

**Q.5.** Give the meaning and treatment of scrap, waste, spoilage and defective ?

**Ans.** a) **Scrap** : It is an incidental residue from the materials used in manufacturing operations, usually of small value and is recoverable without further processing. For control purposes, standards for scrap may be set up, responsibility may be determined for scrap by departments, functions, etc. Scrap report may be prepared and remedial action should be taken.

There are mainly three methods of accounting of scrap :

1. Sale value of scrap credited to Profit and Loss Account.
2. Net value, i.e. the sales value *minus* its selling and distribution costs, credited to Overheads A/c.
3. Scrap value realised being credited to job or process responsible for scrap.

b) **Waste** : Waste is that portion of raw material which is either lost or which evaporates or shrinks in a manufacturing process.

The cost of normal waste is treated as part of the cost of production and total cost incurred is distributed over the reduced output, i.e. the units of good production only. The cost of abnormal waste should be excluded from the total cost and taken to Profit and Loss Account.

c) **Spoilage** : Production that does not meet quality standard and is so damaged that it is not capable of rectification economically and is disposed of without further processing is known as spoiled material. The cost of normal spoilage is treated as a part of the cost of production. Cost of abnormal spoilage does not form a part of the cost of production and should be written off the Closing Profit and Loss Account. A spoilage report should be prepared and steps may be taken to control any abnormal spoilage.

d) **Defectives** : This is the production which is below standard specification or quality but which can be reworked by additional applications of material, labour and processing and made into saleable condition. The additional cost to be applied to a defective product is known as Rectification Cost or Re-operation Cost.

Where the defective production is inherent in the process of manufacturing and can be identified with specific jobs, the cost of rectification is charged to specific jobs. If it cannot be identified with specific products or jobs, the cost of rectification is charged to the manufacturing overhead.

But if the defective production is due to the fault of a particular department, the cost of rectification is directly charged to that department.

If the defectives arise due to the wrong instruction from the customer, it is charged to the job account and recovered from customer.

If the defectives arises out of abnormal circumstances, the cost of rectification is charged to Profit and Loss Account.

**Q.6.** Discuss the advantages and disadvantages of centralised purchasing of materials.

**Ans.** Purchase may be centralised or decentralised. In centralised purchasing, there is only one purchase department which makes all purchases of all types of raw materials and other items. In decentralised purchasing, each department is authorised to make its own purchases. However, most businesses operate of central purchasing system which is usually a very satisfactory arrangement. But decentralised purchasing may suit where different production units are located in different cities or at long distances from each other.

**Advantages of Centralised Purchasing :**

1. Expert purchasing possesses several advantages. These are of specialised knowledge and skill may be derived.
2. Bulk purchases, which results from centralised purchasing, gives economies of scale.
3. A firm policy can be initiated with regard to terms of purchases, e.g. terms of payment, cost of delivery, etc.
4. It effects economy in the use of staff, accommodation, forms and stationery.
5. Effective control over inventories is facilitated.
6. It also facilities standardisation of materials.

**Disadvantages of Centralised Purchasing :**

1. The main disadvantage of centralised is that it is expensive due to increase in administration cost and small firms may not be in a position to afford it.
2. Centralised purchasing is also not suitable when plants are located far away from one another or are using different basic raw materials.

**Q.7.** Write short notes on following :

1. Bin Card
2. Bill of Materials
3. Material Requisition Note
4. Imprest system of Stores
5. Material Transfer Note
6. Material Return Note

**Ans.:** 1. **Bin Card :** Material are kept in appropriate bins, drawers or other containers. A bin card is made out for each type of material. It shows quantities of each materials received, issued and in stock. Maintaining a bin card is not a part of the accounting record as such, but it shows the quantity of each material in hand at all times and is a check on the stores ledger in the accounting department.

**Bin Card**

Description .....				Bin No. ....		
Stores Ledger No. ....				Code No. ....		
Minimum Level.....				Unit.....		
Re-order Level.....				Re-order Quantity.....		
Date	Received G.R. No.	Quantity	Issued S.R. No.	Quantity	Balance Quantity	Remarks Audit Notes & Remarks

**2. Bills of Materials :**

Sometimes all the materials required for a particular job are listed by the production department on a single document which is known as a Bill of Materials. When the job is started, all the materials listed on the bills are sent to the production department.

**Bill of Materials**

Job Order No. ....

No. ....  
Date .....

Item No.	Description	Code No.	Quantity or Weight	Rate ₹	Amount ₹

Drawing office

Storekeeper

Account Officer

**3. Materials Requisition Note :**

It is a document which is used to authorised and record the issue of materials from store. The storekeeper should issue materials on the presentation of duly authorised stores requisition note. It should be appreciated that this is a key document in virtually all closing systems and serves the dual purpose of :

- a) authorising the storekeeper to issue material; and
- b) providing a written record of usage of materials.

**MATERIALS REQUISITION NOTE**

Sl. No.  
Date :

Job No. :	Department :	Material Code No.	Quantity	Rate ₹	Value ₹
Sl. No.	Description	Material Code No.			

Entered in Bin Card : Department incharge  
Stores Ledger :

- Imprest System of Stores :**  
Where maintaining a central store does not suit, the ideal solution is to have a central store with sub-stores, imprest system may be used which operates in a similar way as an imprest petty cash system. Under the imprest system of stores, replenishment of each item of stores is made to the sub-stores at the end of a specified period so that the stock level is raised to the predetermined level. This means quantity of material to be replenished should be equal to the quantity of material issued during the period.
- Material Transfer Note:**  
If materials are transferred from one department or Job to another within the organisation, then *material transfer note* should be raised. It is a record of the transfer of materials between stores, cost centres or cost units showing all data for making necessary accounting entries. A specimen of *Material Transfer Note* is given

**MATERIALS TRANSFER NOTE**

Transfer from :						Sl. No.
Transfer to :						Date :
Sl. No.	Description	Material Code No.	Quantity	Rate ₹	Value ₹	

Issuing Dept. Receiving Dept.

- Material Return Note :**  
If materials received from the stores is not of suitable quality or if there is surplus material remaining with the department, they are returned to stores with a note called, '*Material Return Note* evidencing return of material from Department to Stores.

**MATERIALS RETURN NOTE**

Date of return :						Sl. No.
						Date :
Sl. No.	Description	Material Code	Quantity	Rate ₹	Value ₹	

Returning Dept. Store Keeper

**Q.8.** What are the various factors that influence the selection of a particular method of pricing the issue of materials from stores ?

**Ans.:** There are various methods of pricing issues of materials. The problem arises about the selection of a proper method. The following are the general principles which should guide the decision with regard to the selection of a proper method.

1. Frequency of receipts and issue transactions.
2. Extent of price fluctuations.
3. The value of material cost in proportion to total product cost.
4. Whether issues can be identified with purchased lots.
5. Policy regarding the valuation of closing stock. This is because each method causes a different value for the stock.
6. Type of costing system in use.
7. Customs within the industry, i.e. the method being adopted by other firms in the same industry.

**Q.9.** Explain FIFO and LIFO method of pricing of issue of materials ? Which of these methods would you recommend in rising prices and why ?

**Ans.:** *First In First Out (FIFO) :*

This method operates under the assumption that the materials which are received first are issued first and, therefore, the flow of cost of materials should be also in the same order. In other words, the materials issued are priced at the oldest cost price listed in the store ledger account and consequently the materials in hand are valued at the price of the latest purchases.

**Advantages:**

1. The method is realistic in so far as it assumes that materials are issued to production in the order of their receipts.
2. The valuation of closing stock tends to be nearer current market prices as well as cost.
3. Being based on cost, no unreleased profits enter into the financial result.
4. The method is easy to operate if the prices do not fluctuate very frequently.

**Disadvantages :**

1. The issue price may not reflect current market prices and, therefore, in times of rising prices, the charge to production is unduly low.
2. The cost of consecutive similar jobs may differ simply because the prior job exhausted the supply of lower priced stock. This renders comparison between different job difficult.

**Last In First Out (LIFO) :**

This method operates on the assumption that the latest receipts of materials are issued first for production and the earlier receipts are issued last, i.e. in the reverse order to FIFO.

**Advantages :**

1. The method keeps the value of issues close to the current market prices.
2. Unrealised profit or loss is usually made by using this method.

**Disadvantages :**

1. The value of closing stock may be quite different from the current market value and hence may not be acceptable for income tax purposes.
2. This method does not conform to the physical flow of materials.

Under conditions of rising market prices, LIFO method is generally considered better. This is so because under LIFO method reasonably correct effect of current prices is reflected in the cost and the cost is not understated.

## COST ACCOUNTING

**Q.10.** What is Just in Time (JIT) purchase? What are its advantages?

**Ans.** Just in Time (JIT) purchases means the purchase of goods or materials such that the delivery immediately precedes their usage. The main advantages are as follows:

- (1) It results in cost saving, for example, the cost of stock out, inventory carrying, material handling and breakages are reduced.
- (2) Due to frequent purchases of raw material, the issue price is likely to be very close to the replacement price. As such, the method of pricing for valuing material issues becomes less important.
- (3) It attempts to extend daily deliveries to as many areas as possible so that the goods spend less time in warehouses before they are exhausted.

**Q.11.** 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 (usage)	% Value of inventory usage (in end-product)
3,875	96.875	20	5
110	2.750	30	10
15	0.375	50	85
<u>4,000</u>	<u>100.000</u>	<u>100</u>	<u>100</u>

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

**Ans.:** Under ABC Analysis, the items in inventory are classified according to the value of usage. In this question, the classification is done as follows:

**Class 'A' :** It constitutes the most important class of inventories so far as the proportion of total value of inventory is concerned. In this question, class A inventory consists of 15 varieties of inventory because it carries 50% share in total inventory value and 0.375% in total varieties of inventory. Class A inventory requires strict inventory control system with constant attention by purchase and stores department.

**Class 'B' inventory :** It constitutes an intermediate position in which the inventory is neither very expensive nor very cheap. Quantity-wise also, they are neither few nor many. In this question, class B inventory consists of 110 items because it carries 30% share in total inventory value and 2.75% in total varieties of inventory. These items require formalized inventory system and periodic attention by purchase and stores department.

**Class 'C' inventory:** It constitutes a large number of items which is also very cheap. In this question, class 'C' inventory consists of 3,875 varieties of inventory because it carries 20% shares in total inventory value and 96.875% in total varieties of inventory. The items in this class requires only relaxed inventory control.

**Q.12.** Define VED Analysis.

**Ans.:** Here V stands for *vital items* and their stock analysis requires more attention, because out of stock situation will result in stoppage of production. E means *essential items*. Such items are considered essential for efficient running but without these items the system would not fail. Care must be taken to see that they are always in stock. D stands for *desirable items* which do not affect the production immediately but availability of such items will lead to more efficiency and less fatigue, *VED analysis* can very useful to capital intensive process industries.

**Q.13.** Define Perpetual Inventory system. What are its advantages.

**Ans.:** Perpetual Inventory System Under this system a continuous record of receipt and issue of materials is maintained by the stores department and the information about the stock of material is always available.

The entries are made in Bin Cards and stores ledger as and when the receipts and issues of materials take place and ascertaining the balance after every receipt or issue of materials.

**Advantages:**

- ⊛ This system avoids the disruptions to production or trading caused by the periodic stock taking.
- ⊛ This system facilitates production planning and inventory control.
- ⊛ It help in having a detailed and more reliable check on the stocks.

**Q.14.** Define continuous stock-checking. What are its advantages

**Ans.:** Under this system, physical stock verification is made for each item of stock on continuous basis. It is physical checking of the stock records with actual stocks on contiguous basis.

CIMA defines "continuous stock taking is the process of counting and valuing selected items at different times on a rotating basis".

It is a method of verification of physical stock on a continuous basis instead of at the end of the accounting period. It is a verification conducted round the year, thus covering each item of store twice or thrice. Valuable items are checked more frequently than the stocks with lesser value.

**Advantages:**

- ⊛ Any discrepancies, irregularities or changes are detected at early stage and brought to the notice of management.
- ⊛ It acts as a moral check on stores staff and acts as a deterrent to dishonesty.
- ⊛ It insists on up-to-date maintaining of stock records.
- ⊛ It is carried out by independent staff from store keepers avoiding any irregularities in stock taking.
- ⊛ The disruption in production caused by periodic stock taking is eliminated.
- ⊛ Control over stock is improved by eliminating over stocking or running out of stock.
- ⊛ More time is available, reducing errors and allowing time for investigations.
- ⊛ Regular skilled stock takers can be employed, reducing likely errors.

**Q.15.** Define periodic inventory system. What are its advantages.

**Ans.:** **Periodic Stock Taking System-** Under this system the stock levels are reviewed at fixed intervals e.g., at the end of every month or three months.

The aim of periodic stock taking is to find out the physical quantities of materials of all types that are physically counted at a given date.

**Advantages :**

- (1) It is much less costly as compared with perpetual stock-taking.
- (2) Stock taking becomes 'once in a period' affair, thereby, it does not become a hindrance in the period in which normal business affairs are carried on.

**Q.16.** Explain, why the Least in First out (LIFO) has an edge over First in First Out (FIFO) or any other method of pricing material issues.

**Ans.:** LIFO has following advantages:

- (a) The cost of the material issued will be reflecting the current market price.
- (b) The use of the method during the period of rising prices does not reflect undue high profit in the income statement.
- (c) In the case of falling price, profit tend to rise due to lower material cost, yet the finished goods appear to be more competitive and are at market price.
- (d) During the period of inflation, LIFO will tend to show the correct profit.

**REVISIONARY PROBLEMS**

- Q.1.** Two components X and Y are used as follows:
- |                   |   |                                |
|-------------------|---|--------------------------------|
| Normal usage      | - | 600 units per week each        |
| Maximum usage     | - | 900 units per week each        |
| Minimum usage     | - | 300 units per week each        |
| Re-order quantity | - | X 4,800 units, Y 7,200 units   |
| Re-order period   | - | X 4 to 6 weeks, Y 2 to 4 weeks |

Calculate for each components:

- (a) Re-order level      (b) Minimum level      (c) Maximum level      Average stock level.

- [Ans.: (a) X = 5,400 units; Y = 3,600 units  
 (b) X = 2,400 units; Y = 1,800 units  
 (c) X = 9,000 units; Y = 10,200 units  
 (d) X = 4,800 units; Y = 5,400 units

Using the formula:

$$\text{Average Stock level} = \text{Minimum Stock level} + \frac{1}{2} (\text{Re-order Quantity}).$$

- Q.2.** Zee is a product manufactured out of three raw materials M, N and O. Each unit of Zee requires 10 kg., 8 kg. and 6 kg. of M, N and O respectively. The re-order levels of M and N are 15,000 kg. and 10,000 kg. respectively while minimum level of O is 2,500 kg. The weekly production of Zee varies from 300 to 500 units while weekly average production is 400 units. You are required to compute:

- (i) Minimum stock level of M.  
 (ii) Maximum stock level of N, and  
 (iii) Re-order level of O.

