LANDED COST)	850
(f) PRICE p.u. at which 200 units of part A-32 will enter the store ledger card $\frac{850}{200} = 4.25$	4.25

NOTES : ① 2% cash discount won't affect the landed cost & cash discount is an item purely financial in nature

② GST (input tax credit) on purchase of raw material is not included in landed cost as ITC (input tax credit) can be availed.

**Question 21:**

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.

① calculation of Economic order Quantity (EOQ)

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

$$= \sqrt{\frac{2 \times 36000 \times 25}{0.20}}$$

$$= 3000 \text{ units}$$

where

A = Annual requirement of raw material  
= 36,000 units

O = ordering cost per order = ₹ 25

C = carrying cost p.u.p.a. = ₹1 × 20%  
= ₹ 0.20

② Statement showing calculation of saving in inventory management cost if company follows EOQ policy instead of present policy of 6000 units per order

particulars	order size	
	6000 Units (current policy)	3000 units (EOQ policy)
(a) Total purchase cost for the year (₹)	36,000 (36,000 units × ₹1)	36,000 (36,000 units × ₹1)
(b) No. of orders to be placed in a year	6 orders (36,000 / 6,000)	12 orders (36,000 / 3,000)
(c) Total ordering cost for the year (₹)	150	300
(d) Avg stock = (order size / 2)	3,000 units	1,500 units
(e) Total carrying cost for the year (₹)	600	300
(f) Total inventory mgmt cost for the year (₹)	36,750	36,600
(g) Net saving if company follows policy of EOQ		₹ 36,750 - 36,600 = ₹ 150

**Question 22:**

A Company manufactures a special product which requires a component 'Alpha'. The following particulars are collected for the year 2019:

- (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%

↑ Raw material

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.

**① Calculation of Economic order quantity (EOQ)**

$EOQ = \sqrt{\frac{2AO}{C}}$	where
	A = Annual requirement of component Alpha = 8,000 units
$EOQ = \sqrt{\frac{2 \times 8,000 \times ₹ 200}{₹ 80}}$	o = ordering cost per order = ₹ 200
= 200 units of compo Alpha	c = carrying cost p.u.p.a. = ₹ 400 × 20% = ₹ 80

**② Evaluation of proposal of quantity discount**

particulars	order size	
	200 units (EOQ)	4000 units
a) purchase price per unit of component - Alpha (₹)	400	384 [400 - 4% (100)]
b) Total purchase cost for the year (₹) (a × 8000 units)	32,00,000	30,72,000 (32,00,000 - 4%)
c) No. of orders to be placed in a year = $\frac{8000 \text{ units}}{\text{order size}}$	40 orders (8000/200)	2 orders (8000/4000)
d) Total ordering cost for the year (₹ 200 × c) (₹)	8,000	400

e) carrying cost p.u. P. 9. (a x 20%)	80.00	76.80
f) Avg stock = order size / 2	100 units	2000 units
g) Total carrying cost for the year (ext) (₹)	8,000	1,53,600
h) Total inventory management cost for the year (₹) (b + d + g)	32,16,000	32,26,000
i) Extra cost		= ₹ 32,26,000 - ₹ 32,16,000 = ₹ 10,000/-

considering extra cost of ₹ 10,000/-, we advise to reject the offer of quantity discount.

**Question 23:**

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:**

- Compute EOQ for Super Grow and Nature's own.
- 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?
- For the EOQ, compute the number of deliveries per year for Super Grow and Nature's own.

Statement showing calculation of Economic order quantity, Total ordering cost p.a., Total carrying cost p.a., Number of deliveries in a year

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## Question 24:

From the details given below, calculate:

- Re-ordering level
- Maximum level
- Minimum level
- 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.

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

① calculation of Economic order quantity (i.e. EOQ OR ROQ)

$$EOQ = \sqrt{\frac{2 \times \text{Annual requirement of raw material} \times \text{ordering cost per order}}{\text{carrying cost p.u.p.a.}}}$$

$$= \sqrt{\frac{2 \times 5000 \text{ units} \times ₹ 20}{₹ 5}} = 200 \text{ units}$$

② Avg consumption rate =  $\frac{(\text{Mini consumption rate} + \text{Max consumption})}{2}$

$$15 \text{ units} = \frac{\text{Mini consumption rate} + 20}{2}$$

$$\therefore \text{Minimum consumption rate} = (15 \times 2) - 20 = 10 \text{ units per day}$$

③ i) Re-ordering Level (ROL) = (Max usage rate × Max lead time)

$$= (20 \text{ units per day} \times 15 \text{ days}) = 300 \text{ units}$$

ii) Maximum Level = ROL - (Min. usage × Min. Lead time) + EOQ

$$= 300 \text{ units} - (10 \text{ units per day} \times 5 \text{ days}) + 200 \text{ units} = 450 \text{ units}$$

iii) Minimum Level = ROL - (Avg usage rate × Avg lead time)

$$= 300 \text{ units} - (15 \text{ units per day} \times 10 \text{ days}) = 150 \text{ units}$$

iv) Danger Level = Avg consumption rate × Emergency delivery time

$$\text{Contact no. 7774060125/126} \\ 15 \text{ units per day} \times 4 \text{ days}$$

$$= 60 \text{ units}$$

**Question 25:**

From the following data for the year ended 31<sup>st</sup> December, 2026, calculate the inventory turnover ratio of the two items and put forward your comments on them.

