Material Costing

Paper 3A: Cost Accounting Chapter 2

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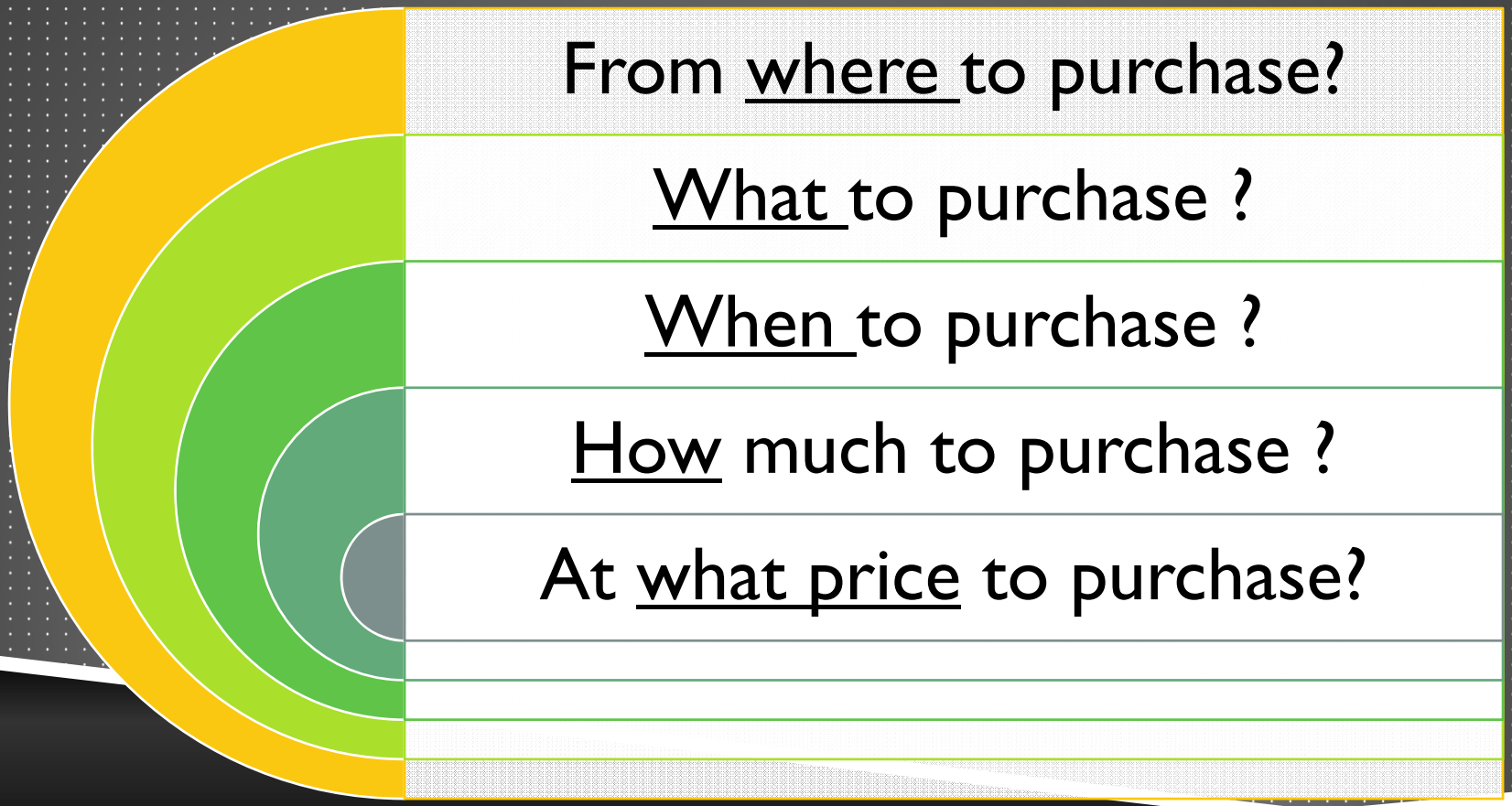
Learning Objectives

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

THE Questions faced....



Example.....

From Where To Purchase

Example

After inviting tenders, two quotations are received as follows:

Suppliers A – Rs. 2.20 per unit;

Suppliers B – Rs. 2.10 per unit plus

Rs. 2,000 fixed charges irrespective of units ordered.

Calculate the order quantity for which the purchase price per unit will be the same. Considering all factors regarding production requirements and availability of finance, the purchase officer wants to place an order for 15,000 units. Which supplier should he select?

