

3. Simplified study material

Slow learners are those students whose learning pace is slower than their peers. The respective class teachers provide simplified study notes to enhance the confidence in the subject and augment their learning peace.

Material for Cost and management Accounting

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Elements of Cost – Materials

The term, “material” is an important element of cost and occupies prominent place in the total cost of a product. In the manufacturing concern the cost of materials accounts for around 60% to 70% of the total cost incurred for manufacturing of a product. The substantial proportion of material cost in the total cost demands more and more attention of the management towards this element. In other words, material constitutes a very significant proportion of a total cost of a finished product. The term, “material” includes both direct materials and indirect materials. Therefore, proper control on material is required. Hence, establishment of suitable procedure for proper control of materials is essential.

Objectives of material control:

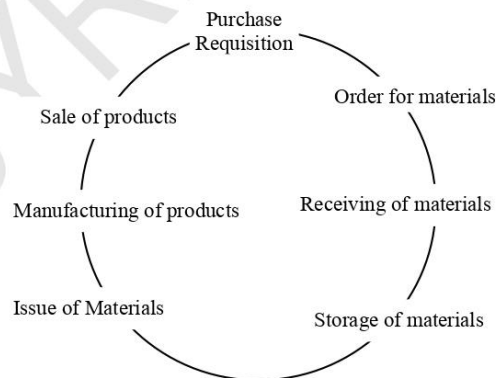
Materials constitute a significant part of the total cost of production and it is controllable to some extent. Therefore, proper planning and controlling of inventories become as an important function of the management. Proper accounting is required for controlling the materials, which includes purchase control, stores control, issues control and control over various losses. Material control aims at efficient purchasing of materials, their efficient storing and efficient consumption of materials. This is an activity of top level management. The following are the objectives of materials control.

- To provide continuous flow of materials for efficient flow and uninterrupted production. It ensures that no activity, i.e., production suffers from interruption for want of materials or shortage of materials.
- To ensure purchase of materials is made as per the requirement and in most economic quantities.
- To minimize investment in inventories.
- To minimize the total cost involved i.e., both cost of acquisition and cost of holding the inventories.
- To avoid unnecessary losses and wastages, which arises from deterioration, theft, loss by fire, handling time etc. Efficient store of materials minimizes these losses and wastages.
- To maintain records properly which provides reliable information.

ADVANTAGES OF MATERIAL CONTROL

A good system of material control ensures the following advantages.

- It eliminates the wastage in the use of materials.
- It reduces the risk of loss from fraud and theft.
- It helps in keeping perpetual inventory and other records.
- It also helps in preparation of accurate materials reports.
- It control over investment or excessive investment in inventories.
- It minimize the cost of storage of materials.
- It discloses the value of materials used in various departments accurately.
- It ensures uninterrupted production by providing materials as per the requirements of production departments.



STEPS IN MATERIAL CONTROL

The concept material control is always deals with establishment of certain procedure for purchasing, receiving, issuing and minimizing material losses. In this regard the following procedure or steps are followed.

- Purchasing and receiving of materials.

- ii. Storing of materials.
- iii. Issue of materials.
- iv. Material losses.

I. PURCHASING AND RECEIVING OF MATERIALS

The procedure followed for procurement of materials differs from business to business. In a manufacturing organization the term "purchasing" includes procurement of raw materials, supplies, machines, tools and services required for equipment. Establishing and maintenance of proper procedure for purchase is most important aspect in the manufacturing concerns. The procedure should ensure that right type of material is purchased at right time, in right quantity at right prices and at right place. Therefore, the purchase department plays a very significant role in an organization. There are two types of purchase systems such as centralized purchase and decentralized purchase system.

- a. Centralized purchase: Generally, in large scale organization, a separate purchase department is maintained in order to procure the requisite materials i.e., centralized purchase.
- b. Decentralization of purchase: In decentralized purchasing, each department or branch makes its own purchases. The advantages of localized purchasing are

II. STORAGE OF MATERIALS:

Storage of materials is another important part of the materials control. Store keeping involves keeping of stocks, identifying and classifying them according to their nature, type and size. It also includes maintenance of proper records. Materials purchased in required quantity is an important part of the materials control. Storage of such materials in an effective manner will be considered as another important aspect of materials control. A good storage system protects the materials from pilferage, careless handling, negligible checking, deterioration etc. Thus, a good system of storage not only preserves the quality of materials but also ensures safe custody of the materials. The person who controls the stores or an in-charge of stores is known as Store Keeper.

The main objectives of store keeping are

- (i) To protect stores against losses.
- (ii) To keep goods ready for delivery or issue
- (iii) To provide maximum service at minimum cost.
- (iv) To avoid over stocking and under stocking.
- (v) To facilitate perpetual inventory.

MATERIAL RECORDS TO BE MAINTAINED BY THE STOREKEEPER:

- a) **BIN CARD:** Bin means a place, rack or cupboard, where materials are stored. A card is attached to each bin in order to disclose the position of stock in the bin, popularly known as Bin Card. Bin Card is also known as store card. It is maintained by the storekeeper. A bin card provides running record of materials receipts, issues and stock in the simplest form. It records all events i.e., receiving of materials, issue of materials, transfers and returns of materials. Information disclosed by bin card should be agree with quantities entered in the relevant stores ledger.

BIN CARD								
Description			Minimum Level					
Material Code			Maximum Level					
Location Code			Ordering Level					
Bin No			Ordering quantity					
Receipts			Issues			Balance		
Date	G.R.No	Quantity	Date	Reqn. No	Quantity	Quantity	Date	Initials

Bin card consists material description, code number of materials, bin number, minimum level, maximum level, re-ordering level, ordering quantity etc. It is specially designed card for recording of receipts and issues of materials. However, it contains only physical quantity of materials but not rupee value of materials.

Advantages of Bin Card:

- (i) There would be less chances of mistakes being made as entries will be made at the time of receipt and issue of materials.
- (ii) Control over stock can be more effective, as it ensures comparison of the actual quantity in hand at any time with the book balance is possible.
- (iii) Identification of the different items of materials facilitated by reference to the bin card.

- b) **STORES LEDGER:** The stores ledger is a record of stock which includes both quantity and value of materials. It is one of the basic record of material accounting in a cost system. The stores ledger usually a loose leaf or card type, and contains an account for each class of material. This ledger is maintained by cost department. Separate ledger folios are maintained in Stores Ledgers for each item of materials. There are three sections in the Stores Ledger such as Receipts, Issues and Balance. Each of these subdivided into three columns viz Quantity, Unit Price and Total Cost.

STORES LEDGER ACCOUNT											
Description						Minimum Level					
Material Code						Maximum Level					
Location Code						Ordering Level					
Bin No						Ordering quantity					
Date	Receipts				Issues				Balance		
	G.R.N No	Qty.	Rate	Amount	Reqn. No	Qty.	Rate	Amount	Qty.	Rate	Amount

Differences between BIN CARD and STORES LEDGER

BIN CARD	STORES LEDGER
1) It is a record of quantity only.	1) It is a record of quantity and value.
2) It is maintained by Storekeeper	2) It is maintained by Cost Department
3) It is attached to the Bin i.e., kept inside the stores.	3) It is kept in Cost Department Office i.e., kept outside the stores.
4) The postings are done before the transactions take place	4) The postings are done after the transactions take place.
5) It gives physical information.	5) It gives physical and value information.
6) Each transaction is individually posted.	6) Transactions may be posted periodically.

- c. **Material issue book:** This book provides information of materials issued as it is meant for recording the issue of materials to the departments or jobs. Separately records the entries of direct materials and indirect materials.
- d. **Material return book:** The book maintained to record the materials returned by the department or job. The unused materials of department or job will be returned to the stores and entered in this book.
- e. **Material transfer book:** Whenever materials are transferred from one production department or job to another, entered in the separate book called material transfer book.
- III. Inventory Control Techniques:
The following are the techniques used in order to control the inventory at storage of materials:
- 1) Setting or fixing of various Stock Levels.
 - 2) ABC Analysis.
 - 3) TWO bin system.
 - 4) Perpetual inventory system and continuous stock verification.
 - 5) Determination of Economic Order Quantity (EOQ).
 - 6) Issue of materials or pricing of materials

1) Setting or fixing of various Stock Levels:

Fixing of inventory levels facilitates easy maintenance and control over various materials. The problem of overstocking and understocking can be eliminated by fixing the inventory levels. Fixation of stock levels also known as the demand and supply method of inventory control. Fixation of inventory levels facilitates easy maintenance and control of various materials. However, the levels which are fixed are not on permanent basis and are subject to regular revision.

The following are the important factors to be considered while fixing the stock levels

- a) Lead time for deliveries.
- b) The rate of consumption.
- c) Requirements of funds.
- d) Keeping qualities, deterioration, evaporation etc.
- e) Storage cost
- f) Availability of space.
- g) Price fluctuations.
- h) Insurance cost.
- i) EOQ

- j) Government and other statutory restrictions.

The following are the important inventory (stock) levels used to control the inventories.

a) **Maximum Level:**

It is the highest stock level of material above which stock should not be allowed to purchase or rise. This level is fixed with a view to avoid overstocking problem. It reveals the maximum quantity of material that may be held in stock. The following are the criticisms of the maximum level.

- (i) Maximum level involves huge amount of capital which is blocked.
- (ii) More space is required
- (iii) Materials may deteriorated or loss of weight due to maintaining maximum level.
- (iv) Overstocking or maximum level caused to loss due to obsolescence.
- (v) The change in market price of materials may arise due to over stocking.

Therefore, the following factors should be considered while fixation of maximum level.

- a) Lead time or delivery time for receiving fresh stock
- b) The rate of consumption.
- c) Requirements of funds.
- d) Keeping qualities, deterioration, evaporation etc.
- e) Storage cost
- f) Availability of space.
- g) Price fluctuations.
- h) Insurance cost.
- i) EOQ
- j) Government and other statutory restrictions

$$\text{Maximum Stock Level} = \text{Re-order Level} + \text{Re-order Quantity} - (\text{Minimum Consumption} \times \text{Minimum re-order period})$$

b) **Minimum Level:**

Minimum stock level is the lowest stock level of materials below which stock of material is never to fall. If the stock goes below this level, there is a danger of interruption of production due to shortage of materials. Therefore, minimum stock level is also known as Safety Stock or Buffer Stock. It is fixed with objective of avoid shortage of materials or understocking of materials. Following are the factors to be considered while estimation of minimum stock level.

