Study Note - 2

COST ASCERTAINMENT - ELEMENTS OF COST

This Study Note includes

2.1 MATERIAL COST (CAS-6)

Material is any substance (Physics term) that forms part of or composed of a finished product. i.e material refers to the commodities supplied to an undertaking for the purpose of consumption in the process of manufacturing or of rendering service or for transformation into products. The term 'Stores' is often used synonymously with materials, however, stores has a wider meaning and it covers not only raw materials consumed or utilized in production but also such other items as sundry supplies, maintenance stores, fabricated parts, components, tools, jigs, other items, consumables, lubricants..... etc. Finished and partly finished products are also often included under the term 'Stores'. Materials are also known as Inventory. The term Materials / Inventory covers not only raw materials but also components, work-in-progress and finished goods and scrap also.

Material cost is the significant constituent of the total cost of any product. It constitutes 40% to 80% of the total cost. The percentages may differ from industry to industry. But for manufacturing sector the material costs are of greatest significance. Inventory also constitutes a vital element in the Working Capital. So it is treated as equivalent to cash. Therefore the analysis and control on Material Cost is very important.

Objectives of Material Control System:

Material Control: The function of ensuring that sufficient goods are retained in stock to meet all requirements without carrying unnecessarily large stocks.

The objectives of a system of material control are as following:-

(a) To make continuous availability of materials so that there may be uninterrupted flow of materials for production. Production may not be held up for want of materials.

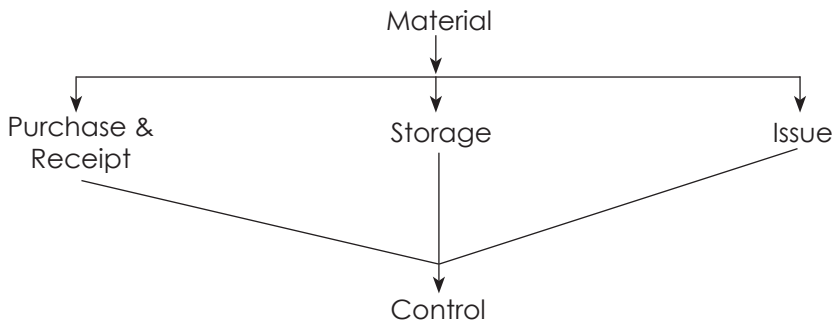
(b) To purchase requisite quantity of materials to avoid locking up of working capital and to minimise risk of surplus and obsolete stores.

(c) To make purchase competitively and wisely at the most economical prices so that there may be reduction of material costs.

(d) To purchase proper quality of materials to have minimum possible wastage of materials.

(e) To serve as an information centre on the materials knowledge for prices, sources of supply, lead time, quality and specification.

(f) Study of Material can be better explained as follows:



Requisites of Material Control System:

(a) Coordination and cooperation between the various departments concerned viz purchase, receiving, inspection, storage, issues and Accounts and Cost departments.

(b) Use of standard forms and documents in all the stages of control.

(c) Classification, coordination, standardization and simplification of materials.

(d) Planning of requirement of material.

(e) Efficient purchase organization.

(f) Budgetary control of purchases.

(g) Planned storage of materials, physical control as well as efficient book control through satisfactory storage control procedures, forms and documents.

(h) Appropriate records to control issues and utilization of stores in production.

(i) Efficient system of Internal Audit and Internal Checks.

(j) System of reporting to management regarding material purchase, storage and utilization.

Purchase Flow:

The main functions of a purchase department are as follows :-

(a) What to purchase? – Right Material with good quality

(b) When to purchase? – Right Time

(c) Where to purchase? – Right Source

(d) How much to purchase? **–** Right Quantity

(e) At what price to purchase? – Right Price

To perform these functions effectively, the purchasing department follows the following procedure:-

(a) Receiving purchase requisitions.

(b) Exploring the sources of supply and choosing the supplier.

(c) Preparation and execution of purchase orders.

(d) Receiving materials.

(e) Inspecting and testing materials.

(f) Checking and passing of bills for payment.