	Material A (₹)	Material B (₹)
Opening stock 1.1.2026	10,000	9,000
Purchase during the year	52,000	27,000
Closing stock 31.12.2026	6,000	11,000

statements showing calculation of inventory turnover ratio, no. of days for which avg. inventory is held

particulars	Material A	Material-B
a opening stock as on 1.1.2026	₹ 10,000	₹ 9,000
b purchases during the year	₹ 52,000	₹ 27,000
c closing stock as on 31.12.2026	₹ 6,000	₹ 11,000
d cost of material consumed during the year (a+b-c)	₹ 56,000	₹ 25,000
e Avg stock held during the year (a+c)/2	₹ 8,000	₹ 10,000
f Inventory turnover ratio (d/e)	7.00 times	2.50 times
g No. of days for which avg inventory is held (365/f)	52 days (approx)	146 days

From above it is clear that raw material-A is fast moving in comparison with raw material-B.

**Question 26:**

RST Limited has received an offer of quantity discount on its order of materials as under:

Price per ton (₹)	Order Size (in ton)
9,600	Less than 50
9,360	50 and less than 100
9,120	100 and less than 200
8,880	200 and less than 300
8,640	300 and above

price-breaks

The annual requirement for the material is 500 tons. The ordering cost per order is ₹12,500 and the stock holding cost is estimated at 25% of the material cost per annum.

**Required :**

- (i) Compute the most Economical Purchase - [www.perceptforca.com](https://www.perceptforca.com) - 7774060125/126
- (ii) Compute EOQ if there are no quantity discounts and the price per ton is ₹10,500.



① Statement showing calculation of total inventory management cost for each order size

order size (tons)	purchase price per ton (₹)	Total purchase cost for the year (₹)	no. of orders to be placed in a year	Total carrying cost p.u.p.a. (₹)	Avg. stock (tons)	Total carrying cost for the year (₹)	Total inventory management cost for the year (₹)
(a)	(b)	(c)	(d)	(e)	(g)	(h)	(i)
25	9,600	48,00,000	20	25,000	12.50	30,000	50,80,000
50	9,360	46,80,000	10	1,25,000	25	58,500	48,63,500
100	9,120	45,60,000	5	62,500	50	1,14,000	47,36,500
200	8,880	44,40,000	2.50	31,250	100	2,22,000	46,93,250
250	8,880	44,40,000	2	25,000	125	2,77,500	47,42,500
300	8,640	43,20,000	1.6666	20,833	150	3,29,000	46,64,833
500	8,640	43,20,000	1	12,500	250	5,40,000	48,72,500

considering minimum total inventory management cost of ₹46,64,833, optimum order size is 300 tons.

② calculation of Economic order quantity (EOQ) if there are no discounts & price per ton is ₹10,500

$$EOQ = \sqrt{\frac{2 \times \text{Annual requirement of raw material} \times \text{ordering cost per order}}{\text{carrying cost p.u.p.a.}}}$$

$$= \sqrt{\frac{2 \times 500 \text{ tons} \times ₹12,500}{10,500 \times 25\%}} = \sqrt{\frac{12,500,000}{2,625}}$$

$$= 69 \text{ tons (approx)}$$

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**Question 27:**

Assume that the following quantity discount schedule for a particular bearing is available to a retail store:

Order size (unit)	Discount (%)
0 - 49	0
50 - 99	5
100 -199	10
200 and above	12

The cost of a single bearing with no discount is ₹30. The annual demand is 250 units. Ordering cost is ₹20 per order and annual inventory carrying cost is ₹4 per unit. Determine the optimal order quantity and the associated minimal total cost of inventory and purchasing costs, if shortages are not allowed.

Statement showing calculation of Total inventory management cost for each order size

order size (units)	purchase price P.u. (₹)	Total purchase cost for the year (₹)	No of orders for the year	Total ordering cost for the year (₹)	carrying cost (₹)	Avg. stock (units)	Total carrying cost for the year (₹)	Total IT. mgmt cost for the year (₹)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Adhoc	(30 discount)	$(250 \times 6)$	$(250/g)$	$= 20 \times 4$	(Given)	$(g/2)$	$= (f \times g)$	$= (c + e + h)$
25	30.00	7,500	10	200	4.00	12.50	50	7,750
50	28.50 <del>30.00</del> 8.59	7,125	5	100	4.00	25	100	7,325
100	27.00 (30-10%)	6,750	2.50	50	4.00	50	200	7,000
200	26.40 (30-12%)	6,600	1.25	25	4.00	100	400	7,025
250	26.40 (30-12%)	6,600	1	20	4.00	125	500	7,120

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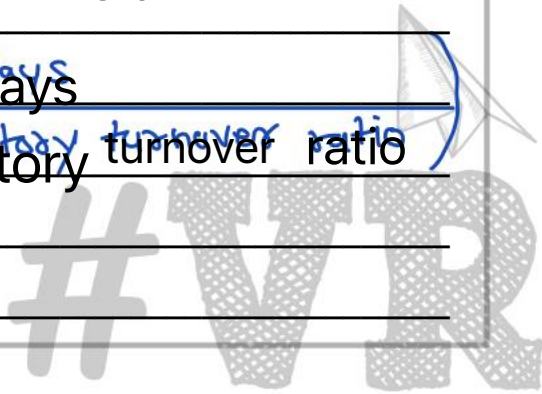
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considering Minimum total inventory management cost of ₹ 7,000 in above table, optimum order size is 100 units