Answer

Supplier	Variable Cost PU	Fixed Cost
Supplier A	2.20	Nil
Supplier B	2.10	2,000

Lets say at X no. of units the Total cost is same.

2.20 X = 2.10 X + 2000

X = 20,000 units

Range of Indifference

Less than 20,000 units	A
= 20,000 units	A or B
More than 20,000 units	B

Procedure .....

Procurement of Materials

Purchase Procedure

Purchase department follows the procedure involving following steps :

1. Receiving purchase requisitions.
2. Exploring the sources of materials supply and selecting suitable material suppliers.
3. Preparation and execution of purchase orders.
4. Receipt and inspection of materials.
5. Checking and passing of bills for payment.

Purchase Requisition (Stage I)

is a form used for making a formal request
to the purchasing department
to purchase materials.

Note:

1. This form is usually filled up by the store keeper for regular materials and by the departmental head.
2. The requisition form is duly signed by either works manager or plant superintendent, in addition to the one originating it.

Sources Of Material (Stages II)

Purchase department in each business house usually maintains a list of suppliers

At least three quotations are invited from such suppliers.

For selecting material suppliers the factors which the purchase department keeps in its mind are—

- price;
- quantity;
- quality offered;
- time of delivery;
- mode of transportation;
- terms of payment;
- reputation of supplier; etc.

Purchase Orders (Stage III)

It is a written request to the supplier to supply certain specified materials at specified rates and within a specified period.

Four copies of purchase order are generated and sent to:

- Supplier
- Stores department
- Receiving department
- Accounts department

Inspection of Material (Stage IV)

- The receiving department is responsible for taking charge of the incoming materials, checking and verifying their quantities, inspecting them as regards their grade, quality or other technical specifications and if found acceptable, passing them on to the stores (or other departments for which these might have been purchased).

Acceptance Testing

If everything is in order and the supply is considered suitable for acceptance, the Receiving department prepares a Receiving Report or Material Inward Note or Goods Received Note.

It is prepared in quadruplicate, the copies being distributed as under :

- Purchase department
- Stores department
- Receiving department
- Cost/Accounting department

Checking & Passing of Bills for Payment (Stage V)

The invoice received from the supplier is sent to the stores accounting section to check authenticity and mathematical accuracy.

The quantity and price are also checked with reference to goods received note and the purchase order respectively.

The stores accounting section after checking its accuracy finally certifies and passes the invoice for payment. In this way the payment is made to supplier.

Procedure .....

Material Issue

Material Requisition Note

It is the voucher of the authority as regards issue of materials for use in the factory or in any of its departments. Where a 'Materials List' has been prepared, either the whole of the materials would be withdrawn on its basis or separate materials requisitions would be prepared by the person or department and the material drawn up to the limit specified in the list. The Requisition Notes are made out in triplicate. The copies are distributed in the following manner:

- Storekeeper
- Cost Department
- Other department requiring it

Bill of Material (BOM)/ Material Specification List/ Material List

It is a schedule of standard quantities of materials required for any job or other unit of production. A comprehensive Materials List should rigidly lay down the exact description and specifications of all materials required for a job or other unit of production and also required quantities so that if there is any deviation from the standard list, it can easily be detected. The materials List is prepared by the Engineering or Planning Department in a standard form. The number of copies prepared vary according to the requirement of each business, but four is the minimum number. A copy of it is usually sent to each of the following department :

- Stores department
- Cost department
- Production department
- Planning department

Transfer of Materials

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

Transfer of Materials - 2

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

- Cost department
- Department making transfer

Some terms .....

Store records

- Bin Cards
- Stock Control Cards
- Stores Ledger

Bin Cards & Stock Control Cards

These are essentially similar, being only quantitative records of stores. The latter contains further information as regards stock on order. Bin cards are kept attached to the bins or receptacles or quite near thereto so that these also assist in the identification of stock. The Stock Control Cards, on the other hand, are kept in cabinets or trays or loose binders.

Stores Ledger

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

Concept .....

Inventory Control

Inventory Control

The main objective of inventory control is to achieve maximum efficiency in production and sales with the minimum investment in inventory. Inventory comprises of stocks of materials, components, work-in-progress, and finished products and stores and spares.

Inventory Control Techniques

- Setting of various stock levels.
- ABC analysis.
- Two bin system.
- Establishment of system of budgets.
- Use of perpetual inventory records and continuous stock verification.
- Determination of economic order quantity.
- Review of slow and non-moving items.
- Use of control ratios.