- (i) Rate of consumption of materials.
- (ii) Re-order level.
- (iii) Lead time or delivery time.
- (iv) Availability of substitutes.

$$\text{Minimum Stock Level} = \text{Re-order Level} - (\text{Normal consumption} \times \text{Normal re-order period})$$

c) **Re-ordering Level:**

Re-order level is the level of stock at which the fresh or new order is placed. It is the point at which the storekeeper should initiate purchase requisition for fresh supply. It is the point which is lying between the Maximum Stock Level and Minimum Stock Level. Thus, it is the point usually be slightly higher than the minimum level, to cover such emergencies as abnormal usage of materials or unexpected delay in delivery of fresh stock. This level is fixed based on some important factors such as

- (i) Lead time or delivery time,
- (ii) Rate of consumption,
- (iii) Minimum Stock Level,
- (iv) Cost of storage and
- (v) EOQ.

$$\text{Re-order Level} = \text{Maximum Consumption} \times \text{Maximum Re-order period}$$

OR

$$\text{Re-order Level} = \text{Minimum Stock Level} + \text{Consumption during time lag period.}$$

d) **Danger Level:**

Danger Level is the level is the level of stock which is below the minimum level. When the stock of materials reaches this level normal issues of materials are stopped and an urgent action is taken for purchase

of materials. At this level normal issues are stopped and issues are made only under specific instructions. This level lies between the minimum level and nil stock.

This level is sometimes fixed above the minimum level, in such a case, this level is preventive. If this level is below the minimum level, this level is corrective in nature.

Danger Stock Level = Normal/Average consumption X Maximum Re-order period for emergency purchases

e) **Average Stock Level:**

Average stock level is the average of Minimum Stock Level and Maximum Stock Level. The following formulae are used to ascertain the Average Stock Level.

1. Average Stock Level =	$\frac{\text{Minimum Stock level} + \text{Maximum Stock Level}}{2}$
2. Average Stock Level =	$\text{Minimum Stock Level} + \frac{1}{2} \text{ of Re-order Quantity}$

1. Following details are related to a manufacturing concern.

Re-order level – 1,60,000 units

EOQ – 90,000 units

Minimum stock level – 1,00,000 units

Maximum stock level – 1,90,000 units

Average lead time – 6 days

Difference between minimum lead time and maximum lead time – 4 days

Calculate

a) Maximum consumption per day

b) Minimum consumption per day (CA IPCC NOV 2014)

2. X Ltd produces product "p". It uses annually 60,000 units of a material "Rex" costing Rs.10 per unit.

Other relevant information are

Cost of placing an order : Rs.800 per order

Carrying cost : 15% per annum of average inventory.

Re-order period : 10 days

Safety stock : 600 units

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

- EOQ for material "Rex" (8,000 units)
 - Re-order level (2,600 units)
 - Maximum level (8,600 units) Min (600 units)
 - Average stock level. (4,600 units)
3. Re-order quantity of a Material X is 5,000 kg. Maximum level 8,000 kg, minimum usage 50 kg per hour, minimum re-order period 4 days, daily working hours in the factory is 8 hours. You are required to calculate the re-order level of material X. (CAIPCC May 2010) (4,600 kgs)
4. A company manufactures 5,000 units of product per month. The cost of placing an order is Rs.100. The purchase price of the raw materials is Rs.10 per kg. The re-ordering period is 4 to 8 weeks. The consumption of raw materials varies from 100 kgs to 450 kgs per week. The average weekly consumption being 275 kgs. The carrying cost of inventory is 20% per annum. Assume 52 weeks in a year. You are required to calculate.
- Re-order quantity (2450 kgs)
 - Maximum level (5,650 kgs)
 - Minimum level (1,950 kgs)
 - Average level (3,800 kgs / 3,175 kgs) (CS (E) June 2012)
5. Material "A" is used as follows
- Minimum usage – 500 units per week
- Maximum usage – 1,500 units per week
- Normal usage – 1,000 units per week
- Ordering quantity – 1,600 units
- Delivery period – 4 -6 weeks
- Calculate (a) Maximum level, (b) Minimum level and (c) Ordering level (CS E June 2009)
- (8,600) (4,000) (9,000)

6. Materials X and Y are used as follows
 Ordinary usage – 50 units per week
 Minimum usage – 25 units per week
 Maximum usage – 75 units per week
 Re-order quantity – X – 400 units, Y – 600 units
 Delivery time – X – 4 to 6 weeks, Y – 2 to 4 Weeks
 Calculate the following for each material (a) Minimum Level, (b) Maximum level, (c) Re-order level and (d) Average level **(ANU July 2015)**
7. From the following information calculate Minimum Stock Level, Maximum Stock Level and Re-order Level.
 a) Minimum consumption – 100 units per day
 b) Maximum consumption – 150 units per day
 c) Normal consumption – 120 units per day
 Re-order period – 10 to 15 days
 Re-order quantity – 1,500 units
 Normal re-order period – 12 days **(ANU April 2014)**
8. Calculate Maximum level, minimum level, re-order level from the following information.
 Re-order quantity – 1,500 units
 Re-order period – 4 to 6 weeks
 Maximum consumption 400 units per week
 Normal consumption 300 units per week
 Minimum consumption 250 units per week **(ANU July 2014)**
9. Two components A and B are used as follows
 Normal usage : 50 units per week
 Minimum usage : 25 units per week
 Maximum usage : 75 units per week
 Re-order quantity : A – 300 units, B – 500 units
 Re-order period : A – 4 to 6 weeks, B – 2 to 4 weeks
 Calculate for each component (a) Re-order Level, (b) Minimum Level, (c) Maximum Level and (d) Average Stock Level **(SKU Oct 2014)**
10. Following information about material “Z” is given below
 Re-order quantity : 1000 units
 Re-order period : 4 to 6 weeks
 Maximum usage : 75 units per week
 Minimum usage : 25 units per week
 Normal usage : 50 units per week
 Calculate Minimum level and Maximum level. **(VSU Oct 2013)**
11. In ABC Ltd., material consumption was as follows
 Average daily requirement - 12 units
 Usual time required for obtaining supply – 2 weeks
 Maximum requirement in a month of 4 weeks – 400 units
 Minimum requirement in this period – 200 units
 Economic order size – 240 units
 Time sufficient for emergency supply – 2 days **(SVU March 2015, ANU Mar 2014)**
 Find (a) Maximum, (b) Minimum, (c) Ordering, (d) Danger and (v) Average Stock Level
12. Two components A and B are used as follows :
 Normal usage : 50 units per week each
 Minimum usage : 25 units per week each
 Maximum usage : 75 units per week each
 Re-order quantity : A – 300 units B – 500 units
 Re-order period : A – 4 to 6 weeks B – 2 to 4 weeks
 Calculate for each component
 1. Re-order level 2. Minimum Level 3. Maximum level 4. Average stock level
13. Two components X and Y are used as follows :
 Normal usage : 100 units per week each
 Minimum usage : 50 units per week each
 Maximum usage : 150 units per week each

Re-order quantity : X – 600 units Y – 1,000 units
 Re-order period : X – 4 to 6 weeks Y – 2 to 4 weeks

Calculate for each component

1. Re-order level 2. Minimum Level 3. Maximum level 4. Average stock level

14. Two components A and B are used as follows :

Normal usage : 3,000 units per week each
 Minimum usage : 1,500 units per week each
 Maximum usage : 4,500 units per week each
 Re-order quantity : A – 3,000 units B – 4,000 units
 Re-order period : A – 4 to 6 weeks B – 2 to 4 weeks

Calculate for each component

1. Re-order level 2. Minimum Level 3. Maximum level 4. Average stock level

(SVU APRIL 1998 & APRIL 1999)

15. The following stock details are extracted from the records of Nanadana Co. Ltd for the year ending 30th June 2010

Reorder quantity : 1,500 units
 Reorder period : 2 to 4 weeks
 Maximum consumption of materials 250 units
 Minimum consumption of materials 200 units
 Maximum reorder period of emergency : 3 weeks

You are required to calculate:

1. Re-order level 2. Minimum Level 3. Maximum level 4. Average stock level and 5. Danger stock level (SVU Mar 2011)

16. From the following information calculate Minimum Stock Level, Maximum Stock Level, Re-order Level and Average stock level.

- Minimum consumption – 50 units per day
 - Maximum consumption – 75 units per day
 - Normal consumption – 60 units per day
- Re-order period – 10 to 15 days
 Re-order quantity – 750 units

Normal re-order period – 12 days (SVU Oct 2012)

17. The particulars of material A is given, calculate (a) Maximum Stock Level and (b) Minimum Stock Level.

Re-ordering quantity – 180 units
 Re-ordering time – 3 to 5 weeks
 Maximum consumption – 45 units per week and
 Minimum consumption- 15 units per week (OU Mar 2015)

2) ABC Analysis:

This method is known as Proportional Parts Value Analysis. It is also known as Always Better Control (ABC). ABC analysis controls the stores by showing utmost care on costlier items. Under this method the materials are classified into three groups such as

- High Priced Materials – denoted by A: Generally high value items (costlier items) forms a small part of the total inventory, but more close control is required on this group of materials.
- Medium Priced Materials – denoted by B: Group B consists of items which are of moderate in quantity and moderate in value. In simple words, these items are neither expensive nor cheap. Therefore,
- Low Priced materials – denote C: The third category C consisting of 70% of total items represents only 10% of total cost of inventory. These materials are least important items and do not have high priority. Therefore, these are least focused and involves less control.

In a nutshell, a very close and tight control is to be exercised on category A, less stringent control is to be exercised on category B and very less control is to be exercised on C category items.

Stock category	% of total items	% of material cost
A	Less than 10%	More than 70%
B	Between 10% and 20%	20% to 25%
C	More than 60%	Less than 10%

Advantages:

- It ensures close and strict control on costlier items.

- (ii) It minimizes the storage cost.
- (iii) It also minimizes the investment in inventory.
- (iv) Scientific inventory control can be exercised.

Disadvantages:

- (i) It is not effective if the materials are not classified into the groups like A, B and C.
- (ii) It is not suitable to the organizations when the costs of materials do not vary significantly.
- (iii) There is no scientific base for classification of materials into A, B and C categories.

However, ABC analysis regarded as powerful tool to the management as it helps in control inventory and minimizes cost.

3) **VED analysis:**

According to VED analysis materials used will be classified into three broad categories viz., Vital, Essential and Desirable. This is very useful to categorize items of spare parts and components. Adequate vital items are to be maintained in stock to ensure smooth and continuous production.

V stands for Vital items and are vital for process of production. If these are not available, the production process becomes stand still. Therefore, strict and proper control over these materials is essential.

E stands for Essential items, stock – out of these items adversely affect efficiency of the production system. Non-availability of these items would not stop for want of these items but causes temporary losses or dislocation of production. Less strict and tight control over these is required.