### Inventory Control Ratios

Input-output ratio	Inventory turnover ratio
<p>It is the ratio of quantity of input material to output of that process/work.</p>	<p>OR Material turnover ratio</p> $= \frac{\text{Cost of raw material consumed during the period}}{\text{Avg stock held during the period}}$
<p>This ratio is helpful in comparison of</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>Standard consumption and Actual consumption</p> </div>	$= \frac{\text{Op. stock} + \text{Purchases of raw materials} - \text{Closing stock}}{\left( \frac{\text{Op stock} + \text{Cl. stock}}{2} \right)}$
<p>example : suppose in process-A 100 kgs of raw material is used &amp; output of process A is 85 kgs then we can say that input-output ratio is <math>100:85 = 20:17</math></p>	<p>this ratio is helpful in identifying slow-moving &amp; fast-moving raw materials.</p> <p>The number of days for avg. inventory is held</p>
	$= \frac{365 \text{ days}}{\text{Inventory turnover ratio}}$

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## Management & Control of Inventory

① **Material control** : it is defined by ISMA as " the function of ensuring that sufficient goods (raw material) are retained in stock to meet all the requirements of production without carrying unnecessary larger stocks "

② Annual requirement of Raw material -  $P = 1,20,000$  kgs

order size = Quantity to be ordered in one purchase order

order size	no of purchase orders in a year	Annual purchase cost	Total ordering cost per year	Total carry. cost per year
small	↑	more	more	Less
Big	↓	comparatively less because of discount	less	more

Question in front of mgmt is, what Quantity should be ordered in one purchase order?

⇒ The order size which minimizes inventory mgmt cost is the optimum order size.

(Total inventory management cost for the year) = (Total purchase cost for the year) + (Total ordering cost for the year) + (Total carrying cost for the year)

Suppose purchase price per kg = ₹5 & supplier doesn't give any discount for bulk buying, then Annual purchase cost of 1,20,000 kgs of raw material -  $P = ₹6,00,000$  irrespective of order size.

∴ (Total inventory mgmt cost) = ₹6,09,000 + 111171 + 111171

It means we can say that : when discount for

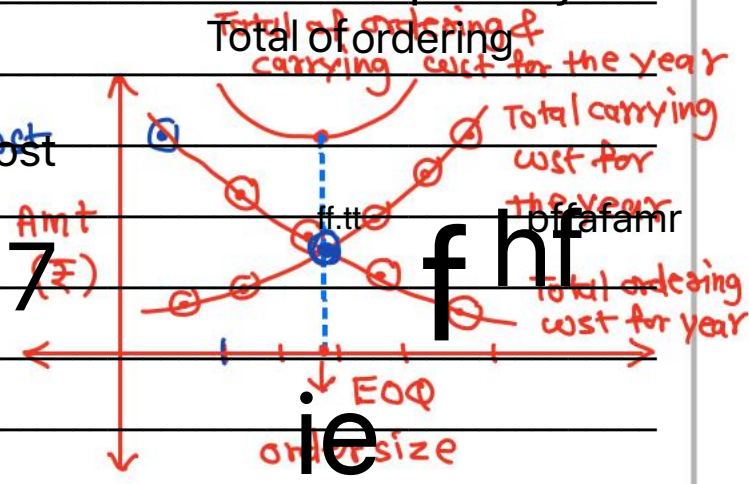
bulk is not available (there are no price breaks) then decision regarding optimum order size is based on ordering & carrying wst.

The order size that minimizes the total of ordering & carrying wst is known as Economic order quantity (EOQ)

At EOQ

① Total of ordering & carrying cost for the year is kept at minimum level

② 
$$\left( \begin{matrix} \text{Total ordering} \\ \text{cost for the} \\ \text{year} \end{matrix} \right) = \left( \begin{matrix} \text{Total carrying} \\ \text{wst for} \\ \text{the year} \end{matrix} \right)$$



③ 
$$E.O.Q = \sqrt{\frac{2 \times \text{Annual requirement of} \times \text{ordering cost per order}}{\text{carrying cost p.u.p.a.}}}$$

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

Please Do not use this formula when discounts for bulk buying are available

This formula can be used only when there are no price breaks (i.e. No discounts)

please remember

① 
$$\left( \begin{matrix} \text{Total ordering wst} \\ \text{for the year} \end{matrix} \right) = \left( \begin{matrix} \text{ordering cost} \\ \text{per order} \end{matrix} \right) \times \left( \begin{matrix} \text{No. of orders to be} \\ \text{placed in a year} \end{matrix} \right)$$

$$= \left( \begin{matrix} \text{ordering cost} \\ \text{per order} \end{matrix} \right) \times \left( \begin{matrix} \text{Annual requi of raw material} \\ \text{order size} \end{matrix} \right)$$

② 
$$\left( \begin{matrix} \text{Total carrying wst} \\ \text{for the year} \end{matrix} \right) = \left( \begin{matrix} \text{carrying cost} \\ \text{p.u.p.a.} \end{matrix} \right) \times \left( \begin{matrix} \text{Avg} \\ \text{stock} \end{matrix} \right)$$

$$= \left( \begin{matrix} \text{carrying cost} \\ \text{p.u.p.a.} \end{matrix} \right) \times \left( \frac{\text{order size}}{2} \right)$$

③ 
$$\left( \begin{matrix} \text{Total inventory} \\ \text{wst for the year} \end{matrix} \right) = \left( \begin{matrix} \text{Total purchase} \\ \text{wst for the year} \end{matrix} \right) + \left( \begin{matrix} \text{Total ordering} \\ \text{wst for the year} \end{matrix} \right) + \left( \begin{matrix} \text{Total carrying} \\ \text{wst for the year} \end{matrix} \right)$$

## Question 28:

Opening Stock of Raw Materials = ₹ 40,000  
 Purchases during the year = ₹ 1,00,000  
 Closing Stock for the year = ₹ 10,000

Find:

- A) Inventory Turnover Ratio  
 B) No. of the days for which Avg. inventory is held.