The following additional data is given:

	M	N	O
Re-order quantity (in kg.)	20,000	15,000	20,000
Delivery (in weeks)	.	.	.
Minimum	2	4	3
Average	3	5	4
Maximum	4	6	5

[Ans.: (i) 3,000 kgs.; (ii) 15,400 kgs; (iii) 15,000 kgs.]

- Q.3.** From the details given below, calculate:  
 (i) Re-ordering level (iii) Minimum level (ii) Maximum level (iv) Danger level  
 Re-ordering quantity is to be calculated on the basis of following information:

Cost of placing a purchase order is ₹ 20.

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

Purchase price per unit inclusive of transportation cost is ₹ 50.

Annual cost of storage per unit is ₹ 5.

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

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

[Ans.: (i) 300 units; (ii) 440 units (Minimum consumption rate = 10 units per day);  
 (iii) 150 units; (iv) 60 units].

- Q.4.** (a) From the following information, find out the Economic Order Quantity:
- |                           |                         |
|---------------------------|-------------------------|
| Annual consumption        | 12,000 units (360 days) |
| Cost per unit             | ₹ 1                     |
| Ordering cost             | ₹ 12 per order          |
| Inventory carrying charge | 24%                     |
| Normal lead time          | 15 days                 |
| Safety stock              | 30 days consumption     |

(b) Also find out (i) when should the order be placed; and (ii) what should be the ideal inventory level immediately before the ordered material is received.

[Ans.: (a) EOQ = 1,095 units.

(b) (i) Re-order level = 1,500 units; (ii) Safety Stock = 1,000 units].

Q.5. Medical Aids Co. manufactures a special product "AID". The following particulars were collected for the year 1998:

(a) Monthly demand of AID	-	1,000 units.
(b) Cost of placing an order	-	₹ 100.
(c) Annual carrying cost per unit	-	₹ 15.
(d) Normal usage	-	50 units per week.
(e) Minimum usage	-	25 units per week.
(f) Maximum usage	-	75 units per week.
(g) Re-order period	-	4 to 6 weeks.

Compute from the above:

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

(6) Average Stock Level.

[Ans.: (1) 186 units (Total consumption = 52 x 50 = 2,600 units;

(2) 450 units; (3) 200 units; (4) 536 units].

Q.6. M/s Tubes Ltd. are the manufacturers of picture tubes for T.V. The following are their details during 2011 :

1. Average monthly market demand 2,000 tubes;
2. Ordering cost ₹ 100 per order;
3. Inventory carrying cost is 20% per annum;
4. Cost of the tube is ₹ 500 per tube;
5. Normal usage is 100 tubes per week;
6. Minimum usage is 50 tubes per week;
7. Maximum usage is 200 tubes per week;
8. Lead time to supply 6 to 8 weeks.

Compute:

(i) Economic Order Quantity. [Ans. 102 tubes]

(ii) If the supplier is willing to supply 1,500 units at a discount of 5%, is it worth accepting. [Ans. It should be accepted]

(iii) Maximum stock level. [Ans. 1,402 tubes]

(iv) Minimum stock level. [Ans. 900 tubes]

(v) RE-order level. [Ans. 1,600 tubes].

Q.7. The following data are available in respect of material X for the year ended 31<sup>st</sup> 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.

[Ans.: 2.5 times; 146 days].



**COST ACCOUNTING**

**Q.8.** If the minimum stock level and average stock level of a raw material are 4,000 and 9,000 units respectively, find out its re-order quantity.  
 [Ans.: 10,000 units]

**Q.9.** A company is deciding on the economic order quantity for two products: A and B. The following is the relevant information :

	A	B
Demand	2,000 bags	1,280 bags
Ordering cost per order (₹)	₹ 1,200	₹ 1,400
Carrying cost per bag (₹)	₹ 480	₹ 560

**Required:**

- Compute EOQ for A and B. [Ans. 100 bags and 80 bags]
  - For the EOQ, what is the sum of the total annual ordering costs and total annual carrying cost for A and B. [Ans.: ₹ 48,000 and ₹ 44,800]
- For the EOQ, compute the number of deliveries per year for A and B. [Ans.: 20 orders and 16 orders.]

**Q.10.** The purchase department of your organisation has received an offer of quantity discount on its orders of materials as under :

Price per tonne	Tonnes
₹ 1,400	Less than 500
₹ 1,380	500 or more but less than 1,000
₹ 1,360	1,000 or more but less than 2,000
₹ 1,340	2,000 or more but less than 3,000
₹ 1,320	3,000 or more

The annual requirement of the material is 5,000 tonnes. The delivery cost per order is ₹ 1,200 and annual stock holding cost is estimated at 20% of the purchase price.

The purchase department wants you to consider the following purchase options and advise among them which will be the most economical order quantity. The purchase quantity options to be considered are 400 tonnes, 500 tonnes, 1,000 tonnes, 2,000 tonnes and 3,000 tonnes.

[Ans.: 1,000 tonnes].

**Q.11** You are given below the following information relating to use of a material in production :

	Standard	Actual
Input of material	12 Kg.	2,000 Kg.
Material content in final product	10 Kg.	1,600 Kg.
Cost per Kg. of material ₹ 20		

Calculate : (i) Standard input-output ratio, (ii) Actual input-output ratio, (iii) Standard and Actual material cost per unit of final product, and (iv) Comment on the over-all level of efficiency.

**Ans.** [ (i) ₹ 120% ; (ii) 125% ; (iii) ₹ 24 and ₹ 25 ]

**Q.12** A factory received a carton containing two materials 'X' and 'Y'. The invoice relating to the materials discloses the following details :

Material X 400 kg. @ ₹ 10 per kg.	₹ 4,000
Material Y 600 kg. @ ₹ 15 per kg.	9,000
	<u>13,000</u>
Sales tax @ 5%	650
Insurance @ 1%	130
Freight and handling charges	220
	<u>14,000</u>

Handling of these materials in the factory resulted in a loss of 10 kgs. of material X and 20 kgs. of material Y. At what rate you would issue these materials to the jobs? Also give revised rate in case a further provision of 10% is to be made for probable obsolescence.

Ans.	Issue rate (Without obsolescence)	Material X ₹ 11.10	Material Y ₹ 16.68
	Issue rate (after obsolescence)	₹ 12.33 ₹ 18.53	

Q.13 The particulars relating to the import of Sealing Ring invoiced by AB & Co., during December 1997 are given below:

- (a) Sealing Ring – 1,000 pieces @ £2 CIF Bombay Port.
- (b) Custom duty was paid @ 100% on invoice value (which was converted to Indian currency by adopting an exchange rate of ₹ 45 per £.)
- (c) Clearing charges – ₹ 1,800 for the entire consignment.
- (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 was 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 the 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.

Calculate:

- (a) Total cost of material and (Ans. ₹ 1,83,200)
- (b) Unit cost of material issued to production. (Ans. ₹ 194.89)

Also state briefly how the value of 100 pieces rejected in inspection will be treated in costs.

Q.14. A company provides following information in respect of a material :-

- (1) Supply Period : 5 to 15 days.
- (2) Rate of consumption
  - ☞ Average 15
  - ☞ Maximum 20 units per day
  - ☞ Yearly 5,000 units.
- (3) Ordering Cost is ₹ 20 per order
- (4) Purchase price is ₹ 50 per unit.
- (5) Storage Cost is 10% of purchase price.

Compute (1) Re-order level  
(2) Minimum level  
(3) Maximum level.

[Ans. (i) 300 units (ii) 150 units (iii) 450 units.]

Q.15. 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, and
- (ii) Re-order level.

[Ans. (i) 500 units (ii) 1600 units]

## COST ACCOUNTING

6.26

A large consignment of material of various types of makes was purchased for ₹ 40,000. Later on these were sorted out into the following categories:

Category A	6,000 units
Category B	4,000 units
Category C	7,000 units

Market price ₹ 4 per unit  
Market price ₹ 3 per unit  
Market price ₹ 2 per unit.

You are required to calculate the purchase price for each of the materials presuming that percentage of profit in each case in the same.

[Ans ₹ 3.2, 2.4 and 1.6]

Q.17. In a company weekly minimum and maximum consumption of material A are 25 and 75 units respectively. The re-order quantity as fixed by the company is 300 units. The material is received within 4 to 6 weeks from issue of supply order. Calculate minimum level and maximum level of material A

[Ans. 200 units and 650 units]

Q.18. Determine Maximum Stock and Buffer Stock to keep stock at a reasonable level while providing a good service where:

	Maximum	Average	Minimum
Daily Consumption	75 units	50 units	25 units
Delivery Period	5 days	2 days	1 day
Ideal Order Size = 125			Units
Re-order Level = 375 units.			

[Ans. 475 units and 275 units]

Q.19. The inventory records of Suneel Brothers, Delhi, for the year 1998 show the following figures:

	Opening Stock	Purchases	Closing Stock
Material A	700 kg	11,500 kg	200 kg
Material B	200 litres	11,000 litres	1,200 litres
Material C	1,000 kg	1,800 kg	1,200 kg

The inventory is valued @ Re.1 per kg or litre.

Calculate the material turnover ratios regarding each of these materials and express in number of days the average inventory held. What inference do you draw?

[Ans. Material Turnover ratio = 26.67, 14.29 and 1.46 times]

Q.20. A chemical producing factory uses ingredient P as the basic material at a cost of ₹ 30 per kg. Input-output ratio with material P is 125%. A sudden shortage of the material has taken place. The producer is considering use of the following substitute materials:

Material	Input output Ratio	Material Price ₹ Kg.
P <sub>1</sub>	150%	28
P <sub>2</sub>	120%	32
P <sub>3</sub>	140%	31

Recommend which of the above three substitutes is the best. By how much per unit of output material cost will increase if best substitute is used. [Ans. P<sub>2</sub>, ₹ 0.90]

Q.21. In manufacturing a product a producer uses three raw materials X, Y and Z. The relevant information relating to the three materials is as follows:

Raw Material	Usage per unit of product (kgs.)	Re-order quantity (kgs.)	Price per kg. (₹)	Delivery period (weeks)	Re-order level (kgs.)	Minimum level (kgs.)
X	8	10,000	4	1 to 5	7,000	....
Y	5	6,000	3	3 to 5	5,000	....
Z	10	12,000	7	2 to 4	....	3,000

Weekly production varies from 200 to 250 units. Determine the quantities of the following:

(a) Minimum stock of X, (b) Maximum stock of Y, (c) Re-order level of Z, and (d) Average stock of X. (Ans. (a) 1,600 kgs. (b) 8,000 kgs. (c) 10,000 kgs. (d) 8,500 kgs.)

Q.22 The Purchase Manger of a company has collected the following data for a particular material item:

Interest on locked up capital	15%	Other holding costs	20%
Order processing cost per order	₹ 50	Other procurement cost per order	₹ 25
Inspection cost per order	₹ 30	Annual Usage	1000 units
Follow up cost for each order	₹ 20	Cost per item	₹ 10
Pilferage while holding inventory	5%		

Discount for a minimum order quantity of 500 items is 10%. What should be the ordering policy of the Purchase Manger?

(Ans. EOQ is 250 units but order of 500 units is recommended)

Q.23 Calculate Economic Order Quantity (EOQ), a minimum stock or safety stock, re-order level and maximum stock with the help of the following data supplied by a producer for a particular material :

Annual consumption for material	= 4,000 units	Average daily usage	= 12 units
Cost of placing an order	= ₹ 200	Maximum daily usage	= 16 units
Per unit cost of material	= ₹ 60	Maximum lead time	= 10 days
Annual rate of interest	= 10%	Minimum lead time	= 6 days
Rent, insurance and storage cost	= ₹ 4 per unit		

[Ans. 400 units, 64 units, 160 units and 512 units]

Q.24 A wholesaler supplies 40 cricket bats to different shopkeeper on each working day. Presently the wholesaler is purchasing bats in lots of 200 at a cost of ₹ 60,000 per lot. On every order h incurs a handling charge of ₹ 150 and freight charge of ₹ 250 per order. Multiple and fractional lots can also be ordered. All orders are supplied the next day. The wholesaler finances investment in inventory by paying 2% monthly interest on borrowed funds. Incremental storage cost per bat is ₹ 8. Working days in a year are 300.

(i) How many bats should be ordered at a time to minimize total annual inventory cost  
(ii) How frequently should order be placed? [Ans. 346 bats and 11 days]

Q.25 XYZ Ltd. has purchased a consignment of material P and Q. The following are the costs in purchasing:

Material P	5,000 kg. @ ₹ 10 per kg.	₹ 50,000
Material Q	8,000 kg. @ ₹ 5 per kg.	40,000
Sales tax @ 3%		2,700
Railway freight		650
		<u>93,350</u>

## COST ACCOUNTING

Other handling charges have been estimated at ₹ 260 combined to both materials. In addition material P involves special handling costs of ₹ 160 in stores. Normal breakage of materials in transit and in storage has been estimated at 5% in case of P and 10% in case of Q. Determine per kg. issue price for P and Q so as to recover normal losses of materials as well as costs incidental to purchases and storage.

[Ans. ₹ 10.96 and ₹ 5.80]

- Q.26** RST Limited has received an offer of quantity discount on its order of materials as under:
- |                |                       |
|----------------|-----------------------|
| Price per tone | Tonnes number         |
| ₹ 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         |
- The annual requirement for the material of 500 tonnes. The ordering cost per order is ₹ 12,500 and the stock holding cost is estimated at 25% of the material cost per annum.
- Required:**
- Compute the most economical level.
  - Compute EOQ if there are no quantity discounts and the price per tonne is ₹ 10,500.
- [Ans. (i) 300 tonnes (ii) 69 tonnes]
- Q.27** A company uses annually 48,000 units of raw material costing ₹ 1.20 per unit. Placing each order costs ₹ 45 and inventory carrying costs are 15% per year of the average inventory values:
- Find the E.O.Q. (Ans. 4,899 units)
  - Suppose that the company follows the E.O.Q. policy and its operates for 300 days a year, that the procurement time is 12 operating days and the safety stock is 500 units, find
    - re-order level, (Ans. 2420 units)
    - the maximum level, (Ans. 5,399 units)
    - the minimum level; (Ans. 500 units)
    - the average inventory. (Ans. 2,950 units)
- Q.28** X Ltd. is committed to purchase 24,000 bearings per annum to Y Ltd. on steady basis. It is estimated that it costs 10 paise as inventory holding cost per bearing per month and that the order cost is ₹ 324.
- What would be the economic order quantity. (Ans. 3,600 units)
  - Assuming that the company has a policy of purchasing 6,000 bearings per order how much extra costs the company would be incurring as compared to the optimum situation suggested in a above? (Ans. ₹ 576)

- Q.29** A company purchased raw material with following particulars (a) 1,000 kgs. @ ₹ 10 per kg. (b) Transport expenditure ₹ 2,000.

Later on it is discovered that 200 kgs. are spoiled. The management decides to treat 77 kgs. as normal loss and balance 123 kgs. as abnormal loss. Compute the unit cost of raw material and what will be the treatment of quantity spoiled. (Ans. ₹ 13 per kg.)

