

Material cost

Concept - Economic Order Quantity

3 Types of Material related cost

- 1) Purchase Cost: Purchase price per unit X units to be purchased
- 2) Ordering Cost: Cost to place order till material is reached in warehouse. It includes inspection cost and transportation cost.
- 3) Carrying Cost: the firm has to incur expenses to keep it safe till use in production. Carrying cost includes
 - a) Insurance cost
 - b) Interest cost
 - c) Storage space cost
 - d) Deterioration or obsolescence Cost

Carrying Cost (%) = Insurance cost (%) + interest cost (%) + storage space cost (%) + obsolescence cost rate (%)

Annual Ordering cost = Total number of orders in a year X Ordering cost per order

$$= \frac{\text{Annual requirement of raw material (A)}}{\text{Quantity ordered each time (Q)}} \times \text{Ordering cost per order (O)} = \frac{A \times O}{Q}$$

Annual carrying cost = Average Inventory X Average carrying cost per unit

$$= \frac{\text{Quantity ordered each time (Q)}}{2} \times \text{Avg. carrying cost per unit (C)} = \frac{Q \times C}{2}$$

Note:- Safety stock:- Stock of raw material which is kept as extra to avoid interruption on production is called safety stock.

- Carrying cost of safety stock = Safety stock units x carrying cost per unit p.a.
- Ordering Cost of Safety stock = No. of orders x ordering cost per order

Note:- In case safety stock is carried forward from previous year then No. of orders for safety stock shall be zero hence ordering cost shall be zero.

Note:- in case safety stock is ordered in current year. Carrying cost of safety stock = 1 x carrying cost Per unit Per Annum.

$$\text{EOQ (Q)} = \sqrt{\frac{2 \times A \times O}{C}}$$

A = Annual requirement of raw material

O = Ordering cost per order

C = Carrying cost per unit per annum

Concept - Will EOQ size shall always be optimum order size?

- Answer is "NO". (Optimum order size is **normally** EOQ Size)
- Optimum order size may not be EQO if **discount for bulk purchase** is given. Bulk purchase means order for a size greater than EOQ size.
- Order size involving minimum material cost shall be optimum order size. (*Calculate total material cost at different order size including EOQ size)

Note:- A cost which is same under difference order size is termed as irrelevant cost hence may be ignored for decision making. Example Purchase cost, carrying cost of safety stock etc.

Concept - Frequency of order and Lead Time

- FOO is the time gap between placing two consecutive orders

$$FOO = \frac{\text{Total number of days in a year}}{\text{Total number of orders}}$$

$$\text{Total number of orders} = \frac{\text{Annual requirement of raw material (A)}}{\text{EOQ (Q)}}$$

- **Lead Time:** it is time gap between date of placing the order with supplier and date of receipt of ordered material. if order is placed on 4th Nov. 2016 and material is received on 8th Nov. 2016 then the lead time is 4 days.

Concept - Re-order Level – When to Order

- It is that level of stock of raw material at which a fresh order for raw material should be placed otherwise the firm may face stock-out situation. This level lies between maximum and minimum level.

ROL

Formula 1:- Maximum Usage X Max lead time

Formula 2:- Minimum Stock + Avg. Usage X Avg. Lead Time

Formula 3:- Safety Stock + Avg. Usage X Avg. Lead Time

(Minimum stock called safety stock)

(Sometimes safety stocks are maintained for contingent situation)

Concept – Other Stock Levels Level

- **Minimum Level:** it is that level of stock below which stock in hand of raw material should not be allowed to fall.

Min. Level

F1 - Re-order Level – Avg. Usage X Avg. Lead Time **OR**

F2 - Max. Lead Time X Max. Usage – Avg. Lead Time X Avg. Usage **OR**

F3 - Safety Stock

Answer from above formulas need not to be same.

- **Maximum level:** it is that level of stock above which stock in hand of raw material should not be allowed to exceed. Like 25 litre in car petrol.

Max. Level

F1- Re-order Level + Re-order quantity – Minimum Usage X Minimum Lead Time.

Note:- ROQ may be EOQ or any other order size.

- **Average Stock Level**

$$\text{Formula 1:- Avg. stock held by an organization} = \frac{\text{Max. Stock Level} + \text{Minimum Stock Level}}{2}$$

Formula 2 :- Min. Stock Level + $\frac{\text{Re-order Quantity}}{2}$ (Derived from carrying cost formula)

Answer from above formulas need not to be same.