How much to order

Economic Order Quantity

- without discount
- with discount

Economic Order Quantity (EOQ)

EOQ is the size of the order which contributes towards maintaining the stocks of material at the optimal level and at a minimum cost

The formula

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

Where,

A= Annual Demand of RAW MATERIAL

O= Ordering Cost per order

C= Carrying/Holding Cost per unit p.a.

Example (without discount)

The annual consumption of a part “X” is 5000 units. The procurement cost per order is Rs. 10 and the cost per unit is Rs.0.5. The storage and carrying cost is 10% of the material unit cost.

Required:

Calculate the EOQ

Solution

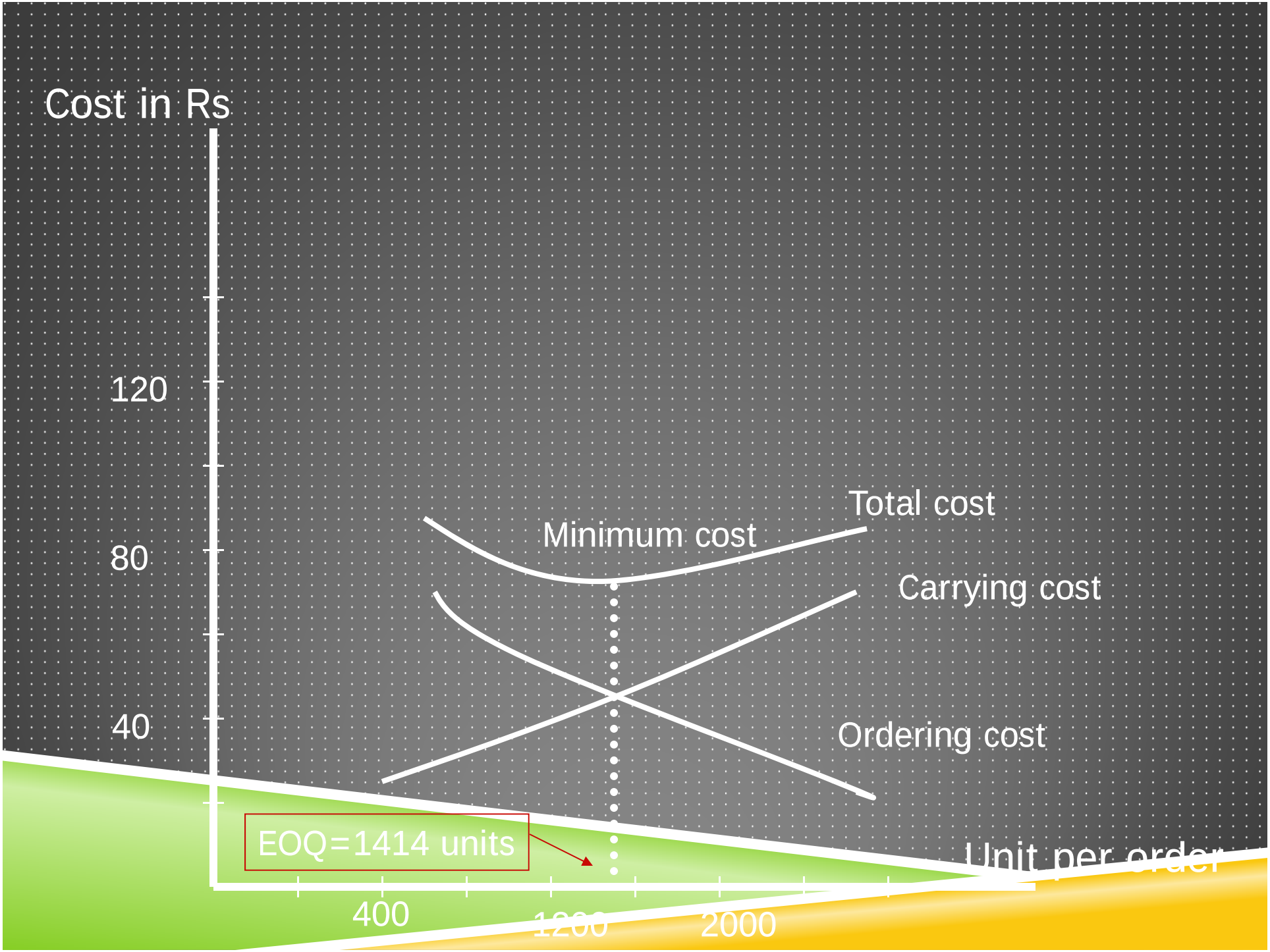
O = 10 per order

C = 10% of 0.50 i.e. 0.05

A = 5000 units

$$EOQ = \sqrt{\frac{2 \times 5000 \times 10}{0.05}}$$

= 1414 units


Cost in Rs
120
80
40
Total cost
Minimum cost
Carrying cost
Ordering cost
EOQ=1414 units
Unit per order
400
1200
2000