Statement showing calculation of Inventory turnover ratio, No. of days for which avg. inventory is held

particulars	Amount (₹)
(a) opening stock of raw material	40,000
(b) purchases during the year	1,00,000
(c) closing stock for the year	10,000
(d) Raw material consumed during the year I.L. matel	1,30,000
(e) Avg stock held during the period (a+c)/2	25,000
(f) inventory turnover ratio (d/e)	5.20 times
(g) Number of days for which avg. inventory is held (365/f)	70 days (approve)

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## Question 29:

Total requirement of raw material = 12,000 units p.a. Purchase Cost p.u. = ₹ 10  
 Carrying Cost p. u = 2% of purchase cost  
 Find - Economic order quantity, if ordering cost per order is ₹ 75

### calculation of Economic order quantity (EOQ)

$$EOQ = \sqrt{\frac{2 \times \text{Annual requirement of raw material} \times \text{ordering cost per order}}{\text{carrying cost p.u.p.a.}}}$$

$$= \sqrt{\frac{2 \times 12000 \text{ units} \times ₹ 75}{₹ 10 \times 0.02}} = 3000 \text{ units}$$

### cross-check

$$\text{Total ordering cost for the year} = ₹ 75 \times \left(\frac{12000}{3000}\right) \text{ orders} = ₹ 3000$$

$$\text{Total carrying cost for the year} = (₹ 10 \times 0.02) \times \frac{3000 \text{ units}}{2} = ₹ 3000$$

## Question 30:

Actual (Inventory) requirement of raw material = 25,000 units  
 Order Cost per order = ₹ 300  
 Carrying cost per unit = 1% per month  
 Purchase cost per unit = ₹ 2

- Find EOQ
- Find total inventory management cost if order size is 5,000 units & seller gives discount of 3%

### ① calculation of Economic order quantity (i.e. EOQ)

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

where A = Annual requirement of raw material = 25,000 units

$$= \sqrt{\frac{2 \times 25000 \times 300}{0.24}}$$

0 = ordering cost per order = ₹ 300

C = carrying cost p.u.p.a.

$$= 7,906 \text{ units (approx)}$$

= (₹ 2 × 1% × 12 months) = 0.24 p.u.p.a.

Note: - in the absence of any specific information, we have assumed that requirement of inventory given in the question is annual requirement

② Total inventory management cost if order size is 5000 units & seller gives 3% discount

$$\begin{aligned}
 &= \text{Total purchase cost for the year} + \left( \text{ordering cost} \times \frac{\text{No. of orders to be placed in a year}}{\text{order}} \right) + \left( \text{carrying cost} \times \frac{\text{order}}{2} \right) \\
 &= \left[ (\cancel{22} - 3\%) \times \frac{25000}{\cancel{2000}} \right] + \left[ \text{₹}300 \times \frac{25000 \text{ units}}{5000 \text{ units}} \right] + \left[ (\text{₹}1.94 \times 11.11\%) \times \frac{5000}{2} \right] \\
 &= \left[ \text{₹}1.94 \times 25000 \text{ units} \right] + \left[ \text{₹}300 \times 5 \text{ orders} \right] + \left[ \text{₹}0.2328 \times \frac{25000}{2} \right] \\
 &= \text{₹}48,500 + \text{₹}1,500 + \text{₹}582 = \text{₹}50,582
 \end{aligned}$$

### Various Inventory Levels

① Re-order Level (without safety stock)

$$= \left( \frac{\text{Maximum usage}}{\text{rate}} \times \text{Maximum lead time} \right)$$

(Lead time = Re-order period = Replenishment time)

② Re-order level (with safety stock)

$$= \left( \frac{\text{Avg usage}}{\text{rate}} \times \frac{\text{Avg lead time}}{\text{time}} \right) + \text{safety stock}$$

③ Maximum Level

$$= \text{Re-order level} - \left( \frac{\text{Minimum usage}}{\text{rate}} \times \frac{\text{Minimum lead time}}{\text{time}} \right) + \text{EOQ}$$

④ Minimum Level

$$= \text{Re-order Level} - \left( \frac{\text{Avg. Usage}}{\text{rate}} \times \frac{\text{Avg. Lead time}}{\text{time}} \right)$$

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⑤ Average Level

$$= \left( \frac{\text{Minimum stock level} + \text{Maximum stock Level}}{2} \right)$$

$$= \text{Minimum stock Level} + \left( \frac{\text{ROQ}}{2} \right)$$

These 2 formulae can give different answer

⑥ Danger Level

$$= \left( \frac{\text{Avg consumption rate}}{\text{Aug}} \times \text{Emergency delivery time} \right)$$

$$\text{ROQ} = \text{Re-order quantity} = \text{order size}$$

### Question 31:

Particulars	Minimum	Average	Maximum
Usage Rate (kgs/day)	10	12	14
Lead Time (Days)	2	3	4