D stands for Desirable materials for future, stock – out or shortage not caused to an immediate consequences on production. The production process can be continued with or without of these materials. Very less control over these items is desirable.

Application of ABC analysis along with the VED analysis gives very good control over the materials.

4) **FNSD analysis:**

The age of the inventory in the organization or the moving position of the inventory during the year will be considered as a factor to classify the inventory into different categories. According to the moving position inventories are classified into four categories. This analysis is known as FNSD analysis.

- (i) F stands for fast moving items. These materials are consumed in a short span of time. Constant observation is required on stock of fast moving materials. The orders are to be placed in time for providing items to avoid interruption of production of process.
- (ii) N indicates normal moving items which are exhausted over a period of a year or so. The order levels and quantities of these items will be fixed on the basis of new estimation of the future demand.
- (iii) S stands for slow moving items and such items are not used frequently. These are exhausted over a period of two or more years.
- (iv) D stands for dead stock which means consumption of such items is nil. These are to be identified and eliminated if they do not have any alternative usage.

5) **Just – in – time inventory (JIT):**

Just in time inventory system is a strategy to increase efficiency and reduce wastage by procuring materials as per the requirements in the production process. This system ensures that the company does not hold safety stock, and can operate with low inventory levels, thereby, it minimizes the inventory carrying cost. Generally, companies are increasing attention to reduce stock levels. In this regard they are creating close relationship with suppliers to supply raw materials in a frequent manner in smaller quantities. This is called Just in time (JIT) purchasing. This ensures holding cost stocks as minimum as possible. The company guarantees for large quantity of purchases and the suppliers should guarantee supply of proper quantity of materials at reasonable prices as and when they are needed. Therefore, this system always exists and is possible with the co-operation of suppliers.

JIT system always saves the cost of materials handling and minimizes investment in stock. It also minimizes the clerical cost.

6) **Two Bin System:**

Under this system for each item of materials two piles or bundles or bins are maintained. The first bin is meant for maintaining larger quantity of stock and the second bin is meant for keeping smaller quantity i.e., safety stock. This system is most useful in the case of slow or low value items. When the materials of the first bin are exhausted then the second bin is tapped. It indicates immediately the store keeper has to prepare a requisition for new supply and submit it to the purchasing department.

Perpetual inventory system and continuous stock verification:

The perpetual inventory system is known as an aid to inventory control which is maintained by stores department. This system records the information of receipt, issue and stock of materials. It provides information of current balance of stocks.

“A system of records maintained by the controlling department, which reflects the physical movement of stocks and their current balances” ---- ICMA (London)

“Perpetual inventory system is a method of recording stock balances after every receipt and issue, to facilitate regular checking and obviate closing down of work for stock taking” – Weldon.

In a nutshell, it is a system which ensures ascertainment of balance of stock after recording every receipt and issue of materials. It is followed by stores department. Perpetual inventory means the system of records, whereas continuous stocking taking means the physical checking of stock records with actual stock. Perpetual inventory system includes

- a) Comparison of bin cards and stores ledger accounts, and
- b) Continuous stock checking (Physical stock verification).

a) **Comparison of bin cards and stores ledger accounts:**

Bin card is maintained by the storekeeper and the stores ledger account is maintained by the stores accountant. Both the records are for recording materials receipts and issues. Therefore, the balances shown by the two records should tally, if they disagree with each other, the reasons for differences should be identified by comparing Bin Card with Stores Ledger. The reasons include omission of items, wrong posting, error in balancing etc.

b) **Continuous stock checking:**

Physical stock verification is the important aspect of perpetual inventory system. Physical stock verification means verifying stocks physically with the balances shown by the bin card and stores ledger. It may be conducted periodically or continuously.

7) **Economic Order Quantity:**

An Economic Order Quantity (EOQ) is the quantity or number of units per order to be purchased which will minimise both carrying cost and ordering cost. The size of an Economic Order Quantity depends on many factors such as inventory carrying cost, cost of purchasing and receiving, normal consumption, interest on capital, quantity discount, availability of storage facility etc.

An Economic Order Quantity basically depends on the two factors viz., carrying cost and ordering cost. The term carrying cost means, the cost which are incurred on the maintenance of materials in the stores and include cost of materials handling, interest on capital, obsolescence, pilferage, insurance and other storage costs. The term ordering cost implies the cost incurred for acquiring materials into the stores. It includes cost of processing purchase orders, receiving and inspection cost, general administration overheads of purchase department etc.

Economic Order Quantity (EOQ) often sometimes termed as Re-Ordering Quantity. The following is the formula for determination of quantity to be ordered that minimises carrying cost and ordering cost.

$$\text{Economic Order Quantity (EOQ)} = \sqrt{\frac{2UO}{C}}$$

Where,

U= Usage or Consumption in units during a particular period or year

O= Cost of Ordering or Order Cost

C= Cost of carrying one unit for the particular period.

18. A bore well company uses about 75,000 valves per annum. The cost of each valve is Rs.1.50 and carrying cost is estimated to be 20% on average inventory. The cost to place and order is Rs.18. Determine EOQ (OU Mar 2014)
19. Find the EOQ when the annual consumption is 600 units, unit price is Rs.20, ordering cost Rs.12 and carrying cost is 20% (KKU Mar 2014 & SKU Mar 14, 12, 11)
20. Calculate EOQ from the following particulars
Annual consumption – 5,000 units.
Ordering cost Rs.20 per order
Carrying cost : 8%
Price per unit – Rs.250. (KKU March 2013)
21. Find out the economic ordering quantity from the following
Annual usage : 6,000 units, Cost of material per unit : Rs.20
Cost of placing and receiving one order : Rs.60
Annual carrying cost of one unit : 10% of inventory value.
22. Find out the economic ordering quantity from the following
Annual usage : 1,20,000, Cost of placing and receiving one order : Rs.60
Annual carrying cost : 10% of inventory value

23. Calculate EOQ from the following particulars
 Annual requirement of raw materials : 60,000 units
 Ordering cost per order Rs.600
 Opportunity cost (cost of capital) of investment Re.1 per unit
 Cost of deterioration, taxes, insurance, supervision cost Re.1 per unit
24. From the following particulars, calculate the economic order quantity
 Annual requirements : 1,600 units
 Cost of materials per unit : Rs.40
 Cost of placing and receiving one order : Rs.50
 Annual carrying cost of inventory : 10% of inventory value.
25. From the following information calculate Economic Order Quantity
 Annual usage – 3,600 units
 Buying cost per unit – Rs.4
 Ordering cost – 32 paise per order
 Carrying cost – 25% per annum (KKU Oct 2015)

IV. ISSUE CONTROL

The most important aspect of material control is the issue control. Materials are issued to production and utmost care is to be taken while issuing the materials. The storekeeper should issue the materials without authorisation to production. But he should receive material requisition which should be in written from the production centre. Materials requisition includes materials required (quality of materials and quantity of materials), date by which it is required etc. and it should be signed by authority i.e., foremen or department head. After receipt of material requisition the storekeeper should take necessary steps to issue the materials. Any excess materials found, the production department should return to the stores by preparing and sending the materials returns note. Sometimes the surplus material of one department can be transferred to another department.

Method of pricing of material issues:

One of the most important aspect of issue control is pricing of the materials issues. Materials issued to production and it is necessary to find out the consumption value of materials in order to ascertain total cost of the production. Therefore, fixation of the price at which issue of materials are to be charged to the production is the most important aspect of cost accounting. To ascertain the total cost of a product produced, the cost of material used in production, should be considered.

When materials are issued for any production work or job, they have to be valued in the cost department. When the materials are purchased for specific job, the cost incurred should directly be charged to such specific job without any problem. In manufacturing organisations, generally, the materials are purchased in anticipation and issued to different production departments or jobs. In such a situation a question will arise at what price the issue is to be charged? Pricing of issue of materials at the same price at which they purchased is not possible. Therefore, it is necessary to price the issues by using certain method. The following are the important methods of pricing of material issues.

Cost price methods	Average price methods	Notional price methods
a) Specific price method	a) Simple average method	a) Standard price method
b) First-In-First-Out	b) Weighted average method	b) Inflated price method
c) Last-In-First-Out	c) Periodic simple average	c) Market price method
d) Highest-In-First-Out	d) Moving simple average	
e) Base stock method	e) Moving weighted average	

a) Specific Price Method:

Specific Price means the price actually paid for the materials for a particular job or contract. Sometimes materials are purchased to use in a particular job, issues can be identified with a particular receipt. When materials are purchased for a specific job the actual paid for purchase can be charged to production. This method can be adopted when prices are stable. It is not followed when materials are purchased for all jobs. Thus, it has limited application.

b) First-In-First-Out (FIFO):

Under this method materials are issued in the order in which they received in the stores. The material received first will be issued to the production first i.e., first come first served. The sequence of issue is as per the dates of purchases. In other words, old stocks are issued first and new stocks will be issued afterwards.

Therefore, this method ensures that the closing stock of materials always be valued at market or latest price. However, the assumption of First-In-First-Out (FIFO) is only for accounting purpose, the physical flow of materials need not necessarily be in the order of the flow of cost.

Advantages:

- (i) This is simple and easy to operate.
- (ii) Value of closing stock of materials will reflect at current market price.
- (iii) This system is suitable for slow moving materials.
- (iv) It is recognised as per the accounting standards.
- (v) It minimises deterioration and obsolescence.
- (vi) It gives good result when prices are falling.

Disadvantages:

- (i) It is not suitable when prices are fluctuating.
- (ii) It result in overestimation of company's profit.
- (iii) During inflation it shows high profits.
- (iv) The pricing of material returns will be difficult.

c) Last-In-First-Out (LIFO):

This method is opposite to First-In-First-Out. Under this method materials received last are issued first. Issues are made from the latest purchases. This method is also called as replacement cost method. The issues are priced at the latest prices. Therefore, it will make the product cost more realistic. But the inventory valuation will be made at the older price. Hence, valuation of inventory as per this method is not accepted while preparation of financial statements i.e., it is not approved as per the accounting standards. However, it is the most significant method in matching cost with revenue in the income determination procedure.

Advantages:

- (i) It is also simple to operate.
- (ii) It is suitable when prices are rising.
- (iii) It matches cost with revenues in a better way
- (iv) It gives realistic product cost.
- (v) It minimises unrealistic gains and losses.