Graph

The graph shows the line representing ordering cost sloping downward, indicating lower cost when a large quantity is purchased and the line representing cost of carrying stock going upward, indicating a higher cost for a large quantity

Example (with discount)

JP Limited, manufacturers of a special product, follows the policy of EOQ (Economic Order Quantity) for one of its component's details are as follows:

	Rs.
Purchase Price per Component	200
Cost of an order	100
Annual cost of carrying one unit in Inventory	10% of Purchase Price
Total Cost of Carrying Inventory and ordering per annum	4,000

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

You are required to:

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

Answer

At EOQ

Holding Cost = Ordering Cost

Thus,

2,000 Rs. Each

2000 = ½ of EOQ x C

2000 = ½ of EOQ x 20

EOQ = 200 units

Continued (WN)

Also Calculating,

$$200 = \sqrt{\frac{2 \times A \times 100}{20}}$$

A = 4,000 units

Answer

	EOQ	Discount
Purchase Price	8,00,000	7,84,000
Carrying Cost	2,000	20,000
Ordering Cost	2,000	200
	8,04,000	8,04,200

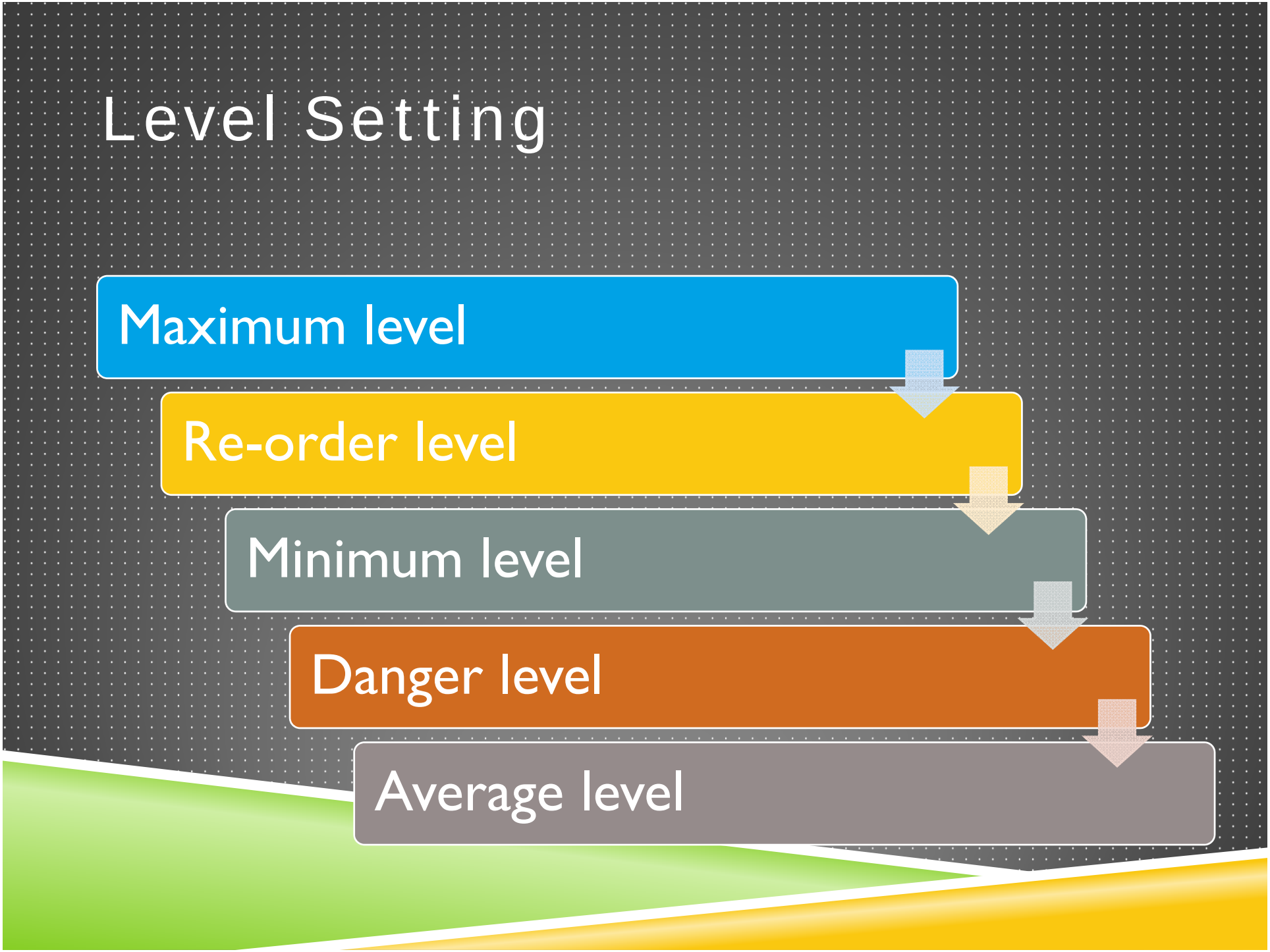
Not Acceptable

Answer

	EOQ	Discount
Purchase Price	8,00,000	7,60,000
Carrying Cost	2,000	40,000
Ordering Cost	2,000	100
	8,04,000	8,00,100

Acceptable

Level Setting



Level Setting

It is to determine the correct or most optimal stock level so as to avoid overstocking or understocking of materials

These levels are known as the Maximum, Minimum and Re-order levels

Re-order level

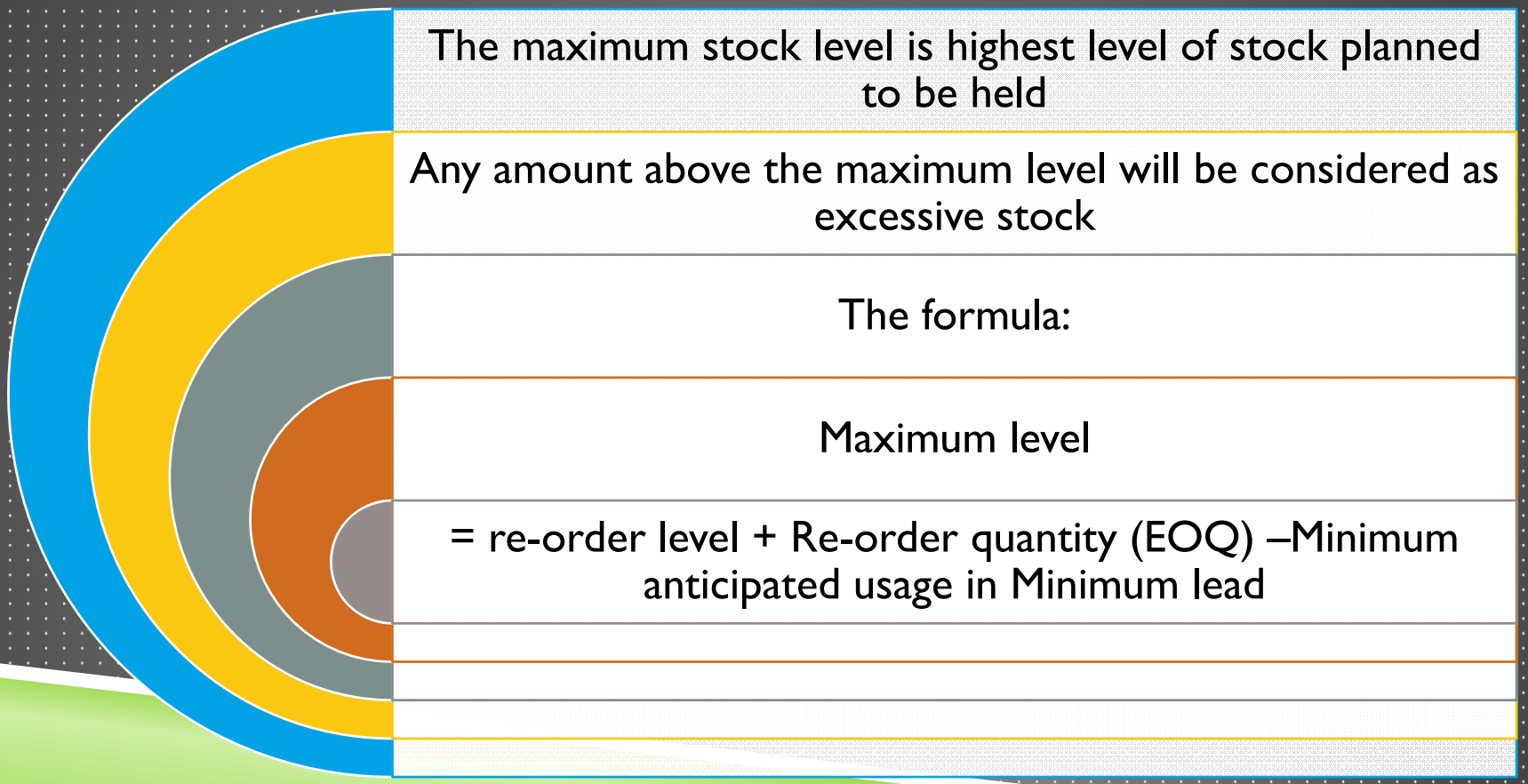
The level of stock of material at which a new order for the material should be placed