- Q.30** Your factory buys and uses a component for production at ₹ 10 per piece. Annual requirement is 2,000 numbers. Carrying cost of inventory is 10% p.a. and the ordering cost is ₹ 40 per order. The purchase manager agrees that as the ordering cost is very high, it is advantageous to place a single order for the entire annual requirement. He also says that if we order for 2,000 number at a time, we get a 3% discount from the supplier. Evaluate this proposal and make your recommendations.

**Ans.** No, Suppliers should not be accepted since it requires incurring of extra cost of ₹ 10 p.a.

**Q.31** Economic Enterprises require 90,000 units of a certain items annually. The cost per units is ₹ 3, the cost per purchase order ₹ 300 and the inventory carrying costs ₹ 6 per unit per year.

- (i) What is the Economic Order Quantity?  
 (ii) What should the firm do if the supplier offers 2% discount on purchase level of 4500 units and 3% discount on purchase level of 6,000 units.

**Ans.** (i) EOQ : 3,000 units ; (ii) Discount after of 2% is more profitable.

**Q.32** A company is reviewing its stock policy and has the following alternatives available for the purchase of stock.

- (a) Purchase stock twice monthly, 100 units;  
 (b) Purchase monthly, 200 units;  
 (c) Purchase every three months, 600 units;  
 (d) Purchase six-monthly, 1,200 units;  
 (e) Purchase annually, 2,400 units.

It is ascertained that the purchase price per unit is ₹ 0.80 for deliveries up to 500 units. A 5% discount is offered by the supplier on the whole order where deliveries are 501 and up to 1,000 and 10% reduction on the total order for deliveries in excess of 1,000.

Each purchase order incurs administration costs of ₹ 5.

Storage, interest on capital and other costs are ₹ 0.25 per unit of average stock quantity held.

**Ans.** EOQ : 1,200 units.

**Q.33** Nathu Sweets supplies a number of products of bankers and confectioners. One of their popular product is "cake decoration. The demand for cake decorations is constant over a long period of time at the rate of 2,000 packets per month. Each packet costs Nathu Sweets ₹ 10 from the manufacturer and a lead time of three days is involved in it. Ordering cost is ₹ 1.20 per order and the holding cost is 10 per cent per annum.

Calculate:

- (a) (i) The economic order quantity.  
 (ii) Total cost of ordering and carrying cake decorations per annum.  
 (b) Assume that the present level is 200 packets and that no buffer stocks are kept, when should the next order be placed? Assume 360 days in a year.

**Ans.** (a) (i) 240 packets (ii) ₹ 240 (b) Next order is to be placed immediately.

**Q.34** G. Ltd. produces a product which has a monthly demand of 4,000 units. The product requires a component X which is purchased at ₹ 20. For every finished product, one unit of component is required. The ordering cost is ₹ 120 per order and the holding cost is 10% p.a.

You are required to calculate:

- (i) Economic order quantity. (Ans. 2,400 components)  
 (ii) If the minimum lot size to be supplied is 4,000 units, what is the extra cost, the company has to incur? (Ans. ₹ 640)

**Q.35** A wholesaler supplies to various shops. Dolls are purchased from the manufacturer in lots of 120 each of ₹ 1200 per lot. Every order incurs a handling charge of ₹ 60 plus a freight charge of ₹ 250 per lot. The incremental cost is ₹ 7.60 per year to store a doll in inventory. The wholesaler finances inventory investment by paying its holding company 2% monthly for borrowed funds. Annual requirement is 7,500 dolls.  
 How much dolls should be ordered at a time in order to minimize the total inventory cost? How frequently should be order?  
 (Ans. 33 days)

Q.36 Anil company buys its annual requirement of 36,000 units in 6 instalments. Each unit costs ₹ 1 and the ordering cost in ₹ 25. The inventory carrying cost is estimated at 20% of unit value. Find the total annual of the existing inventory policy. How much money can be saved by Economic Order Quantity. (Ans. ₹ 150)

Q.37 Your factory buys and uses a component for production at ₹ 10 per piece. Annual requirement is 2,000 numbers. Carrying cost of inventory is 10% p.a. and ordering cost is ₹ 40 per order. The purchase manger argues that as the ordering cost is very high, it is advantageous to place a single order for the entire annual requirement. He also says that if we order 2,000 pieces at a time we can get a 3% discount from the supplier. Evaluate this proposal and make your recommendations.

Q.38 Calculate EOQ and number of orders to be placed and total cost of EOQ by applying formula from the following particulars.

- (i) Annual requirement of raw material 60,000 units.
  - (ii) Ordering cost per order ₹ 600
  - (iii) Annual cost of investment in inventory ₹ 1 per unit.
  - (iv) Cost of deterioration, taxes, insurance, supervision cost ₹ 1 per unit.
- (Ans. EOQ 6,000 units)

Q.39 An industry currently is adopting an optimum purchasing policy in meeting annual inventory requirement of 1,00,000 bags. The purchasing price per bag is ₹ 20. The cost records project holding cost of 20% of purchase price and ordering cost of ₹ 500. The supplier is providing a discount facility of 0.5% if a purchase lot contains 10,000 bags. You are asked to choose the most economic purchase lot between the above two alternatives by presenting your findings and calculation in a tabular form. (Ans. Alternative (2) involves lesser cost to the extent of ₹ 5,100)

Q.40. A manufacturer requires 9,600 units of a certain component annually. This is currently purchased from a regular supplier at ₹ 50 per unit. The cost of placing an order is ₹ 60 per order and the annual carrying cost is ₹ 5 per piece. What is the economic order quantity (EOQ) for placing order ?

Recently, the supplier has expressed his willingness to reduce the price to ₹ 48, if the total requirements are obtained from him in two equal orders and to ₹ 47, if the entire quantity required is purchased in one lot. Analyse the costs of the three options and recommend the best course.

What other factors should also be considered before the decision is taken ?

Q.41. A publishing house purchases 2,000 units of a particular item per year at an unit cost of ₹ 20, the ordering cost per order is ₹ 50 and the inventory carrying cost is 25 per cent. Find the optimal order quantity and minimum total cost including purchase cost. If a three per cent discount is offered by the supplier for purchases in lots of 1,000 units, should the publishing house accept the proposal.

Q.42. The following information relating to a type of Raw material is available :

Annual requirement	2,000 units
Unit price	₹ 20
Ordering cost per order	₹ 20
Storage cost	2% p.a.
Interest rate	8% p.a.
Lead time	Half-month

Calculate economic order quantity and total annual inventory cost of the raw material.

Ans.: EOQ = 200 units and total inventory cost = ₹ 80,400.

**Q.43.** A company buys in lots of 12,500 units which is a three months' supply. The cost per unit is ₹ 1.20. Each order costs ₹ 45 and inventory carrying cost is 15% p.a.

**Required :**

1. What is the total annual cost of existing inventory policy ?

2. How much money could be saved by employing the 'economic order quantity'?

**Ans. :** EOQ = 5,000 units and ₹ 405 can be saved by adopting EOQ policy.

**Q.44.** G Ltd. produces a product which has a monthly demand of 4,000 units. The product requires a component X which is purchased at ₹ 20. For every finished product, one kg. of component is required. The ordering cost is ₹ 120 per order and the holding cost is 10% p.a.

**You are required to calculate :**

1. Economic order quantity;

2. If the minimum lot size to be supplied is 4,000 kgs., which is the extra cost the company has to incur ?

3. What is the minimum cost, the company has to incur ?

**Ans.:** EOQ = 2,400 kgs. and extra cost of ₹ 640 will be incurred if EOQ policy is not adopted.

**Q.45.** A company manufactures a special product which requires a component 'Alpha'. The following particulars are collected for the year 2013 :

- |                                |   |             |
|--------------------------------|---|-------------|
| 1. Annual consumption of Alpha | : | 8,000 units |
| 2. Cost of placing an order    | : | ₹ 200       |
| 3. Cost per unit of Alpha      | : | ₹ 400       |
| 4. Carrying cost % p.a.        | : | 20%         |

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

**Required :**

(i) Compute the economic order quantity.

(ii) Advise whether the quantity discount offer can be accepted.

**Ans.:** EOQ = 200 units and the discount offer may lead to increase in cost to the extent of ₹ 10,000.

**Q.46.** A publishing house purchases 72,000 reams of a special type paper per annum at a cost of ₹ 90 per ream. Ordering cost per order is ₹ 500 and the carrying cost is 5% per year of the purchase price. Normal lead time is 20 days and safety stock is NIL. Assume 300 working days in a year.

**Required :**

(i) Calculate the Economic Order Quantity (E.O.Q.)

(ii) Calculate the Re-order Inventory Level.

(iii) If a 1% quantity discount is offered by the supplier for purchases in lots of 18,000 reams or more, should the publishing house accept the proposal ?

**Ans.:** EOQ = 4,000 reams, re-order level = 4,800 reams. and the discount offer will reduce the cost to the extent of ₹ 40,705.



**Q.47.** The annual carrying cost of material 'X' is ₹ 3.6 per unit and its total carrying cost is ₹ 9,000 per annum. What would be the economic order quantity for material 'X'.

**Ans. :** EOQ = 5,000 units

**Q.48.** In a firm, the annual demand for Raw Material is 4,000 units and the purchase price is expected to be ₹ 90 per unit. The cost of processing an order is ₹ 135 and the cost of storage is estimated to be ₹ 12 per unit p.a.

- a. What is the optimal order quantity and the total relevant cost of this order quantity?
- b. Suppose that the ₹ 135 estimate of the cost of processing an order is incorrect and should have been ₹ 80. Assume that all other estimates are correct. What is the revised EOQ and total relevant cost under revised situation ?
- c. Assume at the start of the period a supplier offers 4,000 units at a price of ₹ 86. The materials will be delivered immediately and placed in the stores. Assume that the cost of placing this order is zero. Is the discount offer acceptable ?

**Ans.:** (a) EOQ = 300 units and total relevant cost = ₹ 3,600;  
(b) Revised EOQ = 231 units and total relevant cost = ₹ 3,724;  
(c) The discount offer will increase the cost to the extent of ₹ 4,400.

## Solutions to Revisionary Problems

### Answer to Q. No. 1 :

- a) Re-order level = Maximum usage  $\times$  Maximum re-order period  
       X =  $900 \times 6 = 5,400$  units  
       Y =  $900 \times 4 = 3,600$  units
- b) Minimum Level = Re-order level - (Nominal usage  $\times$  Normal re-order period)  
       A =  $5,400 - (600 \times 5) = 2,400$  units  
       B =  $3,600 - (600 \times 3) = 1,800$  units
- c) Maximum Level = Re-order level + Re-order quantity - (min. usage  $\times$  Min. re-order period)  
       A =  $5,400 + 4,800 - (300 \times 4) = 9,000$  units  
       B =  $3,600 + 7,200 - (300 \times 2) = 10,200$  units
- d) Average Stock Level =  $\frac{1}{2}$  (Min. level + Max. level)  
       A =  $\frac{1}{2} (2,400 + 9,000) = 5,700$  units  
       B =  $\frac{1}{2} (1,800 + 10,200) = 6,000$  units

Alternatively,

- Average Stock Level = Min. level +  $\frac{1}{2}$  of re-order quantity  
       A =  $2,400 + \frac{1}{2}$  of  $4,800 = 4,800$  units  
       B =  $1,800 + \frac{1}{2}$  of  $7,200 = 5,400$  units

### Answer to Q. No. 2 :

- (i) Minimum stock level of M  
 = Re-order level - (Normal consumption  $\times$  Average delivery time)  
 =  $15,000 - (400 \text{ units of Zee} \times 10 \text{ kg} \times 3 \text{ weeks})$   
 =  $15,000 - 12,000 = 3,000$  kg.
- (ii) Maximum stock level of N  
 = Re-order level + Re-order quantity - (Minimum consumption  $\times$  Minimum re-order period)  
 =  $10,000 + 15,000 - (300 \text{ units of Zee} \times 8 \text{ kg} \times 4 \text{ weeks})$   
 =  $25,000 - 9,000 = 15,400$  kg.
- (iii) Re-order level of O  
 = Maximum consumption  $\times$  Maximum re-order period  
 =  $500 \text{ units of Zee} \times 5 \text{ kg} \times 6 \text{ weeks}$   
 =  $15,000$  kg.

### Answer to Q. No. 3 :

- Re-order quantity (EOQ) =  $\sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 5,000 \text{ units} \times ₹ 20}{₹ 5}}$   
 =  $\sqrt{40,000} = 200$  units
- (i) Re-ordering level = Max. consumption  $\times$  Max. re-order period  
 =  $20 \times 15 = 300$  units.
- (ii) Maximum level = Re-order level + Re-order quantity - (Min. consumption  $\times$  Min. re-order period)  
 =  $300 + 200 - (10 \times 6) = 400$  units.

Note : Minimum consumption is calculated as follows :

- Average consumption =  $\frac{\text{Min. consumption} + \text{Max. consumption}}{2}$
- 15 =  $\frac{\text{Min. consumption} + 20}{2}$
- Min. consumption = 10
- (iii) Minimum level = Re-order Level - (Average Consumption  $\times$  Average re-order period)  
 =  $300 - (15 \times 10) = 150$  units.
- (iv) Danger level = Average consumption  $\times$  Re-order period in emergent conditions  
 =  $15 \times 60$  units.

## COST ACCOUNTING

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Answer to Q. No. 4 :

(a) Economic Order Quantity (EOQ) =  $\sqrt{\frac{2UP}{S}}$  where U = Annual consumption  
 P = Buying (or ordering) cost  
 S = Storage and carrying cost p.u. p.a.

$$\text{EOQ} = \sqrt{\frac{2 \times 12,000 \times 12}{1 \times 24\%}} = 1,095 \text{ units (Approx.)}$$

(b) (i) When should the order be placed (when stock reaches re-order level)  
 Re-order level = Safety stock + Consumption in lead time

$$\frac{12,000 \text{ units}}{360 \text{ days}} \times 30 \text{ days} + \frac{12,000 \text{ units}}{360 \text{ days}} \times 15 \text{ days} = 1,000 \text{ units} + 500 \text{ units} = 1,500 \text{ units.}$$

(ii) Ideal inventory level immediately before material ordered is received i.e. safety stock

$$\text{Safety Stock} = \frac{12,000 \text{ units}}{360 \text{ days}} \times 30 \text{ days} = 1,000 \text{ units}$$

Answer to Q. No. 5 :

$$(1) \text{ Re-order Quantity} = \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 2,600 * \times 100}{15}} = 186 \text{ units (approx.)}$$

\*Normal usage is 50 units per week. So for one year it is – 52 weeks  $\times$  50 = 2,600 units.

$$(2) \text{ Re-order Level} = \text{Maximum usage} \times \text{Maximum Re-order period} = 75 \times 6 = 450 \text{ units.}$$

$$(3) \text{ Minimum Level} = \text{Re-order level} - (\text{Normal usage} \times \text{Average re-order period}). = 450 - (50 \times 5) = 200 \text{ units}$$

$$(4) \text{ Maximum Level} = \text{Re-order Level} + \text{Re-order quantity} - \left( \text{Minimum usage} \times \text{Minimum re-order period} \right) = 450 + 186 - (25 \times 4) = 536 \text{ units}$$

$$(5) \text{ Average Stock level} = \frac{1}{2} (\text{Minimum level} + \text{Maximum level}) = \frac{1}{2} (200 + 536) = 368 \text{ units}$$

Answer to Q. No. 6 :

$$(1) \quad E = \sqrt{\frac{2UP}{S}}$$

Where

U = Annual usage of tubes  
 = Normal usage per week  $\times$  52 weeks  
 = 100 tubes  $\times$  52 weeks = 5,200 tubes.  
 P = Ordering cost per order = ₹ 100 per order.  
 S = Inventory carrying cost per unit per annum.  
 = 20%  $\times$  ₹ 500 = ₹ 100 per unit per annum.  
 E = Economic Ordering Quantity.

$$= \sqrt{\frac{2 \times 5,200 \text{ units} \times ₹ 100}{₹ 100}} = 102 \text{ tubes (approx.)}$$

*Evaluation of offer.* If the supplier is willing to supply 1,500 units at a discount of 5%.