Purchase Organization:

Purchasing involves procurement of materials of requisite quantity and quality at economic price. It is of extreme importance particularly to a manufacturing concern because it has bearing on all vital factors of manufacture such as quantity, quality, cost, efficiency, economy, prompt delivery, volume of production and so on. Purchase department in a business concern can be organized into two types i.e Centralized Purchasing System and De-centralized Purchasing System. Purchasing process in most of the organisation is a centralised function because the advantages of a centralised purchasing out weight its disadvantages. Lets us see the merits and demerits of both the systems.

Merits of a centralised & De-merits of decentralized purchase organization:

(a) When materials are purchased favourable terms (Trade discount, Economies of transport...etc) can be obtained because the quantity involved will be large. In case of decentralized system these benefits cannot be realized.

(b) Specialised purchasing officer can be appointed with the specific purpose of highly efficient purchases functions of the concern. In case of decentralized purchase system, the business entity cannot afford a specialized purchasing officer in every location.

(c) Effective control can be exercised over the stock of materials because duplication of purchase of the same materials may easily be avoided in centralized purchase system, where as in decentralized purchase system, duplication of purchase of same material cannot be avoided.

(d) Under centralized purchase system effective control can be exercised on the purchases of all the materials as the purchase function is channelized through one track which would make the system of receiving, checking and inspection efficient. Where as in decentralized purchase system it is very difficult to exercise controls.

(e) Under centralized system of purchase materials, components and capital equipments can be suitably standardised so that the maximum purchasing benefits be availed of, storage facilities can be improved and available production facilities can be greatly utilized to the maximum possible extent. Under decentralized purchase system standardization of materials, storage facilities.....etc is very difficult to achieve.

(f) Under centralized system of purchase closer cooperation between the financial and purchasing departments can be achieved which may not be easy under decentralized purchase system.

De-Merits of a centralized & Merits of decentralized purchase organization :

(a) In may take unnecessarily long time to place a purchase order under centralized purchase system because to collect the relevant data from various departments/ branches/locations may take more time, These delays can be avoided under decentralized purchase system.

(b) In case of centralized purchasing system, branches at different places cannot take advantage of localized purchasing, whereas under decentralized purchase system localization savings can be realized.

(c) Due to the Chances of misunderstanding / miscommunication between the branch and the centralized purchasing office may result in wrong purchase of material also. Whereas under decentralized purchase system, the chances of miscommunication/ misunderstanding is very limited.

(d) Centralized system will lead to high initial costs because a separate purchasing department for purchase of materials is to be setup. No such costs are required to be incurred in the decentralized system.

(e) Replacement of a defective item may take long time resulting in strain on smooth production flow under centralized system of purchase. No such delay in decentralized system.

Now let us see the various material control documents in detail.

Purchase Requisition:

Purchases Requisition is a request made to the Purchase Department to procure materials of given description and of the required quality and quantity within a specified period. It is a formal request and it authorizes the Purchase Department to issue a Purchase Order to secure materials intended for periodic requirements of a given material or materials to provide guidance to the Purchase Department to estimate the future requirements in order to secure maximum purchase benefits in the form of higher discount and better credit terms. The extent and range of materials requirements provide a basis for preparation of a purchase budget. The actual requirements of a given period can be summarised from the purchases requisition and compared with the purchase budget in order to determine the variances and the reasons thereof. This form is prepared by storekeeper for regular items and by the departmental head for special materials not stocked as regular items.

The Purchase Requisition is prepared in three copies. Original will be sent to Purchase department, Duplicate copy will be retained by the indenting (request initiating) department and the triplicate will be sent to approver for approving the purchase requisition.

Purchase Requisition provides the three basic things :-

(a) What type of material is to be purchased?

(b) When to be purchased?

(c) How much is to be purchased?

The specimen form of Purchase Requisition is as shown below :

Modern Ltd

Purchase Requisition or Indent

Purchase Req Type: Special / Regular :

Purchase Req No : Purchase Requisition Date :

Department :

S.No	Material Code	Description of the Goods	Quantity Required	Material Required by date	Remarks

Requested by Approved by

For use in Purchase Dept.
Quotations from

(1) PO Placed : Yes /No
(2) PO No:
(3)

Purchase Order:

Purchase Order (PO) is a request made in writing to selected supplier to deliver goods of requisite quality, quantity, (as per the purchase requisition) at the prices, terms and conditions agreed upon. It is a commitment on the part of the purchaser to accept the delivery of goods contained in the Purchase Order if the terms included therein, are fulfilled. Purchase Order contains the following details :-

(a) Purchase Order No; (b) PO Date; (c) Supplier Name and Address; (d) Material Code; (e) Material description; (f) Grade & Other particulars of the material; (g) Quantity to be supplied; h) Price; i) Place of delivery; j) Taxes; k) Terms of Payment (Credit period) .....etc

Usually a purchase order is made in five copies, one each for suppliers, Receiving/Stores Department, Originating Department, Accounts Department and filing. Thus we see that all the departments concerned with the materials are informed fully about all the details of every purchases and it becomes easier for everyone to follow up on any relevant matter.