The formula:

Re-order level

=(Maximum usage * Maximum lead time)

Maximum level



Minimum Level/ Safety Stock

- The minimum level is that level of stock that provides a safety buffer in the event of increased demand or reduced receipt of stock caused by the lengthening of lead time
- The stock level should not be allowed to fall below the safety stock
- The formula:
- Minimum level=
- Re-order level – Average usage in average lead time

Average Inventory Level

This level of stock may be determined by using the following formula :

Average inventory level

= Minimum level + 1/2 Re-order quantity

Danger level

It is the level at which normal issues of the raw material inventory are stopped and emergency issues are only made.

Danger level

= Average consumption × Lead time for emergency purchases


Levels
Units
1500
1000
500
Maximum level
Reorder level
Minimum level
Weeks

Example

Average usage	100 units per week
Minimum usage	70 units per week
Maximum usage	140 units per week
Lead time	
(the time between ordering and replenishment of goods)	3-5 weeks
Ordering cost per order	180
Annual cost of carrying a unit in stock	5.2

Required

Calculate:

- Economic Order Quantity (EOQ)
- Reorder level
- Minimum level
- Maximum level

Answer

- Economic Order Quantity (EOQ)

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

$$EOQ = \sqrt{\frac{2 \times 180 \times 5200}{5.2}}$$

= 600 units

Reorder level

Re-order level
= (Maximum consumption X Maximum re-order period)
= 140 units X 5
= 700 units

Minimum level

Minimum level
= Re-order level – Average usage in average lead time
= 700 units – (100 units X 4)
= 300 units

Maximum level

Maximum level
= re-order level + EOQ –Minimum anticipated usage in Minimum lead

= 700 units +600 units – (70 units X 3)
= 1090 units

Example

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	Rs. 20.
Number of units to be purchased during the year is	5,000.
Purchase price per unit inclusive of transportation cost is	Rs.50.
Annual cost of storage per unit is	Rs. 5.

Details of lead time: Average 10 days, Maximum 15 days, Minimum 6 days. For emergency purchases 4 days.

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

Answer

$$EOQ = \sqrt{\frac{2 \times 5000 \times 20}{5}}$$

= 200

Re- order level

= Max Usage x Max re order period

= 15 x 20 = 300 units

Answer

Maximum Level
= Re- order level + EOQ – Min usage x min re order period
= 300 + 200 – 10 x 6
= 440 units
Minimum Level
= Re order level – Avg usage x Avg re order period
= 300 – 15 x 10 = 150 units
Danger Level
= 15 x 4 = 60 units

ABC Analysis

ABC Analysis

This system exercises discriminating control over different items of stores classified on the basis of the investment involved. Usually the items are divided into three categories according to their importance, namely, their value and frequency of replenishment during a period.

A Category

‘A’ Category of items consists of only a small percentage i.e., about 10% of the total items handled by the stores but require heavy investment about 70% of inventory value, because of their high prices or heavy requirement or both.

B Category

‘B’ Category of items are relatively less important; they may be 20% of the total items of material handled by stores. The percentage of investment required is about 20% of the total investment in inventories.

C Category

‘C’ Category of items do not require much investment; it may be about 10% of total inventory value but they are nearly 70% of the total items handled by store.

Example

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

No. of varieties of inventory	***%***	***% value of inventory holding (average)***	***% of inventory usage (in end-product)***
3,875	96.875	20	5
110	2.750	30	10
15	0.375	50	85
4,000	100.00	100	100

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

Solution

15 number of varieties of inventory items should be classified as ‘A’ category items because of the following reasons :

1. Constitute 0.375% of total number of varieties of inventory handled by stores of factory, which is minimum as per given classification in the table.
2. 50% of total use value of inventory holding (average) which is maximum according to the given table.
3. Highest in consumption about 85% of inventory usage (in end-product).