(i) Total Cost = Cost of 5,200 Units + Ordering Cost + Carrying Cost (when order size is 1,500 units).

$$\begin{aligned}
 &= 5,200 \text{ units} \times ₹ 475 + \frac{5,200 \text{ units}}{1,500 \text{ units}} \times ₹ 100 + \frac{1}{2} \times 1,500 \text{ units} \times 20\% \times ₹ 475 \\
 &= ₹ 24,70,000 + ₹ 346.67 + ₹ 71,250 \\
 &= ₹ 25,41,596.67
 \end{aligned}$$

(ii) Total Cost (when order size is 102 units).

$$\begin{aligned}
 &= 5,200 \text{ units} \times ₹ 500 + \frac{5,200 \text{ units}}{102 \text{ units}} \times ₹ 100 + \frac{1}{2} \times 102 \text{ units} \times 20\% \times ₹ 500 \\
 &= ₹ 26,00,000 + ₹ 5,098.03 + ₹ 5,100 \\
 &= ₹ 26,10,198.03
 \end{aligned}$$

The above calculation shows the total cost under quarterly supply of 1,500 units with 5% discount is lower than that when order size is 102 units. Therefore, the offer should be accepted.

(2) *Maximum Level of Stock*

$$\begin{aligned}
 &= \text{Re-order level} + \text{Re-order quantity} - (\text{Min. usage} \times \text{Min. Re-order period}) \\
 &= 1,600 \text{ units} + 102 \text{ units} - 50 \text{ units} \times 6 \text{ weeks} \\
 &= 1,402 \text{ units.}
 \end{aligned}$$

(3) *Minimum Level of Stock*

$$\begin{aligned}
 &= \text{Re-order level} - (\text{Normal usage} \times \text{Average Re-order period}) \\
 &= 1,600 \text{ units} - 100 \text{ units} \times 7 \text{ weeks} = 900 \text{ units.}
 \end{aligned}$$

(4) *Re-order Level*

$$\begin{aligned}
 &= \text{Maximum Consumption} \times \text{Maximum Re-order Period} \\
 &= 200 \text{ units} \times 8 \text{ weeks} \\
 &= 1,600 \text{ units.}
 \end{aligned}$$

**Answer to Q. No. 7 :**

(i) Inventory Turnover Ratio =  $\frac{\text{Cost of Raw Material consumed during the period}}{\text{Average stock of raw material during the period}}$

$$= \frac{₹ 2,50,000}{₹ 1,00,000} = 2.5$$

(ii) Average Number of days for which the average inventory

$$\text{is held} = \frac{365 \text{ days}}{\text{Inventory turnover ratio}}$$

$$= \frac{365 \text{ days}}{2.5} = 146 \text{ days}$$

**Working Notes :**

1. Cost of raw material consumed

Opening Stock of Raw Material on 1.4.1996  
Add : Material purchased during the year

Less : Closing Stock of raw martial  
Cost of Raw Material consumed

₹
90,000
<u>2,70,000</u>
3,60,000
<u>1,10,000</u>
<u>2,50,000</u>

**COST ACCOUNTING**

6.38

2. Average Stock of Raw Material =  $\frac{1}{2}$  (Opening stock of raw material + closing stock of raw material)  
 =  $\frac{1}{2}$  (₹ 90,000 + ₹ 1,10,000) = ₹ 1,00,000

**Answer to Q. No. 8 :**

Minimum Stock Level of Material A  
 Average Stock Level of Material A  
 Average Stock Level  
 or  $\frac{1}{2}$  Reorder Quantity

= 4,000 units  
 = 9,000 units  
 = Minimum Stock level +  $\frac{1}{2}$  Re-order Quantity  
 = 9,000 units - 4,000 units  
 = 5,000 units  
 = 10,000 units.

or Re-order quantity

**Answer to Q. No. 9 :**

(1)  
 Annual Demand (bags)  
 Cost of one order (p)  
 Carrying cost per bag(s)

	<b>A</b>	<b>B</b>
	2,000	1,280
	₹ 1,200	₹ 1,400
	₹ 480	₹ 560

Hence,

EOQ =  $\sqrt{\frac{2UP}{S}}$   
 A =  $\sqrt{\frac{2 \times 2,000 \text{ bags} \times ₹ 1,200}{₹ 480}}$   
 = 100 bags.  
 B =  $\sqrt{\frac{2 \times 1,280 \text{ bags} \times ₹ 1,400}{₹ 560}}$   
 = 80 bags.

(2)  
 Ordering Cost

<b>A</b>	<b>B</b>
$20 \times 1,200$	$16 \times 1,400$
= ₹ 24,000	= 22,400

(No. of orders  $\times$  Cost per order) (+) Carrying Cost

$\frac{100}{2} \times 480$	$\frac{80}{2} \times 560$
----------------------------	---------------------------

$\left( \frac{\text{EOQ}}{2} \times \text{Carrying cost/bag} \right)$

= 24,000	= 22,400
<u>₹ 48,000</u>	<u>₹ 44,800</u>

(3) Number of deliveries (orders)

A =  $\frac{2,000 \text{ bags}}{100 \text{ bags}} = 20.$   
 B =  $\frac{1,280 \text{ bags}}{80 \text{ bags}} = 16.$

Answer to Q. No. 10 :

Total Annual Requirement (tones)	Order Size (tonnes)	Price per tonne	No. of orders (1) ÷ (2)	Total cost of inventory (1) × (4)	Ordering Cost (4) × ₹1,200	Carrying Cost per tonne p.a. (2) × ½ × (3) × 20%	Total Cost (5) + (6) + (7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
5,000	400	1,400	12.5	70,00,000	15,000	56,000	70,71,000
	500	1,380	10	69,00,000	12,000	69,000	69,81,000
	1,000	1,360	5	68,00,000	6,000	1,36,000	69,42,000
	2,000	1,340	2.5	67,00,000	3,000	2,68,000	69,71,000
	3,000	1,320	1.67	66,00,000	2,000	3,96,000	69,98,000

Advice to Purchase Department : The above table shows that the most economical order size among the given options is 1,000 tonnes, as at this order size, the total cost is minimum. The purchase department should therefore place 5 order of 1,000 units each.

Answer to Q. No. 11 :

Standard Input-output ratio =  $\frac{12}{10} \times 100 = 120\%$

Actual Input-output ratio =  $\frac{2,000}{1,600} \times 100 = 125\%$

Standard Material Cost per unit of output =  $20 \times \frac{120}{100} = ₹ 24.$

Actual Material Cost per unit of output =  $20 \times \frac{125}{100} = ₹ 25$

The overall performance regarding use of material is lower than the standard. While the standard input-output ratio is 120% the actual ratio is 125% indicating inefficiency in material use. As a result actual material cost per unit of finished product is ₹ 25 against the standard cost of ₹ 24.

Answer to Q. No. 12 :

Assumption : It is assumed that the loss of 10 kgs. of material X and 20 kgs of material Y in the factory store is a normal handling loss chargeable to the output.

	Material X		Material Y	
	Quantity (kgs.)	Amount (₹)	Quantity (kgs)	Amount (₹)
Material Price	400	4,000	600	9,000
Sales tax @ 5%		200		450
Insurance @1%		40		90
Freight (in the ratio of weight)		88		132
Weight loss in handling	-10		-20	
Net Weight and Value	390 kgs.	₹ 4328	580 kgs.	₹ 9672

Issue rate for material X =  $4328 \div 390 = ₹ 11.10$  per kg. (approx.)

Issue rate for material Y =  $9672 \div 580 = ₹ 16.68$  per kg. (approx.)

Revised rate after providing for obsolesce :

Quantity available before obsolescence

Less : 10% provision for obsolescence

Net normal availability

Revised rate for X =  $4328 \div 351 = ₹ 12.33$  per kg. (approx.)

Revised rate for Y =  $9672 \div 522 = ₹ 18.53$  per kg. (approx.)

Material X	Material Y
390 kgs.	580 kgs.
-39	-58
<u>351 kgs.</u>	<u>522 kgs.</u>

COST ACCOUNTING		6.38	
CALCULATION OF COST OF MATERIAL			
Answer to Q. No. 13 :	Quantity Pieces	Amount ₹	
Purchase price of 1,000 pieces of sealing ring £ 2 i.e., ₹ 90 per piece (1£ = ₹ 45)	1,000	90,000	90,000
Custom duty @ 100% on invoice value		1,800	1,800
Clearing Charges		1,400	1,400
Freight Charges	1,000	1,83,200	1,83,200
	60	-	-
Less: Normal loss	940	1,83,200	1,83,200
Total Cost of Material			

Unit Cost of Material (per piece) =  $\frac{₹ 1,83,200}{940 \text{ pieces}} = ₹ 194.89$

*Treatment of 100 Pieces Rejected in Inspection*

Out of 100 pieces rejected, 60 pieces have been treated as normal loss by the management. Issue price has been inflated to recover the cost of normal loss from production as shown above. The cost of 40 remaining pieces @ ₹ 184.89 per piece has been treated as abnormal loss and should be debited to Costing Profit and Loss Account.

**Answer to Q. No. 14 :**

**(i) Re-ordering level (ROL)**

= Maximum consumption rate × Maximum lead time  
 = 20 units per day × 15 days  
 = 300 units

**(ii) Maximum level**

= ROL + ROQ - (Minimum consumption rate × Minimum lead time)  
 = 300 units + 200 units -  $\left[ \begin{matrix} 10 \text{ units per day} \times 5 \text{ days} \\ \text{(See Note-1)} \quad \quad \quad \text{(see Note-2)} \end{matrix} \right]$   
 = 450 units

**(iii) Minimum level**

= ROL - (Average consumption rate × Average lead time)  
 = 300 units - (15 units per day × 10 days)  
 = 150 units.

**Note-1**

$$ROQ = \sqrt{\frac{2 \times \text{Annual Consumption} \times \text{Cost of one order}}{\text{Storage cost per unit per annum}}}$$

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

**Note-2**

Average consumption =  $\frac{\text{Minimum Consumption} + \text{Max. consumption}}{2}$

15 units per day =  $\frac{\text{Minimum Consumption} + 20 \text{ units per day}}{2}$

Hence, minimum consumption per day = 10 units.

**Answer to Q. No. 15 :**

Annual Consumption (U) = 50 items × 365 days  
 = 18,250 units  
 Ordering Cost (P) = ₹ 50  
 Inventory Carrying cost per item per annum (S) = ₹ 0.02 × 365 = ₹ 7.30

(i) Economic Order Quantity =  $\sqrt{\frac{2U \times P}{S}}$   
 =  $\sqrt{\frac{2 \times 18,250 \times ₹ 50}{₹ 7.30}}$   
 = 500 units

(ii) Re-order Level = Maximum Usage per day × Maximum Lead Time  
 = 50 units per day × 32 days  
 = 1,600 items.

**Answer to Q. No. 16 :**

Presuming that all units were sold away, the percentage of profit will be as follows:

Category A	6,000 units × ₹ 4 =	₹ 24,000
Category B	4,000 units × ₹ 3 =	12,000
Category C	7,000 units × ₹ 2 =	14,000
	<b>Total Sales</b>	<b>50,000</b>
	<b>Total Cost</b>	<b>40,000</b>
	<b>Profit</b>	<b>10,000</b>

Percentage of Profit on Sales =  $\frac{10,000 \times 100}{50,000} = 20\%$

**COMPUTATION OF THE PURCHASE PRICE**

Material	S.P. per unit	Profit per unit	Cost per unit	Total Cost
A	₹ 4	₹ .80	₹ 3.20	₹ 19,200
B	3	.60	2.40	9,600
C	2	.40	1.60	11,200
				<b>40,000</b>

**Answer to Q. No. 17 :**

Minimum Level = Re-order level – (Average Rate of Consumption × Average Lead Time)  
 = 450 units – (50 units × 5 weeks) = 200 units.

Maximum Level = Re-order Level + Re-order Quantity – (Min. Usage Rate × Min. Lead Time)  
 = 450 units + 300 units – (25 units × 4 weeks)  
 = 650 units.

**Working Note:**

Re-order Level = Maximum Usage Rate × Maximum Lead Time  
 = 75 units × 6 weeks = 450 units.

**Answer to Q. No. 18 :**

Maximum Stock Level = Re-order Level – (Min. Consumption × Min. Lead Time) + Re-order Qty.  
 = 375 – (25 × 1) + 125  
 = 375 – 25 + 125 = 475 units.

Safety Stock or Minimum Stock Level = Re-order Level – (Average Usage Rate × Average Lead Time)  
 = 375 – (50 × 2)  
 = 375 – 100 = 275 units.



**Answer to Q. No. 19 :**

Materials Consumed	=	Opening Stock + Purchases - Closing Stock.
Material A	=	700 + 11,500 - 200 = 12,000 kg of ₹ 12,000.
Material B	=	200 + 11,000 - 1,200 = 10,000 litres of ₹ 10,000.
Material C	=	1,000 + 1,800 - 1,200 = 1,600 kg of ₹ 1,600.
Average Inventory	=	(Opening Stock + Closing Stock) / 2
Material A	=	(700+200)/2 = 450 kg of ₹ 450
Material B	=	(200 + 1,200) / 2 = 700 litres of ₹ 700
Material C	=	(1,000 + 1,200) / 2 = 1,100 kgs of ₹ 1,100.
Material Turnover Ratio	=	$\frac{\text{Value of materials consumed during a period}}{\text{Value of average inventory held}}$
Material A	=	12,000 / 450 = 26.67
Material B	=	10,000 / 700 = 14.29
Material C	=	1,600 / 1,100 = 1.46.
No. of days for which inventory in held	=	$\frac{\text{Days of the period}}{\text{Inventory turnover}}$
Material A	=	$\frac{365}{26.67} = 14 \text{ days (app.)}$
Material B	=	$\frac{365}{14.29} = 26 \text{ days (app.)}$
Material C	=	$\frac{365}{1.46} = 250 \text{ days}$

Material A is fast moving because it is held in the store for least number of days.