Disadvantages:

- (i) Accounting standards does not recognise.
- (ii) This is not suitable when prices are fluctuating.
- (iii) The stock is valued at older prices.

d) Highest-In-First-Out:

According to this method materials of the highest prices are issued first, irrespective of the order of purchase. This is based on the assumption that the inventory should be valued at the lowest possible price. This method has an advantage that in a fluctuating market the highest cost of material is recovered first and closing stock value is conservative. This method is suitable for cost plus contracts.

e) Base stock method:

The quantity of minimum of stock that should be maintained is known as safety stock or base stock. The base stock is always maintained or valued at which the first lot of materials is received. This is the stock not to be issued until emergency arises. The portion of stock above this level is issued under any one of the pricing methods. Generally, it is used with either First-In-First-Out or Last-In-First-Out. This not popular as First-In-First-Out or Last-In-First-Out and not approved by accounting standards.

f) Simple Average Price Method:

Simple average price is the price which is calculated by taking into account all the prices of materials in the stock from which materials to be issued. The average of prices of various lots of materials which are included in stock of materials from which materials are issued is calculated by dividing the total of prices by number of prices. In other words, simple average is the average of prices ignoring the quantities involved.

Advantages:

- (i) It is easy to calculate and understand.
- (ii) It is useful when prices are do not fluctuate much.

Disadvantages:

- (i) It does not take into account the quantity of materials
- (ii) Materials are not charged to production at actual cost

g) **Weighted Average Price Method:**

Weighted average price is the price which is calculated by taking into account both the price and the quantity of materials purchased. Issue price is computed every time whenever receipt of materials occurs. Weighted average price will arrive by dividing the total cost of materials by total quantity. This method is appropriate to use even the material prices are stable. The price of materials is estimated on the receipt of materials rather than issue of materials.

Advantages:

- (i) It is suitable when the prices are vary widely
- (ii) The stock is valued according to the accounting principles.
- (iii) It gives weightage to quantity of materials.

Disadvantages:

- (i) It involves more clerical work.
- (ii) It is most complicated to operate.

h) **Periodic Simple Average Method:**

According to this method, the average price is calculated periodically i.e., weekly or monthly. The average price is to be calculated by adding all the prices excluding prices of opening stock during the period and dividing the sum of these prices by the number of prices.

i) **Moving Simple Average Method:**

The moving simple average price is the average of the simple average prices for a specified number of periods. The moving average is computed by dividing periodic averages by number of periods.

j) **Moving Weighted Average Method:**

Under this method, the issue price of materials will be calculated by dividing the total of the periodic weighted average prices for a number of periods by the total number of periods.

k) **Standard Price Method:**

The issue of price of material is predetermined, known as standard price. The standard price is determined by taking into account various factors which affect the price. The factors include market trends, freight and warehouse expenses etc.

Inflated price method and market price methods are also used for fixing the issue price as and when necessary.

However, the most commonly used method for determining the issue of price of materials are First-In-First-Out, Last-In-First-Out, Simple Average and Weighted Average.

26. Prepare stores ledger account under, First-In-First-Out, Last-In-First-Out, simple average and weighted average methods from the following

2022

March 1	Opening stock 1,000 units @ Rs.30 per unit
5	Purchased 2,400 units @ Rs.32 per unit
8	Issues 2,000 units
10	Received 1,200 units @ 33 per unit
15	Issued to workshop 1,000 units
20	Purchases 1,600 units @ Rs.36 per unit
25	Issue to production 1,200 units
30	Returns from workshop 40 units
31	Purchased 800 units @ Rs.35 per unit
31	Issued 800 units

(SVU Oct 06, RSU Sep 14, Mar 13 & Krishna Mar 13)

27. Akash Company purchased and issued the materials in the following order

Date	Particulars	Units	Unit cost (Rs.)
1 st January	Purchase	300	3.00
5 th January	Purchase	600	4.00
10 th January	Issue	500	
12 th January	Purchase	700	4.00
15 th January	Issue	800	
20 th January	Purchase	300	5.00
30 th January	Issue	100	

Ascertain the closing stock as per First-In-First-Out and Last-In-First-Out.

28. The following purchases and issues were subsequently made. Prepare the store ledger account showing how the value of the issues would be recorded under (a) FIFO, (b) LIFO, (c) Simple Average and (d) Weighted average methods

Jan 2	Purchased 4,000 units @ Rs. 4-00 per unit
Jan 20	Purchased 500 units @ Rs. 5-00 per unit
Feb 5	Issued 2,000 units
Feb 10	Purchased 6,000 units @ Rs. 6-00 per unit
Feb 12	Issued 4,000 units
Mar 2	Issued 1,000 units
Mar 5	Issued 2,000 units
Mar 15	Purchased 4,500 units @ Rs. 5-50 per unit
Mar 20	Issued 3,000 units

29. From the following particulars write stores ledger account (**KKU Oct 15**)

Purchases		Issues	
4.1.2022	500 units @ Rs.20 per unit	7.1.2022	350 units
6.1.2022	800 units @ Rs.10 per unit	12.1.2022	600 units
18.3.2022	1,150 units @ Rs.24 per unit	28.3.2022	710 units
16.4.2022	1,500 units @ Rs.32 per unit	22.4.2022	1,430 units
26.5.2022	400 units @ Rs.19 per unit	1.6.2022	790 units

30. The following purchases and issues were subsequently made. Prepare the store ledger account showing how the value of the issues would be recorded under (a) FIFO, (b) LIFO, (c) Simple Average and (d) Weighted average methods

September 1 Opening balance 24,000 kgs. @ Rs. 7,500 per tonne

1	Purchases 44,000 kgs. @ Rs.7,600 per tonne
1	Issue 10,000 kgs
5	Issue 16,000 kgs
12	Issue 24,000 kgs
13	Purchase 10,000 kgs @ Rs. 7,800 per tonne
18	Issue 24,000 kgs
22	Purchase 50,000 kgs @ Rs. 8,000 per tonne
28	Issue 30,000 kgs
30	Issue 22,000 kgs

(SVU Dec 2013)

31. Prepare stores ledger account on the basis of weighted average price method and LIFO price method 2023

January 1	Balance 400 units @ Rs. 20 per unit
4	Issues 150 units
6	Purchases 100 units @ Rs. 22 per unit
10	Returns from a work order 10 Units issued on 4 th January
15	Issues 180 units
16	Stock verification reveals loss of 3 units
20	Purchases 220 Units @ Rs. 25 per unit
28	Stock verification reveals loss of 4 units
30	Issues 113 units (SVU Apr 10)

32. The following details are available in respect of certain materials in the Harini industries for 3 months period ending 31st March 2017.

5.1.2023	Purchase of 1,000 kgs @ Rs.1.20 per kg
11.1.2023	Issue 2,000 kgs
1.2.2023	Purchase 1,500 kgs @ Rs.1.30 per kg
18.2.2023	Issue 2,400 kgs
26.2.2023	Issue 1,000 kgs
8.3.2023	Purchase 1,000 kgs @ Rs.1.40 per kg
17.3.2023	Purchase 1,500 kgs @ Rs.1.30
28.3.2023	Issue 2,000 kgs

The stock on 1st January 2023 was 5,000 kgs @1.10 per kg. You are required prepare stores ledger, by adopting weighted average method of pricing issues.

33. The following is the receipts and issue of materials in Pavan Co Ltd during November 2022

Nov 1	Opening balance 500 kgs @ Rs.25
-------	---------------------------------

- 3 Issues 70 kgs
- 6 Issues 100 kgs
- 9 Issues 80 kgs
- 13 Received from supplier 200 kgs @ Rs.24.50
- 14 Returned of surplus from a work order 15 kgs @ Rs.24
- 16 Issue 180 kgs
- 20 Received from suppliers 240 kgs @ Rs.24.30
- 24 Issue 304 kgs
- 25 Received from suppliers 320 kgs @ Rs.24.40
- 26 Issue 112 kgs
- 27 Returned of surplus 12 kgs @ Rs.25
- 28 Received from suppliers 100 kgs @ Rs.25

Issues are priced on the principle of Last-In-First-Out method. The stock verifier notices on 15th, he had found a shortage of 5 kgs and on 27th another shortage of 8 kgs. Write out the stores ledger account.

34. From the following particulars prepare stores ledger under First-In-First-Out and Weighted Average method. (SKU Mar 14, ANU July 11 & AU July 14)

- 2023 Jan 1 Balance 500 units at Rs.25 per unit
- 3 Issues 250 units
- 10 Purchases 200 units at Rs.26 per unit
- 12 Returns from department 15 units at Rs.24 per unit
- 18 Issue 180 units
- 16 Stock verification reveals a loss of 5 units
- 20 Purchases 320 units at Rs.30 per unit
- 28 Stock verification reveals a loss of 8 units
- 30 Issue 112 units

35. Prepare a store ledger account showing how the value of the issue should be arrived under the base stock method when it operates with FIFO and LIFO. Base stock is 200 units

Date	Quantity received	Rate per unit	Issue of Materials
1	500	1.00	---
6	--	--	200
10	400	1.10	---
15	300	1.20	---
20	---	---	500
21	---	---	200
24	500	1.30	---
25	---	---	300
28	---	---	200

36. The following information is provided by Sunrise industries for the fortnight of April 2023
Opening stock : Balance on 1.4.2023 100 units value Rs.500

Purchases		Issues	
5.4.2023	300 units @ Rs.6 per unit	6.4.2023	250 units
8.4.2023	500 units @ Rs.5 per unit	10.4.2023	400 units
12.4.2023	600 units @ Rs.8 per unit	14.4.2023	500 units

Write up the stores ledger on First-In-First-Out method (AU July 13, May 11)

37. Prepare stores ledger under FIFO and LIFO methods from the following transactions

Receipts :

- 3rd Jan. 2023 300 units @ Rs. 25 per unit
- 9th Jan. 2023 200 units @ Rs. 25 per unit
- 15th Jan 2023 150 units @ Rs. 26 per unit
- 22nd Jan 2023 100 units @ Rs.24 per unit

Issues :

- 5th Jan 2023 250 units
- 10th Jan 2023 200 units
- 25th Jan 2023 250 units

Opening stock: on 1st January 2023 500 units @ Rs. 25 per unit

Returns: Received 20 units (Which were issued on 10th Jan 2023) on 20th Jan 2023.

Base stock: 200 units

38. Prepare stores ledger account on the basis of Weighted average price method and Last-In-First-Out method.

Date	Particulars	Units	Value
2023 April 1	Balance	300	6,000
2	Purchases	200	4,400
4	Issues	150	
6	Purchases	200	4,600
11	Issues	150	
19	Issues	200	
22	Purchases	200	4,800
27	Issues	250	
28	Shortage of stock as per the stock verification is 20 units		

39. The stock in hand of a material as on 1st September, 2023, was 1,000 units at Re.1 per unit. The following purchases and issues were subsequently made. Prepare the store ledger account showing how the value of the issues would be recorded under (a) FIFO, and (b) LIFO. Assume base stock is 500 units.