Solution - 2

110 number of varieties of inventory items should be classified as ‘B’ category items because of the following reasons :

(i) Constitute 2.750% of total number of varieties of inventory items handled by stores of factory.

(ii) Requires moderate investment of about 30% of total use value of inventory holding (average).

(iii) Moderate in consumption about 10% of inventory usage (in end–product).

Solution - 3

3,875 number of varieties of inventory items should be classified as ‘C’ category items because of the following reasons:

(i) Constitute 96.875% of total varieties of inventory items handled by stores of factory.

(ii) Requires about 20% of total use value of inventory holding (average).

(iii) Minimum inventory consumption i.e. about 5% of inventory usage (in end-product).

An Introduction

Two Bin System

Two bin system:

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

- Review of Slow and Non moving items

Review of slow and non-moving items:

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

- Use of Ratios

Use of control ratios

Input output ratio:

Inventory control can also be exercised by the use of input output ratio analysis. Input-output ratio is the ratio of the quantity of input of material to production and the standard material content of the actual output.

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

Example

- A chemical manufacturing unit uses ingredient. A as the basis material. The cost of the material is Rs. 20 per kg. and the Input-Output ratio is 120%. Due to a sudden shortage in the market the material becomes non-available and the unit is considering the use of one of the following substitutes available:

Material	***I-O Ratio***	***Rs. per kg.***
B 1	135%	26.00
B 2	115%	30.00

You are required to recommend which of the above substitutes is to be used. Also indicate additional cost required to be incurred.

Answer

	A	B 1	B 2
Input output ratio	120%	135%	115%
Input per kg of Output	1.2	1.35	1.15
Cost per kg	20	26	30
Total Cost	24	35.10	34.50

Additional Cost = 10.50 (B2 is better)

Inventory Turnover Ratio

Provides a useful guidance for measuring inventory performance.

High inventory turnover ratio indicates that the material in the question is a fast moving one.

A low turnover ratio indicates over-investment and locking up of the working capital in inventories.

Inventory turnover ratio may be calculated by using the following formulae:-

- Cost of material consumed / Average Stock

Example

The following data are available in respect of material X for the year ended 31st March, 2011.

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

Calculate:

(i) Inventory turnover ratio, and

(ii) The number of days for which the average inventory is held.

Answer (Working Note)

Opening stock of raw material	90,000
Add: Material purchases during the year	2,70,000
Less: Closing stock of raw material	1,10,000
Cost of stock of raw material consumed	2,50,000

Answer

Stock Turnover ratio

2,50,000/1,00,000 = 2.5 Times

Inventory holding period

365 days/2.5 = 146 days

Valuation of Material Receipts

- General principle is that all costs incurred upto the point of procuring and storing materials should constitute the cost of materials purchased.

The amount of trade discount (not cash Discount), and excise duty State VAT (under CENVAT credit scheme) being credit items and are thus deducted from the invoice of material purchased.

The transport charges (carriage and freight), central sales tax, insurance, cost of containers, customs and excise duty (without CENVAT credit) should be included in the invoice cost of material.

In case the containers are returnable, their resale value should also be taken in the invoice price of material to correctly ascertain the cost of material purchased.

Example

A manufacturer of Surat purchased three Chemicals A, B and C from Bombay. The Invoice gave the following:

	Rs.
Chemical A: 3,000 kg. @ Rs. 4.20 per kg.	12,600
Chemical B: 5,000 kg. @ Rs. 3.80 per kg.	19,000
Chemical C: 2,000 kg. @ Rs. 4.75 per kg.	9,500
Sales Tax	2,055
Railway Freight	1,000
Total Cost	44,155

A shortage of 200 kg. in Chemical A, of 280 kg. in Chemical B and of 100 kg. in Chemical C was noticed due to breakages.

At Surat, the manufacturer paid Octroi duty @ Re. 0.10 per kg. He also paid cartage Rs. 22 for Chemical A, Rs. 63.12 for Chemical B and Rs. 31.80 for Chemical C.

Calculate the stock rate that you would suggest for pricing issue of chemicals assuming a provision of 5% towards further deterioration.

Answer

Particulars	A	B	C
Purchase Price	12,600	19,000	9,500
Add: Sales Tax	630	950	475
Add: Railway Freight (ratio of Qty)	300	500	200
Add: Octroi Duty	280	472	190
Add: Cartage	22	63.12	31.80
Total Cost	13832	20985.12	10396.80

W note:

Particulars	A	B	C
Qty Purchased	3000	5000	2000
Less: Shortage	200	280	100
Net Qty	2800	4720	1900
Less: Prov for Loss	140	236	95
	2660	4484	1805

Stock Rate

	A	B	C
Total Cost	13832	20985	10396
Qty	2660	4484	1805
Stock Rate	5.20	4.68	5.76

Methods .....