**Answer to Q. No. 20:** Cost of material in one unit of final product = Input output ratio × Material Price

$$\text{Cost of Material P} = \frac{125}{100} \times 30 = ₹ 37.50$$

$$\text{Cost of Material P}_2 = \frac{120}{100} \times 32 = ₹ 38.40$$

$$\text{Cost of Material P}_1 = \frac{150}{100} \times 28 = ₹ 42$$

$$\text{Cost of Material P}_3 = \frac{140}{100} \times 31 = ₹ 43.40$$

Of the above three substitutes material P<sub>2</sub> is most economical despite higher price. It is so due to higher productivity with P<sub>2</sub>. Use of substitute P<sub>2</sub> will result in an increase in material cost of ₹ 38.40 - 37.50 = ₹ 0.90 per unit in final product.

**Answer to Q. No. 21:**

$$\text{Average or Normal Weekly production} = \frac{1}{2} (200 + 250) = 225 \text{ units}$$

$$\begin{aligned} \text{(a) Minimum Level of X} &= \text{Reorder Level} - (\text{Normal usage} \times \text{Average Delivery Period}) \\ &= 7,000 - [225 \times 8] \times \frac{1}{2} (1 + 5) = 7,000 - (1,800 \times 3) = 1,600 \text{ kgs.} \end{aligned}$$

(b) Maximum Stock of Y = Reorder Level + Reorder quantity - (Minimum usage × Minimum Delivery Period).

$$= 5,000 + 6,000 - [(200 \times 5) \times 3] = 8,000 \text{ kgs.}$$

(c) Reorder Level of Z = Max. usage × Maximum Delivery Period =  $(10 \times 250) \times 4 = 10,000$  kgs.

(d) Average Stock of X =  $\frac{1}{2}$  (Minimum Stock + Maximum Stock)

We have already determined minimum stock level of X which is 1,600 kgs. Let us now find out maximum stock level of X. Maximum Stock Level of X = Reorder Level + Reorder Quantity - (Minimum Usage × Minimum Delivery Period)

$$= 7,000 + 10,000 - [(200 \times 8) \times 1] = 15,400 \text{ kgs.}$$

$$\text{Average stock of X} = \frac{1}{2} (1600 + 15400) = 8,500 \text{ kgs.}$$

**Answer to Q. No. 22:** Inventory carrying cost, i.e.,  $S = 15\% + 5\% + 20\% = 40\%$  of ₹ 10 = ₹ 4  
Ordering cost per order, i.e.,  $P = 50 + 30 + 20 + 25 = ₹ 125$

$$\text{EOQ} = \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 1,000 \times 125}{4}} = 250 \text{ units}$$

Total cost with EOQ = Purchase cost + Total storage cost + Total ordering cost

$$= [10 \times 1,000] + [(250 \div 2) \times 4] + [1,000 \div 250] \times 125 = 10,000 + 500 + 500 = ₹ 11,000$$

In case order size is 500 to avail 10% discount, then number of orders is  $1000 \div 500 = 2$ ;  
purchase price is  $10 \times 90\%$

= ₹ 9; and carrying cost is 40% of ₹ 9 = ₹ 3.60.

$$\text{Total cost} = [9 \times 1,000] + [(500 \div 2) \times 3.60] + [2 \times 125] = 9,000 + 900 + 250 = ₹ 10,150.$$

Thus order size of 500 units with 10% discount results in total cost saving of ₹ 11,000.

**Answer to Q. No. 23:** The general rule of estimation is :

$$\text{Average} = \frac{\text{Maximum} + \text{Minimum}}{2}$$

Minimum Daily Consumption =  $2 \times \text{Average daily consumption} - \text{Maximum daily consumption} = 2 \times 12 - 16 = 8$  units.

$$\text{Average Lead time} = \frac{\text{Maximum Lead time} + \text{Minimum Lead time}}{2} = \frac{10 + 6}{2} = 8 \text{ days}$$

$$\text{EOQ} = \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 4,000 \times 200}{\left(60 \times \frac{10}{100} + 4\right)}} = 400 \text{ units}$$

Reorder Level = Maximum Daily Consumption × Maximum Lead time =  $16 \times 10 = 160$  units

Safety Stock or Minimum Level = Reorder Level - (Average Daily Consumption × Average Lead time)  
=  $160 - (12 \times 8) = 64$  units

Maximum Level = Reorder Level + EOQ - (Minimum Daily Consumption × Minimum Lead time)  
=  $160 + 400 - (8 \times 6) = 512$  units

**Answer to Q. No. 24:** Annual Requirement = Daily requirement of bats × Working days in a year  
 = 40 × 300 = 12,000 bats

$$\text{Cost per bat} = \frac{\text{Cost per lot}}{\text{No. of bats per lot}} = \frac{60,000}{200} = ₹ 300$$

Ordering Cost per Order = Handling charges + freight = 150 + 250 = ₹ 400  
 Carrying Cost per bat = Annual interest cost per bat + Incremental carrying cost

$$= \left( 300 \times \frac{2}{100} \times 12 \right) + 8 = 72 + 8 = ₹ 80$$

$$\text{EOQ} = \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 12,000 \times 400}{80}} = 346.4 \text{ say } 346 \text{ bats}$$

$$\text{Number of Orders per annum} = \frac{\text{Annual Requirement of bats}}{\text{Bats per lot}} = \frac{12,000}{346} = 34.7$$

$$\text{Time gap between two orders} = \frac{365}{34.7} = 10.52 \text{ days or } 11 \text{ days (approx.)}$$

**Answer to Q. No. 25:**

	Material P ₹	Material Q ₹	Total ₹
Invoice Value	50,000	40,000	90,000
Sales tax @ 3% or apportioned in the ratio of value	1,500	1,200	2,700
Railway freight apportioned in the ratio of weight	250	400	650
Special handling costs	160	—	160
Other handling charges apportioned in the ratio of weight	100	160	260
	₹ 52,010	₹ 41,760	₹ 93,770
Quantity purchased	5,000 kg.	8,000 kg.	
Normal loss of material @ 5% and 10% respectively	-250	-800	
Materials effectively available for issue	4,750 kg.	7,200 kg.	

$$\text{Issue price of material P} = \frac{52,010}{4,750} = ₹ 10.95; \text{ Issue price for material Q} = \frac{41,760}{7,200} = ₹ 5.80$$

**Answer to Q. No. 26:**

(i)

Order size (Q) (Units)	No. of orders A/Q (Units)	Cost of purchase of A × per unit cost	Ordering cost $\frac{A}{Q} \times ₹12500$	Carrying cost $\frac{Q}{2} \times C \times$ 25%	Total cost (3+4+5)
(1)	(2)	(3)	(4)	(5)	(6)
40	12.5	48,00,000 (500 × 9600)	1,56,250	48,000 $\left(\frac{40}{2} \times 9600 \times 0.25\right)$	50,04,250
50	10	46,80,000 (500 × 9360)	1,25,000	58,500 $\left(\frac{50}{2} \times 9360 \times .25\right)$	48,63,500
100	5	45,60,000 (500 × 9120)	62,500	1,14,000 $\left(\frac{100}{2} \times 9120 \times .25\right)$	47,36,500
200	2.5	44,40,000 (500 × 8880)	31.25 (2.5 × 12500)	2,22,000 $\left(\frac{200}{2} \times 8880 \times 2.5\right)$	46,93,250
300	1.67	43,20,000 (500 × 8640)	20.875 (1.67 × 12500)	3,24,000 $\left(\frac{300}{2} \times 8640 \times 2.5\right)$	46,64,875

The above tables shows that the total cost of 500 units including ordering and carrying cost is minimum (₹ 46,64,875) where the order size is 300 units. Hence the most economical purchase level is 300 units.

(ii)  $EOQ = \sqrt{\frac{2 \times 500 \text{ tons} \times ₹ 12,500}{Rs.10,500 \times 25\%}} = 69 \text{ tonnes.}$

**Answer to Q. No. 27:**

U = 48,000 units

P = ₹ 45 per order

S = 15% × 1.20 = ₹ 0.18 per unit p.a.

(i)  $EOQ = \sqrt{\frac{2 \times 48,000 \times 45}{0.18}} = 4,899 \text{ units}$

(ii) (a) Re order level = Safety Stock + (Normal consumption × Normal Delivery time)  
 = 500 + (48,000 × 12 / 300)  
 = 500 + 1,920  
 = 2,420 units

(b) Maximum level = Re-order level + Re-order Quantity - (Minimum Consumption × Minimum Lead Time)  
 = 2,420 + 4899 - (12 × 4,800/300)  
 = 5,399 units

(c) Minimum Level = Re-order Level - (Normal Consumption × Normal Lead Time)  
 = 2,420 -  $\left(\frac{48,000}{800} \times 12\right)$

(d) Aver. inventory = 500 units  
 = Minimum level + ½ EOQ  
 = 500 + ½ 4899  
 = 2,950 units

**Answer to Q. No. 28:**

$$(a) \text{ EOQ} = \sqrt{\frac{2UP}{S}}$$

U = Annual Consumption Production = 24,000 bearings  
 P = Cost per order = ₹ 324  
 S = Carrying Cost = ₹ 0.10 × 12 = ₹ 1.20 per unit p.a.

$$= \sqrt{\frac{2 \times 24,000 \times 324}{1.2}}$$

$$= 3,600 \text{ units}$$

(b) Statement shown computation of extra cost, the co. would be incurring if it manufactures 6000 units per run.

	6,000 units	3,600 units
Annual Set up costs $\left(\frac{24,000}{6,000} \times 324\right)$	1,296	
$\left(\frac{24,000}{3,600} \times 324\right)$		2,160
Annual Carrying Costs $\left(\frac{6,000}{2} \times 1.20\right)$	3,600	
$\left(\frac{3,600}{2} \times 1.20\right)$	—	<u>2,160</u>
	<u>4,896</u>	<u>4,320</u>

Extra cost of ₹ 576

**Answer to Q. No. 29:**

Purchase Cost (1,000 × 10)  
 Transport charges  
 Total Cost

₹  
 10,000  
2,000  
12,000

Total input purchased = 1,000 kgs.  
 (-) Normal loss =  $\frac{77 \text{ kgs.}}{923 \text{ kgs.}}$   
 Normal consumption

Hence, unit Cost of raw material =  $\frac{\text{Rs. } 12,000}{923 \text{ Kgs.}} = ₹ 13 \text{ per kg.}$

Out of 923 Kgs, 800 Kgs. will be used in various jobs and as such the materials cost chargeable to the jobs will be 800 Kgs. × ₹ 13 per Kg = ₹ 10,400.  
 Quantity abnormally spoiled is 123 Kgs. and as such the amount charged to P & L A/c is 123 × 13 = ₹ 1,599 or say ₹ 1,600.

**Answer to Q. No. 30:**

Annual Usage (U) = 2,000 Pieces.  
 Cost of one order (P) = ₹ 40

Carrying Cost per piece p.a. (S) = ₹ 10 ×  $\frac{10}{100}$   
 = ₹ 1

$$\text{EOQ} = \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 2,000 \times 40}{1}} = 400 \text{ Pieces.}$$

Total Inventory Cost

$$= \text{Purchase Cost} + \sqrt{2UPS}$$

$$= (2,000)(10) + \sqrt{2 \times 2,000 \times 40 \times 1}$$

$$= ₹ 20,400$$

If 2,000 Kgs. are purchased in single order with 3% discount, total inventory cost is Computed below—

Purchase Cost (2,000 × ₹ 9.7)	₹
Ordering Cost (1 Order)	19,400
Carrying Cost $\left(\frac{2,000}{2} \times 10\% \text{ of } 9.7\right)$	40
	<u>970</u>

**Conclusion:** There is extra cost of ₹ 10 per annum. 20,410

**Answer to Q. No. 31:**

Annual Usage (U) = 90,000 units.

Cost of One order (P) = ₹ 300

Inventory Carrying cost p.u. p.a. (S) = ₹ 6

(i)  $EOQ = \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 90,000 \times 300}{6}}$   
 = 3,000 units.

(ii) **Discount offer of 2%**

Presently, we order 3,000 units each time and there are total number of 30 orders. The present total inventory cost is computed below —

Purchase Cost (90,000 units × ₹ 3 per unit)	₹
Ordering Cost (30 orders × ₹ 300)	2,70,000
Carrying Cost $\left(\frac{3,000 \text{ units}}{2} \times ₹ 6\right)$	9,000
	<u>9,000</u>
	<u>2,88,000</u>

In case 4,500 units are purchased each time with 2% discount, total inventory cost would have been —

Purchase Cost (90,000 units × ₹ 2.94)	₹
Ordering Cost (20 orders × ₹ 300)	2,64,600
Carrying Cost $\left(\frac{4,500 \text{ units}}{2} \times ₹ 6\right)$	6,000
	<u>13,500</u>
	<u>2,84,100</u>

The discount offer will reduce total inventory cost to the extent of ₹ 3,900 (2,88,000 – 2,84,100)

**Discount offer of 3%**

Hence 6,000 units are to be purchased each time and there will be total number of 15 orders.

Purchase Cost (90,000 units × ₹ 2.91)	₹
Ordering Cost (15 orders × ₹ 300)	2,61,900
Carrying Cost $\left(\frac{6,000}{2} \times ₹ 6\right)$	4,500
	<u>18,000</u>
	<u>2,84,400</u>

The discount offer will reduce total inventory cost to the extent of ₹ 3,600 (2,88,000 – 2,84,400).

**Conclusion:** The discount offer of 2% is more profitable.

**Answer to Q. No. 32:**

Types of Cost	Order Size (Units)				
	100	200	600	1200	2400
Purchase Cost	$2400 \times 0.80 = 1,920$	$2400 \times 0.80 = 1,920$	$2400 \times 0.76 = 1824$	$2400 \times 0.72 = 1,728$	$2400 \times 0.72 = 1,728$
Ordering Cost	$24 \times 5 = 120$	$12 \times 5 = 60$	$4 \times 5 = 20$	$2 \times 5 = 10$	$1 \times 5 = 5$
Storage & Carrying Cost	$\frac{100}{2} \times 0.25 = 12.5$	$\frac{200}{2} \times 0.25 = 25$	$\frac{600}{2} \times 0.25 = 75$	$\frac{1200}{2} \times 0.25 = 150$	$\frac{2400}{2} \times 0.25 = 300$
<b>Total</b>	<b>2,052.5</b>	<b>2,005</b>	<b>1,919</b>	<b>1,888</b>	<b>2,033</b>

**Conclusion:** Ideal order size is 1200 units because total inventory cost is least in its case.

**Answer to Q. No. 33:**

$$\begin{aligned} \text{Annual requirement (U)} &= 2000 \times 12 \\ &= 24,000 \text{ packets} \end{aligned}$$

$$\text{Storage \& Carrying Cost per packet per annum (s)} = \text{Rs. } 10 \times \frac{10}{100} = \text{₹ } 1$$

$$\text{Cost of one order (P)} = \text{₹ } 1.20$$

$$\begin{aligned} \text{(a) (i) EOQ} &= \sqrt{\frac{2UP}{S}} \\ &= \sqrt{\frac{2 \times 24,000 \times 1.20}{1}} = 240 \text{ packets} \end{aligned}$$

$$\begin{aligned} \text{(ii) Ordering and Carrying Cost} &= \sqrt{2UPS} \\ &= \sqrt{2 \times 24,000 \times 1.20 \times 1} \\ &= \text{₹ } 240 \end{aligned}$$

$$\begin{aligned} \text{(b) Re-order Level} &= \text{Buffer Stock} + \text{Avg. requirement during lead time} \\ &= \text{NIL} + \left( \frac{24,000 \text{ Units}}{360 \text{ days}} \times 3 \text{ days} \right) \\ &= 200 \text{ units.} \end{aligned}$$

The new order should be placed immediately.