Purchases			Issues		
September	6	100 units at Rs.1.10	September	9	500 units
September	20	700 units at Rs.1.20	September	22	500 units
September	27	400 units at Rs.1.30	September	30	500 units
October	13	1,000 units at Rs.1.40	October	15	500 units
October	20	500 units at Rs.1.50	October	22	500 units
November	17	400 units at Rs.1.60	November	11	500 units

4. Question bank

OPERATING COSTING

- Operating costing is method of costing used in service sector to ascertain and control the cost. Operating costing is also known as service costing. Operating costing is applied where the standardized services are provided either by an undertaking or by a service cost centre within an undertaking. Service may be performed internally and externally.
- Services rendered in the same organisation is known as internal services (they are performed on inter-departmental basis in factory itself). In-house services provided by a service cost centre to other responsibility centres as support services called internal services. Examples of support services are Canteen and hospital for staff, Boiler house for supplying steam to production departments, Captive Power generation unit, operation of fleet of vehicles for transport of raw material to factory or distribution of finished goods to the market outlets, IT department services used by other departments, research & development, quality assurance, laboratory etc
- Services are termed as external when they are to rendered to outside parties. Public utility services like transport, water supply, electricity supply, hospitals are the best example for the service costing.

DEFINITION

1. According to Wheldon – “operating costing actually is unit costing as applied to the cost of services.”
2. According to CIMA, London, “Operating Costing is that form of operation costing which applies where standardized services are rendered either by an undertaking or by a service cost centre within an undertaking.”

FEATURES OF OPERATING COSTING

- a) Uniformity of service to all the customers.
- b) Involves fixed and variable costs. The distinction is necessary to ascertain the cost of service and the unit cost of service.
- c) Service undertakings do not produce physical articles for stock and sale. But services are sold to consumers.
- d) It is not concerned with accounting for inventories, other than those for miscellaneous supplies. There is nothing like finished services inventory similar to finished goods inventory.
- e) The cost unit may be simple in certain cases, and composite or compound in other cases like transport undertakings.
- f) Total costs are averaged over the total amount of service rendered.
- g) It can be applied to the services within the organisation as well as extending services to the community at large.
- h) Documents like the daily log sheet, operating cost sheet, boiler house cost sheet, canteen cost sheet etc. are used for the collection of cost data.

OBJECTIVES OF OPERATING COSTING

- i. To calculate the cost of uniform service rendered to the customers.
- ii. To ascertain cost of all services produced within an undertaking viz., internal and external services.
- iii. To keep the operating cost at the optimum level.
- iv. To make a comparative analysis of operating cost incurred for different periods.
- v. To make proper evaluation of different alternatives available.
- vi. To determine whether to produce a service or buy it from outside.
- vii. To ascertain whether the cost incurred on maintenance is excessively incurred or not.

COST UNIT

- ❖ Determination and selection of suitable cost unit for ascertainment of cost is a major problem in service costing.
- ❖ Selection of proper cost unit depends upon the nature of work and the cost objectives.
- ❖ There are simple cost units and composite cost units.
- ❖ Simple cost unit is understandable for example, per student, per mile, per bed etc.
- ❖ Composite cost unit means combination of more than one unit like passenger kilometre, tonne kilometre etc.

Service industry	Unit of cost (examples)
Transport Services	Passenger- km., (In public transportation) Quintal- km., or Ton-km. (In goods carriage)
Electricity Supply service	Kilowatt- hour (kWh)
Hospital	Patient per day, room per day or per bed, per operation etc.
Canteen	Per item, per meal etc.
Cinema	Per ticket, per man show
Hotels	Guest Days or Room Days
Bank or Financial Institutions	Per transaction, per services (e.g. per letter of credit, per application, per project etc.)
Educational Institutes	Per course, per student, per batch, per lecture etc.
IT & ITES	Cost per project, per module etc.
Insurance	Per policy, Per claim, Per TPA etc.

SERVICE COSTING Vs PRODUCT COSTING:

Service costing differs from product costing (such as job or process costing) in the following ways due to some basic and peculiar nature.

- a) Unlike products, services are intangible and cannot be stored, hence, there is no inventory for the services.
- b) Use of Composite cost units for cost measurement and to express the volume of outputs.
- c) Unlike a product manufacturing, employee (labour) cost constitutes a major cost element than material cost.
- d) Indirect costs like administration overheads are generally have a significant proportion in total cost of a service as unlike manufacturing sector, service sector heavily depends on support services and traceability of costs to a service may not economically feasible.

STATEMENT OF COSTS FOR SERVICE SECTORS

For preparing a statement of cost or a cost sheet for service sector, costs are usually collected and accumulated for a specified period viz. A month, quarter or a year, etc.

The cost statement for services may be prepared either on the basis of functional classification as done for product costing or on the basis of variability. Cost sheet on the basis of variability is prepared classifying all the costs into three different heads:

1. Fixed costs or Standing charges
2. Variable costs or Operating expenses
3. Semi-variable costs or Maintenance expenses

Note: In the absence of information about semi-variable costs, the costs would be shown under fixed and variable heads only.

TREATMENT OF DEPRECIATION- FIXED OR VARIABLE:

- If related to effluxion of time or calculated on time basis, will be treated as fixed. However, if the depreciation is calculated on the basis of activity level or usage, it will be treated as variable cost.

TREATMENT OF INTEREST:

- Interest and finance charges shall be presented in the cost statement as a separate item of cost of sales. In general, interest is treated as fixed cost, unless otherwise given.

TRANSPORT COSTING

Transport Costing refers to the determination of the cost per unit of services rendered by a vehicle. E.g. The cost/passenger/km or cost/ton/km.

OBJECTS OF TRANSPORT COSTING

- To find cost per unit of operating a vehicle and to fix the rate for the carriage of passengers or goods.
- The control of the cost of operating each vehicle.
- To compare the cost per unit of one means of transport with that of another, and to find out the profitable means of transport.
- To compare the cost per unit of operating one vehicle, with another vehicle, and to ascertain the efficiency of each vehicle.
- To help to fix the hire charges of a vehicle where a vehicle is given on hire.

COSTING OF TRANSPORT SERVICES

- Transport organizations can be divided into two categories viz. Goods transport and Passenger transport.
- The cost unit for Goods transport organization is Ton– Kilometer – that means cost of carrying one Ton of goods over a distance of one kilometer.
- Cost unit for Passenger transport organization is Passenger– Kilometer – that means cost of carrying one Passenger over a distance of one kilometer.

The costs are shown under the suggestive following heads:

- Standing Charges or Fixed costs: These are the fixed costs that remain constant irrespective of the distance travelled. These costs include the following:
 - Insurance
 - License fees
 - Salary to Driver, Conductor, Cleaners, etc if paid on monthly basis
 - Garage costs, including garage rent
 - Depreciation (if related to efflux of time)
 - Taxes
 - Administration expenses, etc
 - Interest on capital
- Variable costs or Running costs: These costs are generally associated with the distance travelled. These costs include the following:
 - Petrol and Diesel
 - Engine oil
 - Lubricant oils,
 - Wages to Driver, Conductor, Cleaners, etc if it is related to operations
 - Depreciation (if related to activity)
 - Mechanics
 - Cleaner
 - Any other variable costs identified.
- Semi-variable costs or Maintenance costs: These costs include the following:
 - Repairs and maintenance
 - Tyres

- Spares, etc
- Overhauling
- Painting
- Cleaning

The heads for a cost may change as per the situation or condition. For an example salary of driver may be treated as standing charges or running cost depending on the situation and nature of his employment.

PASSENGER KILOMETRES: Passenger kilometres are always calculated using absolute method. Formula is as follows:

Passenger Kilometres = No. of busses X Distance X Round Trip X Seating Capacity X % of Occupancy X No. of days

1. A transport company maintains fleet of Lorries for carrying goods from Delhi to Panipat, 100 KMs off. Each lorry, which operates 25 days on an average in a month, starts every day from Delhi with a load of 4 tonnes and returns from Panipat with a load of 2 tonnes. Calculate the total commercial tonne-KMs.

$$= (4 \text{ tonnes} + 2 \text{ tonnes}) / 2 \times 100 \text{ kms} \times 2 \times 25 \text{ days} = 15,000 \text{ tonne kms}$$

2. Calculate passenger kilometre

- a. No of buses in the undertaking – 4
- b. Number of days operated in the month – 25 days
- c. Trips made by each bus daily - 2 trips
- d. Distance of route – 100 kms (one side)
- e. Capacity of each bus – 50 passengers
- f. Normal passengers travelling – 80% of capacity

$$= 4 \times 100 \times 2 \times 25 \times 50 (80\%) = 16,00,000 \text{ kms}$$

3. From the following information, calculate kilometres and total passenger kilometres

- a. Number of buses – 4
- b. Days operated in a month – 30 days
- c. Trips made by each bus – 4
- d. Distance of route – 30 kilometres long (one way)
- e. Capacity of bus – 60 passengers
- f. Normal passengers travelling – 80% of the capacity

$$\text{Ans : } 28,800 \text{ (} 4 \times 30 \times 4 \times 60 \text{)} = 13,82,400$$

4. From the following information, calculate total kilometres and total passenger kilometres

- a. Number of buses – 5
- b. Days operated in the month – 25 days
- c. Trips made by each bus – 4
- d. Distance of route – 25 kms (one side)
- e. Capacity of bus – 50 passengers
- f. Normal passenger travelling – 90% of capacity

$$\text{Ans : } 25,000 = 11,25,000 \text{ passenger kilometres}$$

5. Broadways Co. runs six buses between two towns which are 100 kms apart. The seating capacity of each bus is 50 passengers. Actual passengers carried are 70% of the seating capacity. All the 4 buses run for 25 days a month making one round trip per day. Calculate the total passenger-kms

Solution:

Total Passenger-kms

= No. of buses X Distance per round trip X No. of round trips per day X No. of days X Capacity of the bus X Actual capacity utilised

$$= 4 \times (100 \text{ kms} \times 2) \times 1 \times 25 \text{ days} \times 50 \text{ passengers} \times 70\%$$

= 7,00,000 passenger-kms

6. A truck starts with a load of 10 tonnes of goods from station P. It unloads 4 tonnes at station Q and rest of the goods at station R. It reaches back directly to station P after getting reloaded with 8 tonnes of goods at station R. The distances between P to Q, Q to R and then R to P are 40 kms, 60 kms. and 80 kms. Respectively. Compute 'absolute tonne-km.' and 'commercial tonne-km'.