Valuation Techniques

Valuation of Material Issues

Cost Price Methods

- Specific Price
- First-In First-Out (FIFO)
- Last-In-first-Out (LIFO)
- Base Stock

Average Price Methods

Market Price Methods

Replacement price method.

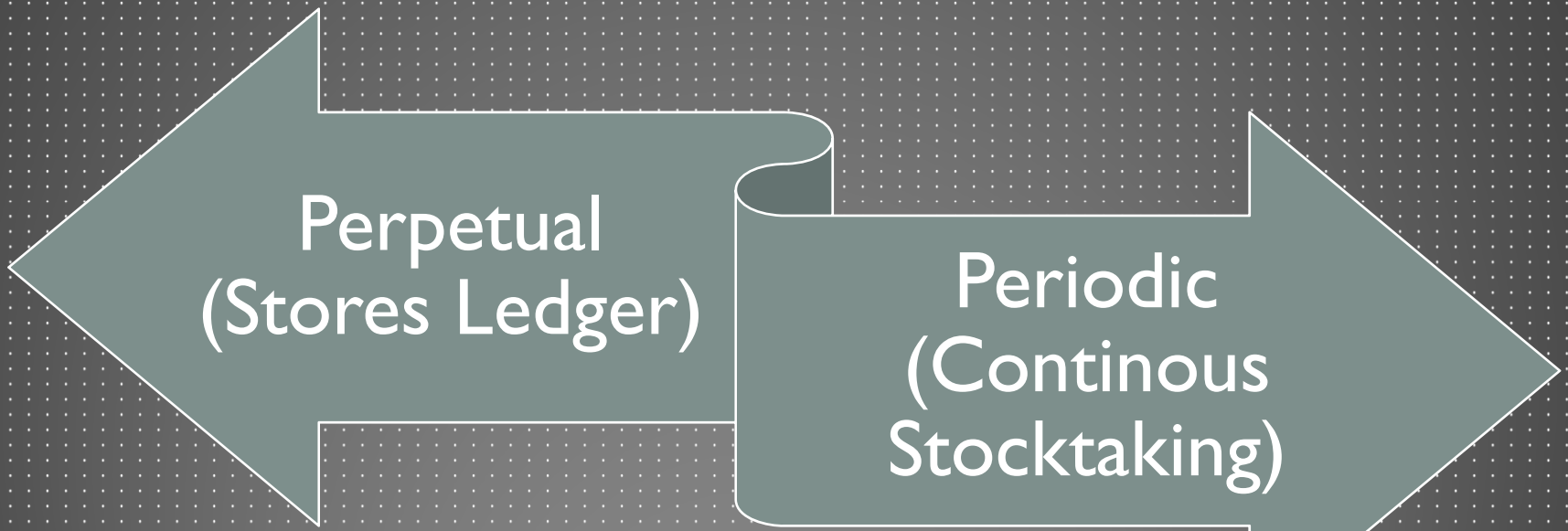
Realisable price method.

Notional Price Methods

Standard Price Method

(generally used when it approximates actual cost)

System of Inventory



Concept and Treatment

Waste

That portion of raw material that is wasted in production

- Normal Waste
- Abnormal Waste

Spoilage

That part of the production which is badly damaged.

- Normal
- Abnormal

Defectives

That part of production which can be rectified

- Normal
- Abnormal

Example

Following costs were incurred in producing 800 M.T. of M.S. Rods:

	Rs.
Materials	2,80,000
Labour	1,00,000
Processing Charges	1,00,000
	4,80,000

Of the total output 10%, was defective and had to be sold after a discount of 10% of the normal price. The scrap arising out of the production realised a sum of Rs. 8,760. The sale price is calculated to yield 15% profit on sales.

You are requested to find out the normal price as well as the discount price of per M.T. of M.S. Rods.

Answer

Total Cost	4,80,000
Less: Scrap	8,760
	4,71,240
Add: Profit (15/85)	83,160
	5,54,400

720y + 80x 0.9 y = 554400

Y = 700

Discounted price = 630

Lesson Summary

1. Material PROCUREMENT
2. Material ISSUE
3. Material VALUATION METHODS
4. Material INVENTORY SYSTEMS
5. Treatment of Scrap, Waste, Spoilage and Defectives

Thank You