**Answer to Q. No. 34:**

$$\text{Annual Usage (U)} = 48,000 \text{ components}$$

$$\text{Cost of our order (P)} = \text{₹ } 120$$

$$\text{Storage and Carrying Cost per component per annum (S)} = 10\% \text{ of ₹ } 20 = \text{₹ } 2$$

$$\begin{aligned} \text{(i) EOQ} &= \sqrt{\frac{2UP}{S}} \\ &= \sqrt{\frac{2 \times 48,000 \times 120}{2}} \\ &= 2,400 \text{ components.} \end{aligned}$$

$$\begin{aligned} \text{(ii) Ordering and Carrying Cost at EOQ purchase} \\ \text{level} &= \sqrt{2UPS} \end{aligned}$$

$$= \sqrt{2 \times 48,000 \times 120 \times 2}$$

$$= ₹ 4,800$$

However, if 4,000 units are purchased in one order, the relevant cost is computed below –

Ordering Cost $\left( \frac{48,000}{4,000} \times 120 \right)$	₹
	1,440
Carrying Cost $\left( \frac{4,000}{2} \times 2 \right)$	<u>4,000</u>
Excess Cost = 5,440 – 4,800	<u>5,440</u>
= ₹ 640.	

**Answer to Q. No. 35:**

Annual Requirement (U) = 7500 dolls.

Cost of one order (P) = 60 + 250 = ₹ 310

Storage and Carrying Cost per unit p.a. (S) = ₹ 7.60 + 24% of ₹ 10 = ₹ 10.

Purchase Cost per doll =  $\frac{1200}{120} = ₹ 10$

$$EOQ = \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 7500 \times 310}{10}}$$

$$= 682 \text{ dolls}$$

$$\text{No. of orders} = \frac{7500}{682} = 11$$

$$\text{Time gap between two orders} = \frac{365}{11}$$

$$= 33 \text{ days}$$

**Answer to Q. No. 36:**

**CALCULATION OF THE ANNUAL COST OF EXISTING INVENTORY POLICY**

	₹
Ordering cost of 6 orders @ ₹ 25 per order	150
Carrying cost @ 20% $\left( \text{i.e. } \frac{36,000}{6} \times ₹ 1 \times \frac{1}{2} \times \frac{20}{100} \right)$	600
Annual cost (excluding purchase price of material)	<u>750</u>

**Calculation of Economic Order Quantity**

$$EOQ = \sqrt{\frac{2UP}{S}}$$

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

$$= 3,000 \text{ units.}$$



## COST ACCOUNTING

6.48

## CALCULATION OF THE ANNUAL COST IF ORDER IS PLACED FOR E.O.Q.

	₹
Ordering cost for 12 orders $\left( \text{i.e. } \frac{36,000 \text{ units}}{3,000 \text{ units}} \right)$ @ ₹ 25 per order	300
Carrying cost @ 20% $\left( \frac{1}{2} \times 3,000 \text{ units} \times ₹ 1 \times 20\% \right)$	300
Total annual cost (excluding purchase price of material)	600

## CALCULATION OF SAVING IN COST BY E.O.Q.

	₹
Annual cost of existing inventory policy (i.e. annual requirement of 36,000 units is purchased in 6 instalments)	750
Less: Annual cost by following E.O.Q.	600
Saving in cost by E.O.Q.	150

Answer to Q. No. 37:

## CALCULATION OF TOTAL COST OF MATERIAL

(If a single order is placed for 2,000 units of annual requirement)

	₹	₹
Material purchase price ₹ 2,000 units @ ₹ 10	20,000	
Less: Discount @ 3%	600	19,400
Ordering Cost for placing one order		40
Carrying Cost @ 10% for average inventory i.e. $\frac{1}{2} \times ₹ 19,400 \times 10\%$		970
Total Cost of Material		20,410

If E.O.Q. is followed

$$\text{EOQ} = \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 2,000 \times ₹ 40}{10\% \text{ of } ₹ 1}}$$

$$= 400 \text{ units}$$

$$\text{No. of orders per year} = \frac{2,000}{400} = 5.$$

## CALCULATION OF TOTAL COST OF MATERIAL IF E.O.Q. IS FOLLOWED

	₹
Material purchase price : 2,000 units @ ₹ 10	20,000
Ordering cost for 5 orders @ ₹ 40	200
Carrying cost @ 10% for average inventory $\left( \frac{1}{2} \times 400 \times ₹ 10 \times 10\% \right)$	200
	20,400

The proposed of the purchase manger of placing a single order should not be accepted because it gives higher cost of ₹ 20,410 as compared to ₹ 20,400 if five orders are placed by following E.O.Q.

**Answer to Q. No. 38:**

(i) Economic Order Quantity (EOQ) =  $\sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 60,000 \times 600}{2}}$

=  $\sqrt{3,60,00,000}$

= **6,000 units**

(ii) No. of order to be placed =  $\frac{\text{Annual Requirement}}{\text{E.O.Q.}}$

=  $\frac{60,000}{6,000} = \mathbf{10 \text{ orders}}$

(iii) Total Cost = Total Ordering cost + Carrying Cost  
 = ₹ 600 × 10 orders + 3,000 (Average Inventory) × ₹ 2.  
 = ₹ 6,000 + ₹ 6,000 = **₹ 12,000**

**Answer to Q. No. 39:**

Optimum Order Quantity =  $\sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 1,00,000 \times ₹ 500}{4}}$

=  $\sqrt{2,50,00,000}$

= **5,000 units**

**Alternative (1)**

Total Annual Cost by placing order of 5,000 units	20,00,000
Purchase price of 10,000 bags @ ₹ 20 per bag	10,000
Ordering cost (20 lots @ ₹ 500)	<u>10,000</u>
Carrying cost (2,500 units × ₹ 4)	<u>20,20,000</u>

**Alternative (2)**

Total Annual Cost by placing order for 10,000 bags	19,90,000
Purchase price of 1,00,000 bags @ ₹ 19.90 (₹ 20 - ₹ 0.10)	5,000
Ordering Cost (10 orders × ₹ 500)	<u>19,900</u>
Carrying cost (5,000 × 20% of ₹ 19.90)	<u>20,14,900</u>

Alternative (2) is better as the Total Annual Cost is less ₹ 5,100.

**Answer to Q. 40.**

Annual usage (U) = 9,600 units

Cost of one order (P) = ₹ 60

Carrying cost per piece p.a. (S) = ₹ 5

EOQ =  $\sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 9,600 \text{ units} \times ₹ 60}{₹ 5}} = \mathbf{480 \text{ units}}$

	₹
<b>Total Cost at EOQ purchased level</b>	4,80,000
Purchase Cost (9,600 units × ₹ 50)	1,200
Ordering Cost $\left(\frac{9,600 \text{ Units}}{480 \text{ Units}} \times ₹ 60\right)$	1,200
Carrying Cost $\left(\frac{480 \text{ Units}}{2} \times ₹ 5\right)$	<u>4,82,400</u>
<b>Total Cost</b>	<u>4,82,400</u>

It is given to us that the supplier is ready to sell the product at ₹ 48 per unit if 9,600 units are obtained in 2 orders of 4,800 units each. The amount of total cost in such a case is computed below :

	₹
Pruchase Cost (9,600 units × ₹ 48)	4,60,800
Ordering Cost (2 orders × ₹ 60)	120
Carrying Cost $\left(\frac{4,800 \text{ Units}}{2} \times ₹ 5\right)$	12,000
<b>Total Cost</b>	<u>4,72,920</u>

It is also given to us that the supplier is ready to sell the product at ₹ 47 per unit if entire requirement of 9,600 units is obtained in one order. The amount of total cost in such a case is computed below :

	₹
Purchase Cost (9,600 units × ₹ 47)	4,51,200
Ordering Cost (1 order)	60
Carrying Cost $\left(\frac{9600 \text{ Units}}{2} \times ₹ 5\right)$	24,000
<b>Total Cost</b>	<u>4,75,260</u>

**Conclusion :**

The best course of action is to purchase at ₹ 48 per unit. However, before taking final decision, following other factors should be considered :

- (1) It is to be examined whether the product will be spoiled if stored for a very long period.
- (2) Whether sufficient storage space is available ?

**Answer to Q. No. 41.**

Annual Usage (U) = 2,000 units  
 Cost of one order (P) = ₹ 50

Inventory carryong cost per unit p.a. (S) =  $20 \times \frac{25}{100} = ₹ 5$

EOQ =  $\sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 2,000 \text{ Units} \times ₹ 50}{₹ 5}} = 200 \text{ units.}$

The amount of total inventory cost at EOQ purchase level is –

	₹
Purchase Cost (2,000 units × ₹ 20)	40,000
Ordering Cost $\left[\left(\frac{2000 \text{ Units}}{200 \text{ Units}} = 10 \text{ orders}\right) (\₹ 50)\right]$	500
Carrying Cost $\left(\frac{200 \text{ Units}}{2} \times ₹ 5\right)$	500
<b>Total Cost</b>	<u>41,000</u>

We are given in the question that the supplier is ready to give discount of 3% if 1,000 units are purchased in each order. The amount of Total Inventory Cost in such a case is computed below :

Purchase Cost (2,000 units × ₹ 19.4)	₹
Ordering Cost (2 orders × ₹ 50)	38,800
Carrying Cost $\left(\frac{1,000 \text{ Units}}{2} \times ₹ 19.4 \times \frac{25}{100}\right)$	100
	2,425
<b>Conclusion :</b>	<b>Total Cost</b>
	<b><u>41,325</u></b>

The discount offer, if accepted, will lead to increase in total inventory cost by ₹ 325. Therefore, the discount offer is to be rejected.

**Ans. to Q.42 :**

Annual Usage (U) = 2,000 units  
 Cost per order (P) = ₹ 20  
 Storage and Carrying Cost per unit p.a. (S) = ₹ 20 ×  $\frac{10}{100}$  = ₹ 2

$$EOQ = \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 2,000 \times 20}{2}} = 200 \text{ units}$$

**Total Inventory Cost**

Purchase Cost (2,000 units × ₹ 20)	= ₹ 80,000
Ordering Cost $\left[\frac{2,000 \text{ units}}{200 \text{ units/order}} \times ₹ 20/\text{order}\right]$	= ₹ 200
Carrying Cost $\left[\frac{200 \text{ units}}{2} \times ₹ 2 \text{ p.u. p.a.}\right]$	= ₹ 200
	<b><u>₹ 80,400</u></b>

Note : This information given in the question regarding "lead time" is not relevant.

**Ans. to Q.43.**

Annual Usage (U) = 12,500 × 4 = 50,000 units  
 Cost per order (P) = ₹ 45  
 Carrying Cost p.u. p.a. (S) = ₹ 1.2 ×  $\frac{15}{100}$  = 0.18

$$EOQ = \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 50,000 \times 45}{0.18}} = 5,000 \text{ units}$$

(i) Existing ordering and carrying cost is computed below :  
 Ordering Cost (4 orders × ₹ 45 / order) = ₹ 180  
 Carrying Cost  $\left(\frac{12,500 \text{ units}}{2} \times 0.18 \text{ p.u. p.a.}\right)$  = ₹ 1,125  
 Total = ₹ 1,305

(ii) At EOQ level, the ordering and carrying cost is computed below :  
 Ordering Cost  $\left[\frac{50,000 \text{ units}}{5,000 \text{ units / order}} \times ₹ 45 / \text{order}\right]$  = ₹ 450  
 Carrying Cost  $\left[\frac{5,000 \text{ units / order}}{2} \times 0.18 \text{ p.u. p.a.}\right]$  = ₹ 450  
 Total = ₹ 900

Hence, saving by adopting EOQ policy is ₹ 405 (₹ 1,305 - ₹ 900).

**Ans. to Q. 44.**

$$\begin{aligned} \text{Annual Usage (U)} &= 4,000 \text{ units p.m.} \times 12 \text{ months} \times 1 \text{ k.g. per unit} = 48,000 \text{ kgs.} \\ \text{Cost per order (P)} &= ₹ 20 \times \frac{10}{100} = ₹ 2 \end{aligned}$$

Carrying Cost per kg. p.a. (S)

$$= ₹ 120$$

$$= 2,400 \text{ kgs.}$$

$$(i) \text{ EOQ} = \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 48,000 \times 2}{120}}$$

(iii) The aggregate of ordering and carrying cost is at minimum level when EOQ policy is adopted. It is computed below :

$$\text{Ordering Cost} \left[ \frac{48,000 \text{ kgs.}}{2,400 \text{ kgs./order}} \times ₹ 2 \text{ per kg. p.a.} \right] = ₹ 2,400$$

$$\text{Carrying Cost} \left[ \frac{2,400 \text{ kgs.}}{2} \times ₹ 2 \text{ per kg. p.a.} \right] = ₹ 2,400$$

$$= ₹ 4,800$$

(ii) If 4,000 kgs. are purchased in each order, the aggregate of ordering and carrying cost is computed below :

$$\text{Ordering Cost} \left[ \frac{48,000 \text{ kgs.}}{4,000 \text{ kgs./order}} \times ₹ 2 \text{ per kg. p.a.} \right] = ₹ 1,440$$

$$\text{Carrying Cost} \left[ \frac{4,000 \text{ kgs.}}{2} \times ₹ 2 \text{ per kg. p.a.} \right] = ₹ 4,000$$

$$= ₹ 5,440$$

Hence, extra cost = 5,440 - 4,800 = ₹ 640

**Ans. to Q. 45.**

Annual Usage (U)  
Cost per order (P)

$$= 8,000 \text{ units}$$

$$= ₹ 200$$

$$\text{Carrying Cost p.u. p.a. (S)} = ₹ 400 \times \frac{20}{100}$$

$$= ₹ 80$$

$$(i) \text{ EOQ} = \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 8,000 \times 200}{80}}$$

$$= 200 \text{ units}$$

(ii) At EOQ level, the amount of total inventory cost is computed below :

$$\text{Purchase Cost (8,000 units} \times ₹ 400 \text{ / unit)} = ₹ 32,00,000$$

$$\text{Ordering Cost} \left( \frac{8,000 \text{ units}}{200 \text{ units / order}} \times ₹ 200 \text{ / order} \right) = ₹ 8,000$$

$$\text{Carrying Cost} \left( \frac{200 \text{ units}}{2} \times ₹ 80 \text{ p.u. p.a.} \right) = ₹ 8,000$$

$$= ₹ 32,16,000$$

Discount of 4% will be available if 4,000 units are purchased in each order. In such a case, total inventory cost is computed below :

$$\text{Purchase Cost (8,000 units} \times ₹ 384 \text{ / unit)} = ₹ 30,72,000$$

$$\text{Ordering Cost (2 orders} \times ₹ 200 \text{ / order)} = ₹ 400$$

$$\text{Carrying Cost} \left[ \frac{4,000 \text{ units}}{2} \times \left( ₹ 384 \times \frac{20}{100} \right) \right] = ₹ 1,53,600$$

$$= ₹ 32,26,000$$

The discount offer should not be accepted as it may lead to increase in cost to the extent of ₹ 10,000 (₹ 32,26,000 - ₹ 32,16,000).