Solution:

Absolute Tonne-kms

$$= (10 \text{ tonnes} \times 40 \text{ kms.}) + (6 \text{ tonnes} \times 60 \text{ kms.}) + (8 \text{ tonnes} \times 80 \text{ kms.})$$

$$= 400 + 360 + 640 = 1,400 \text{ tonne-kms.}$$

Commercial Tonne-kms.

$$= \text{Average load} \times \text{Total km. travelled}$$

$$= \{10+6+8/3\} \text{ tonnes} \times 180 \text{ kms.} = 1,440 \text{ tonne-kms.}$$

7. A passenger transporting company has 4 buses with a seating capacity of 50 each. It covers a distance of 30 kms (one way) to a particular destination. It makes daily 5 trips on an average. The average capacity carried is 90% of the total capacity. Calculate total running kilometres per day and total passenger kilometres per day.

1. Calculation of total running kilometres per day = Distance of one trip \times No. of trips \times No. of buses

$$\text{Total running kilometres} = \text{Distance of one trip} \times \text{No. of trips} \times \text{No. of buses}$$

$$= (30 \times 2) \times 5 \times 4 = 1,200 \text{ kms per day}$$

2. Calculation of total passenger kilometres at 90% capacity

$$\text{Total passenger kilometres} = \text{Distance of one trip} \times \text{No. of trips} \times \text{No. of buses} \times \text{Capacity of bus} \times \% \text{ of passengers travelled}$$

$$= (30 \times 2) \times 5 \times 4 \times (50 \times \frac{90}{100})$$

$$= 54,000 \text{ passenger kms. per day}$$

8. From the following information, calculate total running kilometres and passenger kilometres

- Number of buses – 2
- Days operated in a month – 30
- Number of trips made by each bus – 4
- Distance of route – 50 kilometres (one way)
- Seating capacity – 60 passengers
- Normal passengers travelling – 80% of the capacity.

$$\text{Total running kilometres} = \text{Distance of one trip} \times \text{No. of trips} \times \text{No. of buses} \times \text{No. of days}$$

$$= (50 \times 2) \times 4 \times 30 \times 2 = 24,000 \text{ kms}$$

$$\text{Total passenger kilometres} = \text{Distance of one trip} \times \text{No. of trips} \times \text{No. of buses} \times \text{Capacity of bus} \times \% \text{ of passengers travelled}$$

$$= (50 \times 2) \times 4 \times 30 \times 2 \times (60 \times \frac{80}{100})$$

$$= 11,52,000 \text{ passenger kms.}$$

9. Calculate total passenger kilometres from the following information

Number of buses – 6, number of days operating in a month 25, trips made by each bus per day -8, distance covered – 20 kilometres (one side), capacity of bus 40 passengers, normally 80% of capacity utilisation.

Ans : 15,36,000 passenger kms

10. Calculate total passenger kilometres. The following are the particulars relating to a bus. Days operated in a month – 25 days

Trips made in a day – Round trip

Distance of route – 100 kilometres (one way)

Capacity of bus – 60 passengers

Normal passengers travelling 75% of the capacity.

11. Calculate total passenger kilometers. The following are the particulars relating to a bus

Days operated in a month – 30 days

Trips made in a day – 4

Distance of route – 20 kilometers (one way)

Capacity of bus – 50 passengers

Normal passengers travelling 90% of the capacity.

12. Sigma transport company is running 5 busses between two towns, which are 40 kms apart. Seating capacity of each bus is 40 passengers. Actual passengers carried were 75% of the seating capacity. All the five buses run on all days for the month. Each bus made one round trip per day. Calculate passenger kilometres.

13. A transport company running a bus between two towns 50 km apart. Seating capacity of bus is 50 passengers. Actual passengers carried were 80% of the seating capacity. Assume the bus will make one round trip and operate 25 days in a month. Calculate passenger kilometres.

14. From the following information, calculate total passenger kilometres

Number of buses – 1

Days operated in the month 30 days

Trips made in a day – 1 (round trip) - 80 kilometres

Capacity of bus – 50 passengers

Normal passenger – 90% of capacity

15. The Road Transport Co which keeps a fleet of lorries, gives the following information

	Rs.
Kilometres run for April	30,000 kms
Wages for April	2,000
Petrol oil etc., for April	4,000
Original cost of vehicle	1,00,000
Depreciation to be allowed @25% per annum on original cost	
Repairs for the month of April	6,000
Garage rent etc. for April	1,000
Licence, insurance etc. for the year	6,000

Prepare a statement for April, showing the fixed and variable cost per running km

16. Calculate the cost per KM of a vehicle from the following

	Rs.
Cost of vehicle	25,000
Road license (annual)	750
Supervision yearly	1,800
Driver's wages per hour	4-00
Cost of fuel per litre	1-50
Repairs and maintenance per km	1-50
Tyre cost per km	1-00
Garage rent per year	1,600
Insurance yearly	850
Kilometres run per litre	6
Kilometres during the year	15,000
Estimated life of vehicle (KM)	1,00,000

Charge interest at 5% per annum on cost of vehicle. The vehicle runs 20 kms per hour on an average.

17. Calculate the cost per KM of a vehicle from the following

	Rs.
Value of vehicle	15,000
Road license annual	500
Insurance annual	100
Garage rent annual	600
Driver wages per month	200
Cost of petrol per litre	0-80
Kilometres per litre	8
Maintenance charges per km	0.20
Estimated life (KM)	1,50,000
Estimated annual run (KM)	6,000

18. Lakshmi company running a bus between two towns which are 100 kilometres apart. Seating capacity of each bus is 50 passengers. The following are details

	Rs.
Wages of driver and conductor	6,200
Salaries of staff	1,750
Diesel oil and other oil	6,000
Repairs	1,600
Insurance	2,800
Depreciation	5,000
Interest and other charges	4,000

Actual passengers carried were 90% of the seating capacity. Find out the cost per passenger kilometre.

19. Lakshmi company running a bus between two towns which are 50 kilometres apart. Seating capacity of each bus is 40 passengers. The following are details

	Rs.
Wages of driver and conductor	4,800
Salaries of staff	1,200
Diesel oil and other oil	6,800
Repairs	450
Insurance	3,200
Depreciation	6,000
Interest and other charges	4,000

Actual passengers carried were 80% of the seating capacity. Find out the cost per passenger kilometre.

20. A transport company is running 2 busses between two towns which are 80 miles apart. Seating capacity of each bus is 40 passengers. The following particulars were obtained from their books for April 2021.

Particulars	Rs.
Wages of drivers, conductors and cleaners	10,000
Salaries of office and supervisory staff	8,000
Diesel and other oil	12,000
Repairs and maintenance	4,000
Taxation and insurance	3,600
Depreciation	6,000
Interest and other charges	5,000

Actual passengers carried were 75% of the seating capacity. Two busses ran on all days of the month. Each bus made one round trip per day. Find out the cost passenger mile.

21. The Road Transport Co., which keeps a fleet of lorries, shows the following information. Milage run for April 2021 is 40,000 miles.

Particulars	Rs.
Wages for April	20,000
Petrol, oil etc. for April	12,000
Original costs of vehicles	1,80,000
Depreciation to be allowed @20% per annum on original cost	
Repairs for the month of April	6,000
Garage rent for April	6,000
Licence, insurance etc. for the year	6,000

Prepare a statement for April showing the fixed and variable cost per running mile.

22. The following information relates to a bus operator

Cost of the bus	Rs.18,00,000
Insurance charges	3% p.a.
Manager salary	Rs.8,000 p.m.
Annual tax	Rs.50,000
Garage rent	Rs.2,500 p.m.
Annual repair and maintenance	Rs.1,50,000
Expected life of the bus	15 years
Scrap value at the end of 15 years	Rs.1,20,000
Driver's salary	Rs.15,000 p.m.
Conductor's salary	Rs.12,000 p.m.
Stationery	Rs.500 p.m.
Engine oil, lubricants (for 1,200 kms)	Rs.2,500
Diesel and oil (for 10 kms)	Rs.52
Route distance	20 km long

The bus will make 3 round trips for carrying, on the average 40 passengers in each trip. Assume 15% profit on collections. The bus will work on the average 25 days in a month. Calculate fare for passenger kilometre.

23. A mini bus, having a capacity of 32 passengers, operates between two places A and B. The distance between the place A and B is 30 km. The bus makes 10 round trips in a day for 25 days in a month. On an average, the occupancy ratio is 70% and is expected throughout the year. The details of other expenses are as under

Insurance	Rs.15,600 per annum
Garage rent	Rs.2,400 per quarter
Road tax	Rs.5,000 per annum
Repairs	Rs.4,800 per quarter
Salary of operating staff	Rs.7,200 per month
Tyres and tubes	Rs.3,600 per quarter
Diesel (one litre is consumed for every 5 km)	Rs.13 per litre
Oil and sundries	Rs.22 per 100 km run
Depreciation	Rs.68,000 per annum

Bus operator requires a profit of 25% on total cost. Prepare operating cost statement.

24. The Road Transport Co., which keeps a fleet of lorries, shows the following information. Milage run for April 2021 is 30,000 miles.

Particulars	Rs.
-------------	-----

Wages for April	2,000
Petrol, oil etc. for April	4,000
Original costs of vehicles	1,00,000
Depreciation to be allowed @25% per annum on original cost	
Repairs for the month of April	6,000
Garage rent for April	1,000
Licence, insurance etc. for the year	6,000

Prepare a statement for April showing the fixed and variable cost per running mile.

25. A transport company is running 4 busses between two towns which are 50 miles apart. Seating capacity of each bus is 40 passengers. The following particulars were obtained from their books for April 2021.

Particulars	Rs.
Wages of drivers, conductors and cleaners	2,400
Salaries of office and supervisory staff	1,000
Diesel and other oil	4,000
Repairs and maintenance	800
Taxation and insurance	1,600
Depreciation	2,600
Interest and other charges	2,000

Actual passengers carried were 75% of the seating capacity. All the four busses ran on all days of the month. Each bus made one round trip per day. Find out the cost passenger mile.

$$\begin{aligned}
 \text{Passenger miles} &= \text{No. of buses} \times \text{Distance} \times \text{Round trip} \times \text{No. of Passengers} \times \\
 &\quad \text{No. of days in month} \times \text{Capacity.} \\
 &= 4 \times 50 \times 2 \times 40 \times 30 \times 75\% \\
 &= 3,60,000 \text{ miles}
 \end{aligned}$$

26. Singh has started transport business with a fleet of 10 taxis. The various expenses incurred by him are given below:

Particulars	Rs.
Cost of each taxi	75,000
Salary of office staff (per month)	1,500
Salary of garage staff (per month)	2,000
Rent of garage (per month)	1,000
Driver's salary per taxi per month	400
Road tax and repairs per taxi (per annum)	2,160
Insurance premium @4% of cost per annum	

The life of a taxi is 3,00,000 km. and at the end of which it is estimated to be sold at Rs.15,000. A taxi runs on an average 4,000 km per month of which 20% it runs empty. Petrol consumption is 9 km. per litre of petrol costing Rs.6.30 per litre. Oil and other sundry expenses amount to Rs.10 per 100 km. calculate the effective cost of running taxi per kilometre.