ROQ = 300 Kgs

Find: a) ROL; b) Maximum Level; c) Minimum Level; d) Average Level

① Re-order Level (ROL)

$$= \left( \text{Maximum usage rate} \times \text{Maximum lead time} \right)$$

$$= 14 \text{ kgs per day} \times 4 \text{ days} = 56 \text{ kgs}$$

② Maximum Level = ROL - (Min usage rate x Min lead time) + ROQ

$$= 56 \text{ kgs} - (10 \text{ kgs per day} \times 2 \text{ days}) + 300 \text{ kgs} = 336 \text{ kgs}$$

③ Minimum Level = ROL - (Avg usage rate x Avg lead time)

$$= 56 \text{ kgs} - (12 \text{ kgs per day} \times 3 \text{ days}) = 20 \text{ kgs}$$

④ Average Level =  $\left( \frac{\text{Minimum Level} + \text{Maximum level}}{2} \right) = \frac{20 \text{ kgs} + 336 \text{ kgs}}{2}$

$$= 178 \text{ Kgs} \quad \text{ORO}$$

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$$\text{Average Level} = \text{Minimum} + \left( \frac{\text{ROQ}}{2} \right) = 20 \text{ kgs} + \left( \frac{300 \text{ kgs}}{2} \right) = 170 \text{ kgs}$$

Write down the difference between ROL & ROQ

ROL = Re-order Level	ROQ = Re-order quantity
① ROL = $(\text{Maximum Usage} \times \text{Maximum Lead time})$ 1 Qmate x 1 mine	① ROQ (Generally EOQ) = $\sqrt{\frac{2AO}{C}}$
② It is the inventory level at which new purchase procedure should be initiated	② It is the quantity of raw material to be ordered in one purchase order.
③ It answers the question: When to place new purchase order?	③ It answers the question: What quantity to be purchased in one purchase order?

**Question 32:**

A publishing house purchases 72,000 rims of a special type of paper per annum at cost ₹90 per rim. Ordering Cost per order is ₹500 and the carrying cost is 5% per year of the inventory cost. Required:

- Calculate the Economic Order Quantity (EOQ)
- If 1% quantity discount is offered by the supplier for purchases in lots of 18,000 rims or more, should the Publishing House accept the proposal?

① calculation of Economic order quantity (EOQ)

$EOQ = \sqrt{\frac{2A \cdot O}{C}}$	where
$= \sqrt{\frac{2 \times 72000 \times 500}{4.50}}$	A = Annual requirement of rims = 72000 rims
$= 4000 \text{ rims}$	O = ordering cost per order = ₹500
	C = carrying cost p.u.p.a. = ₹90 × 5% = ₹4.50

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## ② Evaluation of proposal of Quantity discount

	order size	
	4000 rims (₹88)	18,000 rims (₹91)
a) purchase price per rim (₹)	90.00	89.10
b) Total purchase cost for the year (ax 72000 rims) (₹)	64,80,000	64,15,200
c) No. of orders to be placed in a year	18 orders (72000/4000)	4 orders (72000/18000)
d) Total ordering cost for the year (₹500xc) (₹)	9,000	2,000
e) carrying cost p.u.p.a. (₹) (axsi)	4.50	4.455
f) Avg. stock = (order size/k)	2000 rims (4000/2)	9,000 rims (18,000/2)
g) Total carrying cost for the year (ext)	9,000	40,095
h) Total inventory mgmt cost for the year (b+stg)	64,98,000	69,57,295
i) Saving if proposal of quantity discount is accepted		= ₹64,98,000 - ₹69,57,295 = ₹40,705

From above table, It is clear that publishing house should accept the proposal of quantity discount in order to save ₹40,705 in inventory management cost.

## Question 33:

Annual requirement of raw material = 20,000 units  
 Ordering cost per order = ₹100  
 Purchase cost per unit = ₹1,000  
 Carrying cost p.u.p.a = 10%

Calculate -

- EOQ
- Total Inventory Management Cost
- Total ordering and carrying cost for the year, if the company follows EOQ

### ① calculation of Economic order quantity (E.O.Q.)

$$\begin{aligned} \text{E.O.Q.} &= \sqrt{\left( \frac{2 \times \text{Annual requirement of raw material} \times \text{ordering cost per order}}{\text{carrying cost p.u.p.a.}} \right)} \\ &= \sqrt{\frac{2 \times 20,000 \text{ units} \times ₹100}{₹1000 \times 10\%}} \\ &= 200 \text{ units} \end{aligned}$$

### ② i) Total ordering cost for the year

$$\begin{aligned} &= \text{ordering cost per order} \times \text{No of orders to be placed in a year} \\ &= ₹100 \times \left( \frac{20,000 \text{ units}}{200 \text{ units per order}} \right) = ₹100 \times 100 \text{ orders} \\ &= ₹10,000 \end{aligned}$$

### ii) Total carrying cost for the year

$$\begin{aligned} &= \text{carrying cost p.u.p.a.} \times \left( \frac{\text{order size}}{2} \right) \\ &= (₹1000 \times 10\%) \times \frac{200 \text{ units}}{2} = ₹10,000 \end{aligned}$$

### iii) Total inventory management cost for the year

$$\begin{aligned} &= \text{Total purchase cost} + \text{Total ordering cost} + \text{Total carrying cost} \\ &= (₹1000 \times 20,000 \text{ units}) + ₹10,000 + ₹10,000 \end{aligned}$$

$$= ₹2,00,20,000$$

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## Question 34:

From the following data about raw material X,  
Calculate -

- 1) Re-order Level;
- 2) Maximum Level;
- 3) Minimum Level;
- 4) Average Level

Particulars	Minimum	Average	Maximum
Usage Rate (Kgs/day)	100	150	200
Lead Time (Days)	25	30	35

Reorder Quantity = 10,000 kgs.