**Ans. to Q.46.**

Annual Usage (U) = 72,000 reams  
 Cost per order (P) = ₹ 500

Carrying Cost per ream p.a. (S) = ₹ 90 ×  $\frac{5}{100}$  = ₹ 4.5

(i)  $EOQ = \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 72,000 \times 500}{4.5}} = 4,000 \text{ reams}$

(ii) Re-order Level = Safety Stock + (Average usage rate) (Average Lead time)  
 = NIL +  $\left(\frac{72,000 \text{ reams}}{300 \text{ days}}\right)(20 \text{ days}) = 4,800 \text{ reams}$

(iii) Total Inventory Cost (at EOQ level)  
 Purchase Cost (72,000 pcs. X ₹ 90 / pc) = ₹ 64,80,000  
 Ordering Cost  $\left(\frac{72,000}{4,000} \times 500\right) = ₹ 9,000$   
 Carrying Cost  $\left(\frac{4,000 \text{ reams}}{2} \times ₹ 4.5\right) = ₹ 9,000$   
**₹ 64,98,000**

Total Inventory Cost (at 1% discount)  
 Purchase Cost (72,000 x ₹ 89.10) = ₹ 64,15,200  
 Ordering Cost (4 orders x ₹ 500) = ₹ 2,000  
 Carrying Cost  $\left[\frac{18,000 \text{ reams}}{2} \left(₹ 89.10 \times \frac{5}{100}\right)\right] = ₹ 40,095$   
**₹ 64,57,295**

Hence, the discount offer should be accepted as it will reduce total inventory cost to the extent of ₹ 40,705 (₹ 64,98,000 – ₹ 64,57,295).

**Ans. to Q.47.**

We know that –

Total Carrying Cost =  $\left(\frac{EOQ}{2}\right) \times (\text{Carrying Cost p.u. p.a.})$

₹ 9,000 =  $\left(\frac{EOQ}{2}\right) (₹ 3.6)$

Hence,  $EOQ = \frac{2 \times 9,000}{3.6} = 5,000 \text{ units.}$

**Ans. to Q.48**

Annual Usage (U) = 4,000 units  
 Cost per order (P) = ₹ 135  
 Carrying Cost p.u. p.a. (S) = ₹ 12

(a)  $EOQ = \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 4,000 \times 135}{12}} = 300 \text{ units}$

Total Relevant Cost = ₹ 1,800

Ordering Cost  $\left[\frac{4,000 \text{ units}}{300 \text{ units / order}} \times ₹ 135 / \text{order}\right] = ₹ 1,800$

Carrying Cost  $\left(\frac{300 \text{ units}}{2} \times ₹ 12 \text{ p.u. p.a.}\right) = ₹ 3,600$

$$\begin{aligned}
 \text{(b) Revised EOQ} &= \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 4,000 \text{ units} \times ₹ 80}{₹ 12 \text{ p.u. p.a.}}} &= 231 \text{ units} \\
 \text{Ordering Cost} &\left( \frac{4,000}{231} \times ₹ 135 / \text{order} \right) &= ₹ 2,338 \\
 \text{Carrying Cost} &\left( \frac{231 \text{ units}}{2} \times ₹ 12 \right) &= ₹ 1,386 \\
 &&= ₹ 3,724
 \end{aligned}$$

(c) We are given that purchase price is ₹ 86 per unit if the entire requirement of 4,000 units are purchased in single order. Total Inventory Cost, in such a case, is computed below :

$$\begin{aligned}
 \text{Purchase Cost (4,000 units} \times ₹ 86 / \text{unit)} &= ₹ 3,44,000 \\
 \text{Ordering Cost} &= \text{NIL} \\
 \text{Carrying Cost} &\left( \frac{4,000 \text{ units}}{2} \times ₹ 12 \text{ p.u. p.a.} \right) = ₹ 24,000 \\
 &= ₹ 3,68,000
 \end{aligned}$$

On the other hand, Total Inventory Cost at EOQ level is

$$\begin{aligned}
 \text{Purchase Cost (4,000 units} \times ₹ 90) &= ₹ 3,60,000 \\
 \text{Ordering \& Carrying Cost (computed above)} &= ₹ 3,600 \\
 &= ₹ 3,63,600
 \end{aligned}$$

The discount offer should not be accepted as it may lead to increase in cost to the extent of ₹ 4,400 (₹ 3,68,000 – ₹ 3,63,600).

## LABOUR COST

- Q.1.** There are two piece workers, Mr. X and Mr. Y who are paid ₹ 5 for each piece work executed which costs ₹ 15 per piece in material. In a working day of 8 hours, Mr. X can complete 4 pieces and Mr. Y only 3. If the overhead charges be ₹ 1.50 each per hour show which of the two piece workers is more useful to the factory. Also indicate the circumstances in which the less efficient worker may be employed.
- Q.2.** Two fitters, a labourer, and a boy undertake a work on piece-work for ₹ 600. The time by each of them is 220 ordinary working hours and the rates of pay are for the two fitters ₹ 0.75 each per hour, for labourer ₹ 0.25 per hour and for the boy ₹ 0.25 per hour. Ascertain the amount of the piece-work premium and show the amount of it which each worker will receive when it is divided proportionately to the time wages paid, and show in each case the percentage the premium bears to the wages payments at ordinary rates.
- Q.3.** The standard time taken to complete a product is 12 hours at 25 p. per hour. Time wages are allowed to workers taking more than the time allowed. But workers who complete the job in standard time or less receive a straight piece work rate plus 10% bonus. Calculate the wages earned by A, B, C and D who complete the job in 15, 12, 10 and 8 hours respectively. What will be their effective hourly rate? If the overhead rate chargeable to production is ₹ 0.50 per hour, what will be the "Cost of Conversion" (Labour and Overhead) per piece produced by each worker?
- Q.4.** Calculate the earnings of A and B from the following particulars for a month and allocate the labour cost to each job X, Y and Z.

		A	B
(i)	Basic Wages	₹ 100	₹ 160
(ii)	Dearness Allowance	₹ 50	₹ 80
(iii)	Employer's contribution to P.F. (on basic wages)	10%	10%
(iv)	Overtime	10 hours	

The normal working hours for the month are 200. Overtime is paid at double the total of normal wages and dearness allowance. The employer's contribution to P.F. are at equal rates as compared to employee's contribution.

The two workers are employed on jobs X, Y and Z in the following proportions :

	Jobs		
	X	Y	Z
Worker A (excluding Overtime)	40%	30%	30%
Worker B	50%	20%	30%

The overtime was done on Job Y only.



Q.5. A worker is paid 50 paise per hour and the 5 days working week contains 42 hours. The daily allowance for approved absence from his place of work is 12 minutes and his job card shows that his time chargeable during the week to various jobs is as follows :-

Job No.	Hours
305	20
310	10
320	8

The unaccounted time is caused by abnormal factors. Show how his wages for the week would be dealt with in cost accounts.

Q.6. Find out what an average labourer costs the employer for a month of 208 hours, assuming 8 hours a day, from the following:

Average basic wage per hour	₹ 60
Average D.A. per hour	₹ 10
Number of unpaid holidays, in a year	24
Number of other unpaid holidays- festivals - in a year	3
Number of days sick leave with half pay (in a year)	15
Employer's contribution to provident fund $7\frac{1}{4}\%$ of basic wages and D.A.	
Other amenities per month	210

Q.7. Calculate the wages payable to a workman from the following data:

Days	Hours Worked	Days	Hours Worked
Monday	8	Thursday	11
Tuesday	10	Friday	9
Wednesday	9	Saturday	4
Normal Working Hours	8 hours per day		
Normal Rate	₹ 5 per hour		
Overtime Rate	Upto 9 hours in a day at single rate and over 9 hours in a day at double rate		

Or

Upto 48 hours per week at a single rate and over 48 hours at double rate, whichever is more beneficial to the workman.

Q.8. The standard time allowed for a certain piece of work is 300 hours. Normal wages is paid at time rate which is ₹ 0.60 per hour and bonus plan on the following lines is also applicable :

Time Saved	Bonus
Upto 20% of time allowed	10% of time saved
Next 40% of time allowed	20% of time saved
Balance	30% of time saved

Calculate the total earnings of a worker over the piece of work and his earnings per hour when he takes a) 320 hours; b) 255 hours; c) 150 hours; d) 90 hours respectively.

**Q.9.** An employee working under a bonus scheme saves 10 hours in a job for which the standard time is 60 hours. Calculate the rate per hour worked and wages payable to a worker if incentive bonus of 10% on the hourly rate is payable when standard time (namely, 100% efficiency) is achieved, and a further incentive bonus of 1% on hourly rate for each 1% in excess of that 100% efficiency is payable. Assume that the normal rate payment is ₹ 5 per hour.

**Q.10.** From the following data calculate total monthly remuneration of 3 workers X, Y and Z :

- (i) Standard production per month per worker is 1,000 units.
- (ii) Actual production during a month :  
X-800 units; Y-700 units; Z-900 units.
- (iii) Piece-work rate per unit of actual production 15 paise.
- (iv) D.A. ₹ 40 per month (fixed).
- (v) House rent allowance : ₹ 20 per month (fixed).
- (vi) Additional production bonus at the rate of ₹ 5 for each percentage of actual production exceeding 75% of standard.

**Q.11.** A company employs its workers for a single shift of 8 hours per day for maximum of 25 days in a month. The standard output is 40 units per day. The basic wage rate is ₹ 3 per unit subject to minimum of ₹ 80 per day. Dearness Allowance is ₹ 40 per day. If the level of efficiency is more than 80%, bonus of ₹ 50 for every 1% increase above 80% is payable.

The details of performance of 2 workers for a particular month are as follows :-

<u>Worker</u>	<u>Days worked</u>	<u>Output (units)</u>
A	25	820
B	18	400

Compute total earnings of both the workers for the month.

**Q.12.** The standard hours of job X is 100 hours. The job has been completed by Amar in 60 hours, Akbar in 70 hours and Anthony in 95 hours. The bonus system applicable to the job is as follows:

<b>Percentage of time saved to time allowed</b>	<b>Bonus</b>
Saving upto 10%	10% of time saved
From 11% of 20%	15% of time saved
From 21% to 40%	20% of time saved
From 41% to 100%	25% of time saved

The rate of pay is ₹ 10 per hour. Calculate the total earnings of each worker and also the rate of earnings per hour.

**Q.13.** A worker produced 200 units in a week's time. The guaranteed weekly wage payment for 45 hours is ₹ 81. The expected time to produce one unit is 15 minutes which is raised further by 20% under the incentive scheme. What will be the earnings per hour of that worker under Halsey (50% sharing) and Rowan bonus scheme ?

**Q.14.** A job can be completed either through workman A or B. A takes 32 hours to complete the job while B finishes it in 30 hours. The standard time to finish the job is 40 hours. The hourly wage rate is same for both the workers. In addition workman A is entitled to receive bonus according to Halsey Plan (50% sharing) while B is paid bonus as per Rowan Plan. The works overheads are absorbed on the job at ₹ 7.50 per labour hour worked. The factory cost of the job comes to ₹ 2,600 irrespective of the workman engaged. Find out hourly wage rate and cost of raw material input.

**Q.15.** A skilled worker in XYZ Ltd. is paid a guaranteed wage rate of ₹ 30 per hour. The standard time per unit for a particular product is 4 hours. Mr. P has been paid wages under the Rowan Plan and he had earned an effective hourly rate of ₹ 37.50. What could have been his total earnings and effective hourly rate, had he been put on Halsey Incentive Scheme.

**Q.16.** From the following particulars you are required to work out the earnings of a worker for a week under a) Straight piece-rate; b) differential piece-rate; c) Halsey premium scheme (50% sharing) and d) Rowan premium scheme.

Weekly working hours	48
Hourly wage rate	₹ 7.50
Normal time taken per piece	24 minutes
Normal output per week	120 pieces
Actual output per week	150 pieces
Differential piece-rate (on all pieces)	80% of piece-rate when output below normal and 120% of piece rate when output above normal.

**Q.17.** ZED Limited is working by employing 50 skilled workers. It is considered to introduce the incentive scheme—either Halsey scheme (with 50% bonus) or Rowan scheme of wage payment for increasing the labour productivity to cope up the increasing demand for the product. It is believed that proposed incentive scheme could bring about an average 20% increase over the present earnings of the workers; it could act as sufficient incentive for them to produce more.

Because of assurance, the increase in productivity has been observed as revealed by the figures for the month of April, 2014.

Hourly rate of wages (guaranteed)	₹ 30
Standard time to produce one unit	1.975 hours
Number of working days in the month	24
Number of working hours per day of each worker	8
Actual production during the month	6,120 units

**Required :**

- Calculate the effective rate of earnings under the Halsey scheme and the Rowan scheme.
- Calculate the savings to the ZED Limited in terms of direct labour cost per piece as compared to straight piece rate.
- Advise Zed Limited about the selection of the scheme to fulfil the assurance.

**Q.18.** The existing incentive system of a company is as under :—

- Normal working week: 5 days of 8 hours each plus 3 late shifts of 3 hours each.
- Rate of Payment  
Day Work : ₹ 160 per hour  
Late Shift : ₹ 225 per hour.
- Average output per operator for 49 hours week : 120 articles.

In order to increase output and eliminate overtime, it was decided to switch on to a system of payment by results. The following information is obtained:

- Time rate : ₹ 160 per hour
- Basic time allowed for 15 articles : 5 hours
- Piece Work Rate : Add 20% to basic piece-rate
- Standard time per piece for Rowan and Halsey scheme: Add 50% to basic time.
- Output obtained by working 40 hours in a week: 135 articles.

Prepare a statement showing hours worked, weekly earnings, number of articles produced and labour cost per articles under the following system:-

- (a) Existing time-rate
- (b) Straight piece-work
- (c) Rowan System
- (d) Halsey System

Q.19. A Company is undecided as to what kind of wage scheme should be introduced. The following particulars have been compiled in respect of three systems, which are under consideration of the management :

**Workers**

	A	B	C
Actual hours worked in a week	38	40	34
Hourly rate of wages	₹ 6	₹ 5	₹ 7.20
Production in units :			
Product P	21	5	60
Product Q	36	1	135
Product R	46	25	-

Standard time allowed per unit of each product is :

Minutes	P	Q	R
	12	18	30

For the purpose of piece rate, each minute is valued at ₹ 0.10. You are required to calculate the wages of each worker under :

- (i) Guaranteed hourly rate basis.
- (ii) Piece work earnings basis, but guaranteed at 75% of basic pay (guaranteed hourly rate) if his earnings are less than 50% of basic pay.
- (iii) Premium bonus basis where the worker receives bonus based on Rowan Scheme.