- **Danger Level:-**It is the level at which raw material kept for emergency is used for production of FG (Normal issues of raw material is not possible).

Danger Level = Avg. Usage X Max. Lead Time for emergency purchase

Note - Safety Stock also called minimum stock.

Concept - Material Turnover Ratio / Inventory Turnover Ratio for raw material

It is a ratio between raw material consumed during a year and average stock of raw material maintained during the year.

MTR Formula = $\frac{\text{Raw material consumed during a year}}{\text{Avg.stock of raw material}}$

Avg. stock of raw material = $\frac{\text{Opening Stock} + \text{Closing stock}}{2}$

Raw Material holding period or Inventory Turnover period:- it is a ratio between No. of days/months in a year and MTR.

Raw Material holding period = $\frac{365 \text{ Days or } 12 \text{ months}}{\text{Material Turnover Ratio}}$

- Low MTR means High RM holding period which means high carrying cost hence unfavourable. (RM called slow moving).
- High MTR means low RM holding period which means less carrying cost hence favourable. (RM Called fast moving)

Concept - Valuation of raw material:- while calculating per unit cost of raw material purchased, some items are considered as follows:-

1. Trade Discount	Deduct from purchase price
2. Quantity Discount	Deduct from purchase price
3. Cash Discount	Not Deduct from purchase price since it is finance benefit.
4. Road Tax/Toll Tax / Octroi / Entry Tax	Add to purchase cost
5. GST	Add to purchase cost if no input tax credit availed. Unless specifically mentioned in question, it will be excluded from cost of purchase assuming that credit is available.
6. Demurrages / Detention Charges / Fine / Penalty	Deduct from purchase price since it is a penalty
7. Insurance Cost / Comm. / Brokerage Paid / Freight Inwards	Add to purchase cost
8. Cost of containers (if	<ul style="list-style-type: none"> • Add to purchase cost if it is non-returnable.

specifically charged)	<ul style="list-style-type: none"> • Don't add to purchase cost if it is returnable.
9. Normal Loss	Good units shall absorb cost of normal loss of material.

Note:- Cost per unit = $\frac{\text{Total Cost}}{\text{Total units} - \text{normal loss units}}$

Concept - How to Calculate cost of material consumed and cost of closing stock of material if material purchase prices keeps on changing

3 methods

1. FIFO (First in First Out):- Material issued for production shall be priced at the price of material purchased **first** till its quantity exhausts. When the quantity exhausts, **next** price shall be used as basis.
2. LIFO (Last in First Out):-Material issued for production shall be priced at the price of material purchased **LAST** till its quantity exhausts. When the quantity exhausts, **previous** price shall be used as basis.
3. Weighted Average method:- With every receipt of material, price is averaged and this averaged price used for issue of material till next receipt of material. On next receipt of material, average price changes. Used when difficult to identify material physically e.g. petrol storage in a tank.

Note:- We will prepare stores ledger Account to find out cost of material issued and closing stock.

Treatment of normal and abnormal loss of units in valuation

- a. Normal Loss in units :- Price per unit of remaining material shall be increased.
- b. Abnormal loss in units :- it shall be treated as issue of material. Cost of material lost shall be charged to costing P&L A/c as loss.

If given in question “Shortage will be charged as overhead” then it means cost of such issues shall be treated as overhead cost (material became indirect material cost). It is neither normal loss nor abnormal loss.

Concept - ABC ANALYSIS

ABC Analysis suggests to divide all raw material into 3 categories A, B and C. then exercise more control over A category raw material, moderate control over category B raw material and least control over category C raw material.

1. Category A consists of raw material which contain nearly around 70% of total value of raw material.
2. Category B consists of raw material which contain nearly around 20% of total value of raw material.
3. Category C consists of raw material which contain nearly around 10% of total value of raw material.

Practical steps to classify material in category A, B and C

Step 1:- Calculate value of each raw material by multiplying annual consumption of each raw material by its unit price.

Step 2:- Calculate total value of all raw materials.

Step 3:- Calculate % of value of each raw material in relation to total value of all raw materials.

Step 4:- Assign ranking to above calculated % i.e. Rank 1 to highest %, Rank 2 to second highest % and so on.

Step 5:- Classify items having nearly 70% value under category A, 20% value under category B and 10% value under category C.

Concept - Stock-out situation

When a supplier could not supply ordered units of FG then such a situation is called Stock out situation.

Stock out cost = stock out units x Stock out cost per unit x probability (%).