### Calculation of various inventory Levels

$$\text{i) Re-order Level (ROL) (without safety stock)} = \frac{\text{Maximum usage} \times \text{Maximum Lead time}}{\text{Maximum usage rate}}$$

$$= 200 \text{ kgs per day} \times 35 \text{ days}$$

$$= 7,000 \text{ kgs}$$

$$\text{ii) Maximum Level} = \left( \text{Re-order level} - \left( \frac{\text{Minimum usage} \times \text{Minimum lead time}}{\text{Maximum usage rate}} \right) \right) + \text{ROL}$$

$$= 7,000 \text{ kgs} - \left( 100 \text{ kgs per day} \times 25 \text{ days} \right) + 10,000 \text{ kgs}$$

$$= 14,500 \text{ kgs}$$

$$\text{iii) Minimum Level} = \text{ROL} - \left( \frac{\text{Avg usage rate} \times \text{Avg lead time}}{\text{Avg usage rate}} \right)$$

$$= 7,000 \text{ kgs} - \left( 150 \text{ kgs per day} \times 30 \text{ day} \right)$$

$$= 2,500 \text{ kgs}$$

$$\text{iv) a) Avg Level} = \frac{\text{Minimum Level} + \text{Maximum Level}}{2} = \frac{2,500 \text{ kgs} + 14,500 \text{ kgs}}{2}$$

$$= 8,500 \text{ kgs}$$

$$\text{b) Avg Level} = \text{Minimum Level} + \frac{\text{ROL}}{2}$$

$$= 2,500 \text{ kgs} + \frac{10,000 \text{ kgs}}{2}$$

$$= 7,500 \text{ kgs}$$

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**Question 35:**

Compute EOQ and the Total Variable Cost for the following:

- ♦ Annual Demand = 5,000 units
- ♦ Unit Price = ₹20.00
- ♦ Order Cost = ₹16.00 per order
- ♦ Storage Rate = 2% per annum
- ♦ Interest Rate = 12% per annum
- ♦ Obsolescence Rate = 6% per annum

} = 20% of purchase price  
 8.9% of purchase price

Determine the Total Variable Cost (Total inventory management cost) that would result for the items if an incorrect price of ₹12.80 is used.

① calculation of Economic order Quantity (EOQ)

$$EOQ = \sqrt{\frac{2 \times \text{Annual requirement of raw material} \times \text{ordering cost per order}}{\text{carrying cost p.u.p.a.}}}$$

$$= \sqrt{\frac{2 \times 5000 \text{ units} \times ₹ 16}{₹ 20 \times (2 + 12 + 6) \%}} = \sqrt{\frac{1,60,000}{₹ 20 \times 20\%}}$$

$$= \sqrt{\frac{1,60,000}{4}} = 200 \text{ units}$$

② Statements showing calculation of total variable cost (ie. Total inventory management cost)

particulars	with correct price of ₹20 p.u.	with incorrect price of ₹12.80 p.u.
(a) Total purchase cost for the year (₹)	1,00,000 (5000 × ₹20)	64,000 (5000 × ₹12.80)
(b) Economic order quantity	200 units	$\sqrt{\frac{2 \times 5000 \times 16}{20 \times 20\%}}$ 128.841
(c) No. of orders to be placed in a year (5000/b)	25 orders	20 orders
(d) Total ordering cost for the year (ex 16) (₹)	400	320
(e) Total carrying cost for the year (₹) = (carrying cost p.u.p.a. × order size)	400	320
(f) Total inventory management cost for the year (₹) (at rate)	100,800 (100,000 + 800)	64,640 (64,000 + 640)

**Question 36:**

Following details are related to a manufacturing concern:

Re-order Level	1,60,000 units
Economic Order Quantity	90,000
Minimum Stock Level	100,000 units
Maximum Stock Level	1,90,000 units
Average Lead Time	6 days

Difference between Minimum lead time and Maximum lead time 4 days

**Calculate:**

- (i) Maximum consumption per day
- (ii) Minimum consumption per day

$$\text{Avg. Lead time} = \frac{\text{Minimum lead time} + \text{Maximum lead time}}{2}$$

$$6 \text{ days} = \frac{\text{Minimum lead time} + (\text{Minimum lead time} + 4)}{2}$$

$$12 = (2 \times \text{Minimum lead time}) + 4$$

$$\therefore \text{Minimum lead time} = (12 - 4) / 2 = 4 \text{ days}$$

$$\therefore \text{Maximum lead time} = 4 + 4 = 8 \text{ days}$$

$$\text{Re-order Level} = \text{Maximum consumption rate per day} \times \text{Maximum lead time}$$

$$1,60,000 \text{ units} = \text{Maximum consumption rate per day} \times 8 \text{ days}$$