Q.20. Calculate the earning of workers A, B, and C under straight piece-rate system and Merrick's multiple piece-rate system from the following particulars :-

Normal Rate per hour ₹ 5.40  
Standard Time per unit 1 minute.

Output per day is as follows :-

Worker A	-	390 units
Worker B	-	450 units
Worker C	-	600 units

Working hours per day are 8.

Q.21. Standard time to complete a job is 6 hours and hourly wage rate is ₹ 30. The time actually taken by workers A, B and C are 8 hours, 6 hours and 4 hours respectively. Calculate total wages and effective hourly wage rate under Gantt Task and Bonus System.

Q.22. Hourly wage rate = ₹ 60  
Standard time = 16 hours  
Actual time = 9 hrs.  
Compute total wages payable under -

- (a) Barth Scheme
- (b) Bedeaux System.

Q.23. Standard Output in 10 hours is 240 units. Actual output in 10 hours is 264 units. Wage Rate is ₹ 10 per hour. Compute Total Wages under Emerson Plan.

## COST ACCOUNTING

7.6

Q.24. The Standard Output is 80 units per hour, whereas, the actual output is 100 units per hour. In a day of 8 hours, the worker actually produced 800 units. Compute total Wages of the day according to Taylor's Differential Piece Rate System if wage rate per hour is ₹ 160.

Q.25. The cost accountant of Y Ltd. has computed labour turnover rates for the quarter ended 31<sup>st</sup> March, 2011 as 10%, 3% and 5% respectively under 'Flux method', 'Replacement method' and 'Separation method'. If the number of workers replaced during that quarter is 30. Find out the number of (1) workers joined, and (2) workers left and discharged.

Q.26. From the following information, calculate Labour turnover rate :  
 No. of workers as on 01:01:2012 = 7,600  
 No. of workers as on 31:12:2012 = 8,400  
 During the year, 80 workers left while 320 workers were discharged. 1,500 workers were recruited during the year. Of these, 300 workers were recruited because of exits and the rest were recruited in accordance with expansion plans.

Q.27. Calculate standard labour time for machining part No. Z-235 from the following data :

Standard batch size	100 pieces
Set up time	64 minutes
Operating time (each piece)	2 minutes
Fixing job on machine	10 minutes
Cutting time	3 minutes
Removing job from machine	

Allow 10% on total operation time for inspection during progress and allow further 5% on total time for fatigue.

Q.28. The time taken for a particular operation by operator X on three different counts was 24, 22 and 27 minutes while that of operator Y was 20, 23 and 26 minutes. It has been ascertained that the rating of X is 55/60 and that of Y is 70/60. The allowance for fatigue is 15%. Calculate standard time per count of both the operators taken together.

Q.29. Bharat Garment Corporation produces garments of the same size and style. Employees are paid wages at ₹ 2.50 per hour for an eight hour shift. They produce five units per hour per employee. The overhead in this department is ₹ 3 per direct labour hour. The employees and the management are considering the following piece-rate wage proposal :

If the employee produces upto 45 units in a day of 8 hours, his unit wage rate is 50 paise. If his production ranges from 46 units to 50 units, the unit wage rate is 53 paise on all units. If production ranges from 51 to 60 units, the unit wage rate is 57.5 paise on all units. If the production per day exceeds 60 units, the unit wage rate is 60 paise on all units.

Prepare a statement showing gain to the employee and the employer at production level of 40, 45, 50, 55, 60 and 65 units.

Q.30. An article passes through five hand operations as follows :

Operation No.	Time per article	Worker	Wage rate per hour
1	15 minutes	A	₹ 0.65
2	25 minutes	B	₹ 0.50
3	10 minutes	C	₹ 0.40
4	30 minutes	D	₹ 0.35
5	20 minutes	E	₹ 0.30

The factory works 40 hours a week and the production target is 600 dozens per week. Prepare a statement showing for each operation and in total the number of operators required, the labour cost per dozen and the total labour cost per week to produce the target output.

Q.31. The management of sunshine Ltd. wants to have an idea of profit lost as a result of labour turnover last year.

Last year sales accounted to ₹ 66,00,000 and P/V ratio was 20%. The total number of actual hours worked by the direct labour force was 3.45 lakhs. As a result of labour turnover, total 75,000 potentially productive hours were lost. The actual direct labour hours included 30,000 hours attributable to training new recruits, out of which half of the hours were unproductive. The costs incurred consequent on labour turnover is

1. Settlement cost due to leaving	
2. Recruitment cost	27,420
3. Selection cost	18,725
4. Training cost	12,750
	16,105

Assuming that the potential production lost due to labour turnover could have been sold at prevailing prices, ascertain the profit lost last year on account of labour turnover.

Q.32. The present output details of a manufacturing department are as follows :

- (1) Average output per week = 48,000 units from 160 employees.
- (2) Saleable value of output = ₹ 6,00,000.
- (3) Contribution made by output towards fixed expenses and profit = ₹ 2,40,000.

The Board of Directors plans to improve the business at a capital cost of ₹ 1,60,000. The effect of this will be to reduce the number of employees to 120 and increasing the output per individual employee by 60%. The Board intends to offer a 1% increase on the piece-work rate of ₹ 1 per unit for every 2% increase in average individual output achieved.

In order to sell the increased output, it will be necessary to decrease the selling price by 4%.

Calculate extra weekly contribution resulting from proposed change and evaluate the Board's decision of introducing the change.

Q.33. During audit of accounts of G. Company, your assistant found errors in the calculation of the wages of factory workers and he wants you to verify his work.

He has extracted the following information :

- (i) The contract provides that the minimum wage for a worker is his base rate. It is also paid for down times i.e., the machine is under repair or the worker is without work. The standard work week is 40 hours. For overtime production, workers are paid 150 percent of base rates.
- (ii) Straight Piece Work – The worker is paid at the rate of 20 paise per piece.
- (iii) Percentage Bonus Plan – Standard quantities of production per hour are established by the engineering department. The worker's average hourly production, determined from his total hours worked and has production, is divided by the standard quantity of production to determine his efficiency ratio. The efficiency ratio is then applied to his base rate to determine his hourly earnings for the period.
- (iv) Emerson Efficiency Plan – A minimum wages is paid for production upto 66 2/3% of the standard output, he is paid bonus as per the following table :

Efficiency Level	Bonus (on Minimum Wages)
Upto 66 2/3%	Nil
Above 66 2/3% to 79%	10%
80% to 99%	20%
100% - 125%	45%

Your assistant has produced the following schedule pertaining to certain workers of weekly pay roll :

## COST ACCOUNTING

Workers	Wage Incentive Plan	Total Hours	Down Time Hours	Units Produced	Standard Units	Base Rate/hr.	Gross Wages as per Book
Worker						₹ 1.80	₹ 85
A	Straight piece work	40	5	400	—	1.80	95
B	Straight piece work	46	—	425	—	1.80	85
C	Straight piece work	44	—	250	200	2.20	120
D	Percentage bonus plan	40	4	240	300	2.10	93
E	Emerson	40	—	240	500	2.00	126
F	Emerson	40	—	600			

(40 hours production)

\* Total hours of B include 6 overtime hours and total hours of C includes 4 overtime hours.

Compute whether the of workers' wage are correct or not.

**Q.34.** Your organisation is experiencing a high labour turnover in recent years and management would like you to submit a report on the loss suffered by the Company due to such labour turnover. Following figures are available for your consideration:

Sales	₹ 600 Lakhs
Direct Material	₹ 150 Lakhs
Direct Labour	₹ 48 Lakhs on 4,80,000 man hours
Other Variable Expenses	₹ 80 Lakhs
Fixed Expenses	₹ 20 Lakhs.

The direct man-hours include 9,000 man-hours spent on trainees and replacements, only 50% of which were productive. Further, during the year 12,000 man-hours of potential work could not be availed of because of delayed replacement. The cost incurred due to separations and replacements amounted to ₹ 1 Lakh.

On the basis of above data, prepare a comparative statement showing actual profit vis-a-vis the profit which would have been realised had there been no labour turnover.

**Q.35.** A company's basic wage rate is ₹ 60 per hour. The overtime rates are —

- (1) Evening — time and one-third
- (2) Week end — Double the time.

During the last year the following hours were worked —

- (1) Normal time = 2,20,000 hours
- (2) Evening time = 20,000 hours
- (3) Week-end time = 10,000 hours.

The following times have been worked on three jobs :—

	Job A	Job B	Job C
Normal hours	3,000	5,000	4,000
Evening hours	300	600	1,050
Week-end hours	100	50	300

You are required to calculate the labour cost chargeable to each job if —

- (1) Overtime is worked regularly throughout the year.
- (2) Overtime is worked at the request of the customer.

Q.36. A company uses an old method of machining a part manufacturing for sale. The estimates of operating details for the year 2013 – 2014 are as under :

- No. of parts to be manufactured and sold 30,000
- Raw materials required per part : 10 kg. @ ₹ 2 kg.
- Average wage rate per worker : ₹ 40 per day of 8 hrs.
- Standard time required to manufacture one part : 2 hrs.
- Overhead rate ₹ 10 per labour hour.
- Material handling expenses – 2% of the value of raw materials.

The company has suggestion box scheme and an award equivalent to three months' saving in labour cost is passed on to the employee whose suggestion is accepted. In response to this scheme, a suggestion has been received from an employee to use a special jig in the manufacture of the aforesaid part. The cost of the Jig which has life of one year is ₹ 3,000 and the use of the Jig will reduce the standard time by 12 minutes.

**Required :**

- (i) compute the amount of award payable to the employee who has given the suggestion.
- (ii) Prepare a statement showing the annual cost of production before and after the implementation of the suggestion to use the Jig and indicate the annual savings.



## IMPORTANT THEORETICAL QUESTIONS

**Q.1.** What is Labour cost ? What is the objective of study of labour cost?  
**Ans.** **Meaning :** Labour Costs are "Costs incurred in relation to human resources of an enterprise." For example, wages paid to production workers, salary of managers and officers, cost of training office staff etc. are considered as Labour Costs.

**Objectives :** The objectives of the study of labour cost are:

- (a) To keep the total amount of wages paid to workers at reasonable levels based on industry standards.
- (b) To motivate workers and harness their energies to increase output, and reduce per unit cost.
- (c) To contribute to overall organisational profitability and employee-welfare.

**Q.2.** Define Direct and Indirect Labour cost.

**Ans.** **Direct Labour Cost :** It is the "cost of labour expended in altering the construction, composition or condition of a product." It is directly attributable and easily identified and allocated to the cost unit or cost centre. For example, all wages of labourers directly engaged in production and wages paid to workers engaged in construction site and direct wages.

**Indirect Labour Cost:** It is the "cost of labour not directly engaged in production." It is not directly attributable to the cost unit or cost centre. For example, wages and salaries to employees in Purchasing Department, Stores, Office and Time-Keeping Department, Foreman and Supervisors, Maintenance Personnel etc. are indirect labour cost.

**Q.3.** How will you deal with idle time cost in cost accounts ? How can you control such costs ?  
**Ans.** **Idle Time :** When workers are paid on time basis, some difference is likely to arise between the time for which they are paid and the time they actually spend upon production. Idle time may be defined as that time for which wages are paid but no production is obtained.

**Treatment of Idle Time Cost :** From the point of view of treatment in cost accounts, idle time can be classified into normal and abnormal idle time.

**Normal Idle Time :** It refers to that loss of time which is generally unavoidable and is bound to arise. For example, time spent in setting the machines, adjusting the tools, moving from one job to another, tea breaks (if necessary), personal needs, etc. It will be seen that this wastage of times is of such a nature that it cannot be avoided and its cost is therefore, an expenses which is to be directly charged to the job by inflating wage rate. In case it is not feasible, cost of such normal idle time is to be treated as factory overheads.

**Abnormal Idle Time :** Where, due to some abnormal causes the time is lost for which employer must pay, the cost of abnormal idle time should be collected separately and written off to Costing Profit & Loss Account. (e.g. power failure, strikes, etc.)

**Control of Idle Time :** For control purposes, idle time should be divided into three categories :

Idle Time Cost	Accounting Treatment
(a) Cost of normal & controllable Idle Time (e.g. Machine Breakdown, waiting for work, tools, materials or instructions)	(a) It is treated as part of cost and hence treated as part of production overheads
(b) Cost of normal but uncontrollable Idle Time (e.g. set up time for	(b) It is treated as part of cost and hence charged directly to job by inflating wage

machine, interval between one job and another, personal needs)	rates (for example if wage rate is ₹ 18 per hour and workers' effective hours during 10 hours work is 9 hours only, the inflated wage rate will = ₹ 20
(c) Cost of abnormal Idle Time (i.e. due to abnormal reasons such as power failure, strikes, lock out, fire, flood, etc.)	(c) It is not treated as part of cost and hence charged to Costing Profit & Loss Account.

Q.4. Define Overtime. Why is it necessary? How can overtime be controlled? How the overtime is treated in cost accounts?

Ans. Overtime work is work done beyond normal working hours. The Factories Act provides for payments of overtime wages by double the normal rate of wages. Overtime work involves extra cost and should be resorted to only when extremely essential.

**Treatment of Overtime Cost :** The treatment of overtime cost depends upon the circumstances under which it arises. The following treatment will be given to the overtime cost in the following circumstances :

- Where the customers agree to bear the entire charge of overtime due to urgency of work, it should be charged direct to the job or work order concerned.
- When overtime work is required to make up any shortfall in production due to some fault of management or some unexpected development, it should be charged to Costing Profit and Loss Account.
- Overtime required because of some abnormal conditions like floods, earthquake, etc., should be charged to Profit and Loss Account.
- Overtime required for seasonal pressure should be treated as production overheads.

**Control of Overtime :** It is important that proper control over the overtime work should be exercised in order to keep it to the minimum. The following steps may be taken for such control :

- All the overtime work should be duly authorised by a competent authority.
- Overtime cost should be recorded separately in order to investigate and to have proper planning for future.
- When overtime becomes a regular and permanent feature, it should be properly enquired into and, if necessary, more workers may be employed or shift working may be considered.
- If overtime is due to lack of machines, steps may be taken to install more machines.

Q.5. What do you understand by Labour Turnover? How is it measured? What are its causes? what are the remedial steps you would suggest to minimise its occurrence?

Ans. **Labour Turnover :** It is a normal feature in every business organisation that some workers leave their jobs and some new workers take their place. This mobility or change in the labour force is known as labour turnover.

Labour turnover may be defined as the number of workers left during the period in relation to the average number of workers employed during the period. In other words, it is rate of displacement of labour employed in an organisation.

There are three different methods of measurement of labour turnover which may be given as follows :

- Separation Rate Method :** This is the most commonly used method. Under this method, measurement is made by dividing the total number of separations during a period by the average number of workers on the roll during that period.