Particulars	Amount Per month	Amount Per km
Fixed		
Salary of office staff (1500/10)	150	
Salary of garage staff	200	
Rent of garage	100	
Drivers salary	400	
Road tax (2160/12)	180	

Insurance (75,000 x 4%)/12 months	250	
Total fixed charges	1280	0.32
Variable		
Depreciation (75,000-15,000)/3,00,000		0.20
Petrol (6.30/9)		0.70
Oil other lubricants (10/100)		0.10
Total (fixed and variable)		1.32

Effective cost of running a taxi per km = $(1.32 \times 4000) / 3,200 = \text{Rs.} 1.65$

27. A transport company is running 2 busses between two towns which are 100 miles apart. Seating capacity of each bus is 60 passengers. The following particulars were obtained from their books for April 2021.

Particulars	Rs.
Wages of drivers, conductors and cleaners	5,400
Salaries of office and supervisory staff	2,700
Diesel and other oil	10,800
Repairs and maintenance	2,700
Taxation and insurance	3,600
Depreciation	6,000
Interest and other charges	5,000

Actual passengers carried were 80% of the seating capacity. Two busses ran on all days of the month. Each bus made one round trip per day. Find out the cost passenger mile.

28. AXA Passenger Transport Company is running 5 buses between two towns, which are 40 kms apart. Seating capacity of each bus is 40 passengers. Following details are available from their books, for the month of April 20X9:

	Amount (Rs.)
Salary of Drivers, Cleaners and Conductors	24,000
Salary to Supervisor	10,000
Diesel and other Oil	40,000
Repairs and Maintenance	8,000
Tax and Insurance	16,000
Depreciation	26,000
Interest	20,000
	1,44,000

Actual passengers carried were 75% of the seating capacity. All the four buses run on all days for the month. Each bus made one round trip per day. CALCULATE cost per passenger – Kilometre.

Total Passenger Kilometres =

Number of Buses × Distance × Seating Capacity × Used Capacity

× Number of days in the month × Number of trips

= 5 Buses × 40 kms. × 40 Seats × 75% × 30 Days × 2 Single trips (1 Round Trip)

= 3,60,000 Passenger-Kms.

Cost per Passenger-Km = Total costs ÷ Total Passenger

Kilometres Statement of Cost per Passenger – Km

Particulars	Cost Per Month	Cost per Passenger – Km
A. Standing Charges:		

Wages of Drivers, Cleaners and Conductors	24,000	
Salary to Supervisor	10,000	
Tax and Insurance	16,000	
Depreciation	26,000	
Interest	20,000	
Total Standing Charges	96,000	0.267
B. Running charges		
Diesel and other oil	40,000	0.111
C. Maintenance charges		
Repairs and maintenance	8,000	0.022
Total		0.400

29. ABC Transport Company has given a route 40 kilometers long to run bus.

- The bus costs the company a sum of Rs.20,00,000
- It has been insured at 3% p.a. and
- The annual tax will amount to Rs.20,000
- Garage rent is Rs.20,000 per month.
- Annual repairs will be Rs.2,04,000
- The bus is likely to last for 5 years
- The driver's salary will be Rs.30,000 per month and the conductor's salary will be Rs.25,000 per month in addition to 10% of takings as commission [To be shared by the driver and conductor equally].
- Cost of stationery will be Rs.1,000 per month.
- Manager-cum-accountant's salary is Rs.17,000 per month.
- Petrol and oil will be Rs.500 per 100 kilometers.
- The bus will make 3 up and down trips carrying on an average 40 passengers on each trip.
- The bus will run on an average 25 days in a month.

Assuming 15% profit on takings, CALCULATE the bus fare to be charged from each passenger.

Working Note:

(1) Total Kilometres run per annum:

$$\begin{aligned}
 &= \text{Number of Buses} \times \text{Distance} \times \text{Number of days in the Month} \times \text{Number of trips} \times 12 \text{ months} \\
 &= 1 \text{ Bus} \times 40 \text{ kms} \times 25 \text{ Days} \times 6 \text{ Single trips (3 Round Trips)} \times 12 \text{ months} = 72,000 \text{ kms.}
 \end{aligned}$$

(2) Total Passenger Kilometres per annum:

$$\begin{aligned}
 &\text{Total Kilometres run per annum} \times \text{Seating Capacity} \\
 &= 72,000 \text{ Kms} \times 40 \text{ Seats} = 28,80,000 \text{ Passenger-Kms.}
 \end{aligned}$$

(3) Petrol & oil Consumption per annum:

$$\begin{aligned}
 &\text{Total Kilometres run per annum} \times \text{Petrol Consumption per KM} \\
 &= 72,000 \text{ Kms} \times (\text{Rs.}500 / 100 \text{ Kms}) = \text{Rs. } 3,60,000
 \end{aligned}$$

Statement of Cost per Passenger – Km

Particulars	Per Annum	Per Passenger - Kilometer
A. Standing Charges:		
Insurance @ 3% on Rs.10,00,000	30,000	

Annual Tax	20,000	
Garage rent (Rs.20,000 × 12)	2,40,000	
Depreciation	4,00,000	
Salary of Driver (fixed part)	3,60,000	
Salary of Conductor (fixed part)	3,00,000	
Stationary	12,000	
Manager-cum-accountant's salary	2,04,000	
Total Standing Charges	15,66,000	0.5438
B. Running Charges:		
Diesel and other Oil (WN-3)	3,60,000	
Commission to Driver* (10%×Rs.28,40,000×1/2)	1,42,000	
Commission to Conductor* (10%×Rs.28,40,000×1/2)	1,42,000	
Total Running Charges	6,44,000	0.2236
C. Maintenance Charges:		
Repairs	2,04,000	0.0708
Grand Total (A+B+C)	24,14,000	0.8382
Profit (15%×Rs.28,40,000)	4,26,000	0.1479
Fare per Passenger Kilometer		0.9861

*Total takings = Standing Charges + (Running cost + Commission on takings)

+ Maintenance cost + Profit Let Takings = X

Or, X = 15,66,000 + (3,60,000 + 0.1X) + 2,04,000 + 0.15X Or, X – 0.25X = 21,30,000

Or, X = 28,40,000

30. SIDHU TRANSPORT Company supplies following details of a truck of 5 tons capacity:-

Cost of Truck	Rs.9,00,000
Estimated life	10 years
Oil, grease, etc	Rs. 150 per trip each way
Repairs and maintenance	Rs. 5,000 per month
Drivers wages	Rs. 10,000 per month
Insurance	Rs. 48,000 per year
Taxes	Rs. 24,000 per year
General Supervision charges	Rs. 48,000 per year

The truck carries to and fro city covering a distance of 50 km each way. Required to workout operating cost per ton –km. operating days of the truck are 25 days in a month.

Operating Cost Sheet

Particulars	Per month Rs.	Per tonne kilometre Rs.
Fixed Costs :		
Driver's wages	10,000	
Insurance	4,000	
Taxes	2,000	
General supervision charges PA	4,000	2.666
Total	20,000	2.666

Fixed Cost per tonne – kilometre (Rs. 20,000)	7,500	
Running Costs :	5,000	
Oil, grease etc. Rs. (150 × 25 × 2)	7,500	
Repairs and maintenance p.m. ₹		
Rs. ,9 00 000, ₹ Depreciation ₹	20,000	
—————10×12 ₹		
Total		
Running cost per tonne –kilometre (Rs 20,000 ÷ 7500)		5.332
Total cost per tonne kilometre		

Working Note:

•Calculation of tonne – kilometre per month: [(Kilometres for going capacity in tonnes) + (Kilometres for coming in tonnes)] No. of days [(50×5) + (50×1)] 25 = 7500 tonne kilometres.

31. SINGH Tours and Travels, a transport service company, is running 4 buses between two cities, 50 kilometres apart. Seating capacity of each bus is 40 passengers. The particulars are as follows :

	Rs.
Wages of drivers, conducts and cleaners	2,40,000
Salaries of office and supervisory staff	1,00,000
Diesel oil and other oils	4,00,000
Repairs and maintenance	80,000
Taxes, insurance et	1,60,000
Depreciation	2,60,000
Interest and other charges	2,00,000
	14,40,000

Actual passengers carried 75% of seating capacity all the four buses ran all the days of the November month. Calculate the cost per passenger per kilometre.

Particulars	Amount Rs.
Fixed or standing charges :-	
Wages of drivers, conductors and cleaners	2,40,000
Salaries of office and supervisory staff	1,00,000
Taxes, in service etc.	1,60,000
Interest and other charges	2,00,000
	7,00,000
Variable or running charges:	
Diesel and other oils	4,00,000
Repairs and maintenance	80,000
Depreciation	2,60,000
	14,40,000

Calculation of passenger Kilometres:

$$\begin{array}{r} \text{No. of buses} \times \text{No of actual passengers} \times \text{distance of trip} \times \text{days} \\ 4 \times 30(75\% \text{ of } 40) \times 100 \times 30 = 3,60,000 \\ \hline 14,40,000 \end{array}$$

$$\text{Cost per passenger kilometre working} = \frac{3,60,000}{14,40,000} = \text{Rs. } 4$$

32. New Delhi transport company is operating a bus on a route of 20 kms. The cost of the bus is Rs. 4,50,000. It is insured @ 3% p.a. and annual tax is Rs. 5,000. Garage rent is Rs. 500 p.m. Repairs are Rs. 2,500 p.a. and the life of buss estimated 5 years other particulars are : Driver's Salary Rs. 1,500 p.m.

Conductor's salary Rs. 1,200 p.m.

10% common in takings (to be shared by driver and conductor equally

Stationery

Rs. 150 p.m.

Manger salary

Rs. 1,350 p.m.

Diesel and oil Rs. 50 per 100 kms.

The bus will make 3 round trips carrying on an average 40 passengers on each trip.

Assuming 15% profit on earnings, calculate the bus fare to be charged from each passenger. The bus will run on an average 45 days in a month.