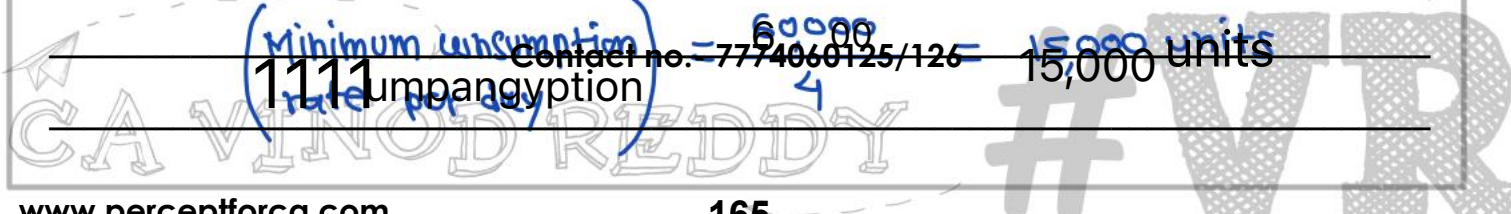
$$\therefore \text{Maximum consumption rate per day} = 20,000 \text{ units}$$

$$\text{Maximum stock Level} = \text{ROL} - \left( \frac{\text{Minimum consumption rate per day} \times \text{Minimum lead time}}{1} \right) + \text{EOQ}$$

$$1,90,000 \text{ units} = 1,60,000 \text{ units} - \left( \frac{\text{Minimum consumption rate per day} \times 4 \text{ days}}{1} \right) + 90,000 \text{ units}$$

$$\left( \frac{\text{Minimum consumption rate per day} \times 4 \text{ days}}{1} \right) = 1,60,000 + 90,000 - 1,90,000 = 60,000 \text{ units}$$

$$\frac{\text{Minimum consumption rate per day}}{1} = \frac{60,000}{4} = 15,000 \text{ units}$$



## Question :

What are the assumptions underlying the formula of EOQ?

Following are the assumptions underlying the formula of EOQ :

- ① A - Annual requirement of raw material is known in advance.
- ② O - ordering cost per order is fixed & Total ordering cost is proportionate to no. of orders
- ③ C - carrying cost p.u.p.a. is fixed & known in advance
- ④ Discounts are not offered by supplier. (i.e. There are no price breaks)
- ⑤ production pattern is evenly distributed.
- ⑥ Raw material availability is un-interrupted
- ⑦ Minimum lead time is zero
- ⑧ There are no transportation cost
- ⑨ Minimum stock level is zero

Perpetual Inventory System is comprised of

1. preparation of Bin - cards.
2. preparation of store ledger cards
3. periodic physical stock taking

## Question :

What is Two Bin System?

- i) under this system each Bin is divided in 2 parts - one, the smaller part to stock the quantity equal to re-order level (or minimum level) and the other to keep remaining quantity of raw material.
- ii) Issues are made out of larger part but as soon as it becomes necessary to use quantity out of smaller portion, new purchase process will be initiated

## Question 37:

Primex Limited produces Product 'P'. It uses annually 60,000 units of a Material 'Rex' costing ₹10 per unit. Other relevant information are :

Cost of Placing an Order	₹ 800 per order
Carrying Cost	15% per annum of average inventory
Re-order Period = Lead time =	10 days
Safety Stock	600 units

The company operates 300 days in a year. You are required to calculate :

1. Economic Order Quantity of Material 'Rex'
2. Re-order Level
3. Maximum Stock Level
4. Average Stock Level

### ① Calculation of Economic order quantity (E.O.Q.)

$$E.O.Q. = \sqrt{\frac{2 \times \text{Annual requirement of Rex} \times \text{ordering cost}}{\text{carrying cost p.u.p.ch.}}}$$

(i.e. ROQ)

$$= \sqrt{\frac{2 \times 60,000 \text{ units} \times ₹ 800}{₹ 10 \times 15\%}} = 8,000 \text{ units}$$

### ② Re-order Level (with safety stock) (ROL)

$$= (\text{Avg usage rate} \times \text{Avg Lead time}) + \text{safety stock}$$

$$= \left[ \left( \frac{60,000 \text{ units}}{300 \text{ days}} \right) \times 10 \text{ days} \right] + 600 \text{ units} = 2,600 \text{ units}$$

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### ③ Maximum stock Level

$$= \text{ROL} - \left( \frac{\text{Minimum usage rate} \times \text{Minimum leadtime}}{\text{rate}} \right) + \text{ROQ}$$

$$= 2600 \text{ units} - \left( 200 \text{ units per day} \times 10 \text{ days} \right) + 8,000 \text{ units}$$

$$= 8,600 \text{ units}$$

### ④ Minimum stock Level

$$= \text{ROL} - \left( \text{Avg usage rate} \times \text{Avg lead time} \right)$$

$$= 2600 \text{ units} - \left( 200 \text{ units per day} \times 10 \text{ days} \right) = 600 \text{ units}$$

### ⑤ Average stock Level

Formula-1 =  $\frac{\text{Minimum stock Level} + \text{Max. stock Level}}{2}$

$$= \frac{600 \text{ units} + 8600 \text{ units}}{2} = 4600 \text{ units}$$

OR

Formula-2 =  $\text{Minimum stock Level} + \left( \frac{\text{ROQ}}{2} \right)$

$$= 600 \text{ units} + \left( \frac{8000 \text{ units}}{2} \right)$$

$$= 4,600 \text{ units}$$

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## Question :

What is importance of proper recording & control of Materials?

- 1) Quality of final product
- 2) price of final product
- 3) production continuity
- 4) cost of stock holding & stock out
- 5) wastages & other losses
- 6) Regular information about availability to resources  
(to the management)

## Question :

What are the objectives of system of Material Control?

- ① Minimising the interruption in production process
- ② optimisation of material cost
- ③ Reduction in wastages
- ④ Adequate information to management
- ⑤ completion of orders in time.

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**Question 38:**

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

① calculation of Economic order Quantity (EOQ)

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

where A = Annual requirement of raw material = 10,000 kgs  
 O = ordering cost per order = ₹50  
 C = carrying cost p.u.p.a. = ₹2 × 8% = ₹0.16

$$= \sqrt{\frac{2 \times 10,000 \text{ kgs} \times ₹50}{₹0.16}}$$

$$= 2,500 \text{ kgs}$$

② Number of orders to be placed in a year

$$= \left( \frac{\text{Annual requirement of raw material}}{\text{order size}} \right) = \left( \frac{10,000 \text{ kg}}{2,500 \text{ kgs}} \right) = 4 \text{ orders}$$

**Question 39:**

Two components, A and B are used as follows:

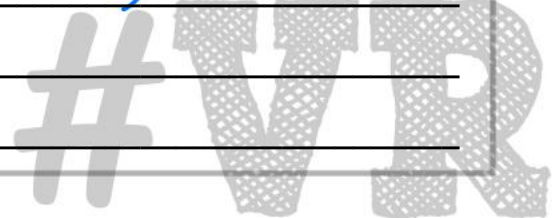
Normal usage	50 per week each
Maximum usage	75 per week each
Minimum usage	25 per week each
Re-order quantity	A: 300; B: 500
Re-order period	A: 4 to 6 weeks B: 2 to 4 weeks

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

① Re-ordering Level = (Maximum usage rate × Maximum lead time)

Raw materials A : (75 units per week × 6 weeks) = 450 units ago this  
 B : (75 units per week × 4 weeks) = 300 units

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$$\textcircled{2} \text{ Minimum Level} = \text{ROL} - \left( \frac{\text{Avg usage}}{\text{rate}} \times \text{Avg Lead time} \right)$$

Raw materials

$$A : 450 \text{ units} - (50 \text{ units per week} \times 5 \text{ weeks}) = 200 \text{ units}$$

$$B : 300 \text{ units} - (50 \text{ units per week} \times 3 \text{ weeks}) = 150 \text{ units}$$

$$\textcircled{3} \text{ Maximum level} = \text{ROL} - \left( \frac{\text{Min. usage}}{\text{rate}} \times \text{Min. Lead time} \right) + \text{ROD}$$

Raw materials

$$A : 450 \text{ units} - (25 \text{ units per week} \times 4 \text{ weeks}) + 300 \text{ units} = 650 \text{ units}$$

$$B : 300 \text{ units} - (25 \text{ units per week} \times 2 \text{ weeks}) + 500 \text{ units} = 750 \text{ units}$$

$$\textcircled{4} \text{ Avg. stock Level}$$

$$i) \frac{\text{Minimum stock Level} + \text{Maximum stock Level}}{2}$$

Raw materials

$$A : \frac{(200 + 650) \text{ units}}{2} = 425 \text{ units}$$

$$B : \frac{(150 + 750) \text{ units}}{2} = 450 \text{ units}$$

$$ii) \text{ Minimum stock Level} + \frac{\text{ROD}}{2}$$

Raw materials

$$A : 200 \text{ units} + \left( \frac{300 \text{ units}}{2} \right) = 350 \text{ units}$$

$$B : 150 \text{ units} + \left( \frac{500 \text{ units}}{2} \right) = 400 \text{ units}$$

## Question 40:

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

Item	Units	Unit cost (₹)
1	7,000	4.450
2	4,000	19.140
3	1,500	8.900
4	29,000	0.180
5	10,000	8.190
6	40,000	0.450
7	60,000	0.180
8	13,000	0.980
9	10,000	0.205
10	29,000	0.360
11	11,500	6.320
12	4,000	5.220

## Statement of Total Cost and Ranking

Item	Units	% of Total units	Unit cost (₹)	Total cost (₹)	% of Total cost	Ranking
1	7,000	3.1963	4.450	31,150	8.7557	4
2	4,000	1.8265	19.140	76,560	21.5195	2
3	1,500	0.6849	8.900	13,350	3.7524	7
4	29,000	13.2420	0.180	5,220	1.4672	11
5	10,000	4.5662	8.190	81,900	23.0205	1
6	40,000	18.2648	0.450	18,000	5.0594	6
7	60,000	27.3973	0.180	10,800	3.0357	9
8	13,000	5.9361	0.980	12,740	3.5810	8
9	10,000	4.5662	0.205	2,050	0.5762	12
10	29,000	13.2420	0.360	10,440	2.9345	10
11	11,500	5.2511	6.320	72,680	20.4289	3
12	4,000	1.8265	5.220	20,880	5.8690	5
	<b>2,19,000</b>			<b>3,55,770</b>		

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Basis for selective control (Assumed)

₹ 50,000 & above : 'A' items

₹ 13,000 to 50,000 : 'B' items

Below ₹ 13,000 : '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	5	4.5662	81,900	23.0205	
2	2	1.8265	76,560	21.5195	
3	11	5.2511	72,680	20.4289	
<b>Total</b>	<b>3</b>	<b>11.6438</b>	<b>2,31,140</b>	<b>64.9689</b>	<b>A</b>
4	1	3.1963	31,150	8.7557	
5	12	1.8265	20,880	5.8690	
6	6	18.2648	18,000	5.0594	
7	3	0.6849	13,350	3.7524	
<b>Total</b>	<b>4</b>	<b>23.9726</b>	<b>83,380</b>	<b>23.4365</b>	<b>B</b>
8	8	5.9361	12,740	3.5810	
9	7	27.3973	10,800	3.0357	
10	10	13.2420	10,440	2.9345	
11	4	13.2420	5,220	1.4672	
12	9	4.5662	2,050	0.5762	
<b>Total</b>	<b>5</b>	<b>64.3836</b>	<b>41,250</b>	<b>11.5946</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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