Statement of Operating Cost

Fixed Charges	Per annum	Per Month Rs.
Insurance	13,500	6,241.66
Road Tax	5,000	
Garage rent	6,000	
Driver's Salary	18,000	
Conductor's Salary	14,400	
Stationery	1,800	
Manager salary	16,200	
Total Fixed Charges	74,900	
Operating Charges		

Diesel and oil : $50 \times 3000/100$ kms	1500.00
$\frac{4,50,000}{5} \text{ Rs. } 90,000$	7500.00
Depreciation = $\frac{4,50,000}{5} \div 12$	
Repairs	208.34
Commission	2060.00
Total Cost Per Month	17,510.00
Add profit 15% on earnings	3,090.00
Total earnings	20,600

Workings

Effective passenger km per month

Distance \times trips (3 round trips) Days passengers

$20 \text{ kms} \times 6 \text{ (one way)} \times 25 \times 40 = 1,20,000$ passenger-kms

Bus fare to be charged = $20,600 \div 1,20,000 = \text{Rs. } 0.17$

Commission

$$x \times 10 = x \quad \text{_____}$$

Total earnings : - If x to be total takings, commission is 10% of x that is

$$\frac{100}{100} \quad \frac{10}{10}$$

Total earnings = Total cost +
Commission + Profit Accordingly
Profit = 15% on taking i.e., $x \times 15 = 15x$ —
or $\frac{3x}{20}$

100 100 20

x 3x
10 20

Total earnings = 15,540 (total above excluding commission) +

= 3 09 000, + 2x + 3x
x

20
 $20x = 3,09,000 + 2x + 3x$ $2x - 5x = 3,09,000$ $x = \text{Rs. } 20,600$
Commission is 10% of Rs. 20,600 = Rs. 2,060
Profit if 15% of Rs. 20,600 = Rs. 3,090

33. Work out in appropriate cost sheet form the unit cost per passenger KM for the year 2004-05 for a fleet of passenger buses booked by a Transport Company from the following figures extracted from its books:

5 passenger buses costing Rs. 50,000, Rs. 1,20,000, Rs. 45,000, Rs. 55,000 and Rs. 80,000 respectively (Total cost is Rs. 3,50,000). Yearly depreciation of vehicles is 20% of the cost. Annual repairs, maintenance and spare parts expenses are 80% of depreciation.

Wages of 10 drivers	@ Rs. 100 each per month
Wages of 20 cleaners	@ Rs. 50 each per month
Yearly rate of interest	4% on capital
Rent of six garages	@ Rs. 50 each per month
Director's fees	@ Rs. 400 per month
Office establishment	@ Rs. 1,000 per month
Licence and taxes	@ Rs. 1,000 every six months

Realization by sale of old tyres and tubes is @ Rs. 3,200 every six months. 900 passengers were carried over 1,600 KMs during the year.

34. Varun Limited is running four buses between Delhi and Alwar, covering a distance of 100 KMs. The seating capacity of each bus is 40 passengers. The following particulars are obtained from its books for the month of October 2009:

Wages of drivers and conductors	Rs. 9,600
Salaries of office staff	Rs. 3,000
Honorarium of accountant	Rs. 1,000
Diesel, oil etc.	Rs. 16,000
Repair and maintenance	Rs. 3,200
Road tax and insurance	Rs. 6,400
Depreciation	Rs. 10,400
Interest and other charges	Rs. 8,000

Actual passengers carried were 75% of the seating capacity. All the buses ran for 30 days. Each bus made one round trip per day. Find out the fare the company should charge per passenger KM if it wants a profit of 20% on the taking.

35. There are two warehouses for storing finished goods produced in a factory. Warehouse 'A' is at a distance of 10 kms. and Warehouse 'B' is at a distance of 15 kms from the factory. A fleet of 5 tonne lorries is engaged in transporting the finished goods from the factory. The records show that the lorries average a speed of 30 kms. per hour when running and regularly take 40 minutes to load at the factory. At warehouse 'A' unloading takes 30 minutes per load while at warehouse 'B' it takes 20 minutes per

load.

Drivers' Wages, depreciation, insurance and taxes amount to Rs.18 per hour operated. Fuel oil, tyres, repairs and maintenance cost Rs. 2.40 per kilometer. You are required to draw up a statement showing the cost per tonne kilometer of carrying the finished goods to the two warehouses.

Statement showing computation of total cost and cost per tonne kilometre of carrying finished goods to warehouses:

Particulars	A	B
Time for travelling	40 Min	60 Min
Time for loading	40 Min	40 Min
Time for unloading	30 Min	20 Min
	110 Min	120 Min
Cost of Insurance, wages, tax, etc. [(110/60) x 18]	33.00	
[(120/60) x 18] Rs.		36.00
Fuel & oil etc. (20 x 2.4) (30 x 2.4) Rs.	48.00	72.00
Total Cost Rs.	81.00	108.00
Tonne Kilometers (5 x 10) (5 x 15)	Rs. 50.00	75.00
Cost per tonne KM Rs.	1.62	1.44

36. Janata Transport Co. has been given a route 20 km. long for running buses. The company has a fleet of 10 buses each costing Rs. 50,000 and having a life of 5 years without any scrap value.

From the following estimated expenditure and other details calculate the bus fare to be charged from each passenger.

(i) Insurance charges	3%	p.a.
(ii) Annual tax for each bus	Rs. 1,000	
(iii) Total garage charges	Rs. 1,000	
(iv) Drivers' salary for each bus	Rs. 150	p.m.
(v) conductor's salary for each bus	Rs. 100	p.m.
(vi) Annual repairs to each bus	Rs. 1,000	
(vii) Commission to be shared by the driver and conductor equally: 10% of the takings		
(viii) Cost of stationary	Rs. 500	p.m.
(ix) Manager's salary	Rs. 2,000	p.m.
(x) Accountant's salary	Rs. 1,500	p.m.
(xii) Petrol and oil	Rs. 25	per 100 km

Each bus will make 3 round trips carrying on an average 40 passengers on each trip. The bus will run on an average for 25 days in a month. Assuming 15% profit on takings, calculate, the bus fare to be charged from each passenger.

Particulars	Amount (Rs.)
Insurance (50,000 x 3% x 10/12)	1,250
Tax (1,000 x 10/12)	833.33
Garage charges	1,000
Drivers salary (150 x 10)	1,500

Conductor salary (100 x 10)	1,000
Repairs (1,000 x 10/12)	833.33
Cost of stationary	500
Managers salary	2,000
Accountant salary	1,500
Depreciation (50,000 x 10/5 x 1/12)	833.33
Petrol * (30,000/100) x 25	7,500
Commission of conductor & driver 35,000 x (10/100)	3,500
	29,750
(+) Profit @ 15% on takings (35,000 x 15/100)	5,250
	35,000

* 10 x 20 x 3 x 2 x 25 = 30,000

Let 'X' be the takings

$X = 26,250 + (10/100 X) + (15/100 X) 100 X = 26,25,000 + 25 X$

$\therefore X = 35,000$

Fare per passenger Km = $35,000 / (30,000 \times 40)$
= 0.0292 = Rs. 0.03

37. Union Transport Company supplies the following details in respect of a truck of 5 tonne capacity

Cost of truck	Rs. 90,000
Estimated life	10 years
Diesel, oil, grease	Rs. 15 per trip each way
Repairs and maintenance	Rs. 500 p.m.
Driver's wages	Rs. 500 p.m.
Cleaner's wages	Rs. 250 p.m.
Insurance	Rs. 4,800 per year
Tax	Rs. 2,400 per year
General supervision charges	Rs. 4,800 per year

The truck carries goods to and from the city covering a distance of 50 kms. each way.

On outward trip freight is available to the extent of full capacity and on return 20% of capacity. Assuming that the truck runs on an average 25 days a month, work out:

(a) Operating cost tonne-km.

(b) Rate for tonne per trip that the company should charge if a profit of 50% on freight is to be earned.

Solution:

Particulars	Amount Rs.
Repairs & Maintenance	500
Drivers wages	500
Cleaners wages	250
Insurance	400
Tax	200
Supervision charge	400
Depreciation $[(90,000/10) \times (1/12)]$	750
Diesel, oil, grease (15 x 2 x 25)	750

	3,750
(+) 50% profit on freight (100% on cost)	3,750
	7,500

Tonne Kms = 25 [(50x5) + (20/100 x 50 x 5)]
= 7,500

Cost per tonne km =
3,750 / 7,500 =

0.50(+) Profit @ 50% on freight = 0.50
= 1.00

38. A transport company has been given a 40 kilometre long route to run 5 buses. The cost of each bus is Rs.6,50,000. Buses will make 3 round trips per day carrying on an average 80 percent passengers of their seating capacity. The seating capacity of each bus is 40 passengers. Buses will run on an average 25 days in a month. The other information for the year 2022-23 are given below

Garage rent	Rs.4,000 per month
Annual repairs and maintenance	Rs.22,500 each bus
Salaries of 5 drivers	Rs.3,000 each per month
Wages of 5 conductors	Rs.1,200 each per month
Managers salary	Rs.7,500 per month
Road tax, permit fee	Rs.5,000 for a quarter
Office expenses	Rs.2,000 per month
Cost of diesel	Rs.33
Kilometre run per litre for each bus	6 kilometres
Annual depreciation	15% of cost
Annual insurance	3% of cost

You are required to calculate the bus fare to be charged from each passenger per kilometre, if the company wants to earn a profits of 33 1/3 percent on taking (total receipts from passengers).

39. Agarwal Automobiles distributes its goods to a regional dealer using a single lorry. The dealer's premises are 40 kilometres away by road. The lorry has a capacity of 10 tonnes and makes the journey twice a day fully loaded on the onward journeys and empty on return journey. The following information is available for a four weekly period during the year 2022

Petrol consumption	5 kilometres per litre
Petrol cost	Rs.22 per litre
Oil	Rs.150 per week
Driver's wages	Rs.800 per week
Repairs	Rs.100 per week
Garage rent	Rs.300 per week
Cost of lorry	Rs.6,00,000
Life of lorry	1,00,000 kms
Insurance	5% of cost of lorry
Cost of Tyres	Rs.10,000
Estimated value of lorry at the end of its life	Rs.40,000
Cost of licence	Rs.150 per week
Other overhead costs	Rs.39,000 p.a
Life of tyres	Rs.25,000 kms

Lorry operates on a five day week. Calculate the vehicle cost per kilometre and per ton kilometre.

Particulars		Amount
Fixed costs		
Garage rent		1,200
Insurance	6,00,000 x 5%	30,000
Licence fees		600
Other over heads	39,000 x 4/52	3,000
Total		34,800
Running expenses		
Petrol	$((40 \times 2 \times 20 \text{ days}) / 5) \times 22$	14,080
Drivers wages		3,200
Oil		600
Repairs		400
Depreciation	$((600000 - 40000) / 100000) \times 3200$	17,920
Cost of tyre	$(10000 \times 3200) / 25000$	1,280
		37,480
		72,280

Outward (40x2x20x10) – 16,000 tonnes
 Inward (40x2x20x0) - 0
 Effective 16,000 tonnes