Modern Ltd

Purchase Order

To
Supplier XXXXXX

Address

PO No:
PO date:
Quotation Reference:
PR No:

Please supply the following items in accordance with the instructions mentioned there in on the following terms and conditions.

S.No	Material Code	Material Description	Quantity	Rate per Unit	Amount	Delivery Date	Remarks
			Packing & Freight				
			Taxes				
			Total Amount				

Delivery: Goods to be delivered at
Delivery date:
Payment Terms:

Authorised signatory

Receipt & Inspection of Materials:

Goods Received cum Inspection Note:

The stores department will receive the material after the gate entry. It will compare the quantities received with the PO Quantity. It is a valuable document as it forms the basis of accounting entry in the stores ledger and stock records. It is the document basis for quality control department to carry inspection of the material in warded.

It also forms the basis of payments to be made to the supplier in respect of the materials supplied by him. Suppliers invoices are checked with goods received notes which such for actual receipt of the goods supplied by the supplier. One copy of such note is also sent to Inspection Department who after inspection of materials approves the note for Stores Department to receive the materials. Outstanding Goods Received Notes which are not linked with supplier's bills enable the Accounts Department to estimate at the year end the liability for goods purchased for which supplier's bills not received.

The specimen copy of the Goods Received cum Inspection Note as below:

New India Ltd

Goods Received cum Inspection Note

Received from: GRN No:

GR Date:

Received at: PO Ref No:

Gate Entry No:

S.No	Material code	Material Description	Quantity Received	Quantity Accepted	Qty Rejected	Reason for Rejection	Remarks

Prepared by Inspected by

Received by Storekeeper

Purchase Quantity:

Important requirement for an efficient system of purchase control is to ensure that only the correct quantity of materials is purchased. The basic factors to be considered while fixing the ordering quantity are as follows :-

(a) There should be no overstocking.

(b) Materials should always be available in sufficient quantity to meet the requirements of production and to avoid plant shut down.

(c) Purchases should be made in economic lots.

Other factors to be considered are quantity already ordered, availability of funds, business cycle... etc.

Purchase department in manufacturing concerns is usually faced with the problem of deciding the quantity of various items, which they should purchase basing on the above factors. If purchases of material are made in bulk then inventory cost will be high. On the other hand if the order size is small each time then the ordering cost will be very high. In order to minimise ordering and carrying costs it is necessary to determine the order quantity which minimises these two costs.

Economic Order Quantity: (EOQ)

The total costs of a material usually consist of Buying Cost + Total Ordering Cost + Total Carrying Cost.

Economic Order Quantity is 'The size of the order for which both ordering and carrying cost are minimum'.

Ordering Cost: The costs which are associated with the ordering of material. It includes cost of staff posted for ordering of goods, expenses incurred on transportation, inspection expenses of incoming material....etc

Carrying Cost: The costs for holding the inventories. It includes the cost of capital invested in inventories. Cost of storage, Insurance.....etc

The assumptions underlying the Economic Ordering Quantity (EOQ)**:** The calculation of economic order of material to be purchased is subject to the following assumptions:-

(a) Ordering cost per order and carrying cost per unit per annum are known and they are fixed.

(b) Anticipated usage of material in units is known.

(c) Cost per unit of the material is constant and is known as well.

(d) The quantity of material ordered is received immediately i.e lead time is Zero.

The famous mathematician 'WILSON' derived the formula used for determining the size of order for each purchases at minimum ordering and carrying costs, which is as below :-

$$\textbf{Economic Ordering Quantity} = \sqrt{\frac{2AO}{C}}$$

Where,

A = Annual demand /Consumption

O = Ordering Cost per order

C = Carrying Cost per unit per annum.

Graphical representation of EOQ:

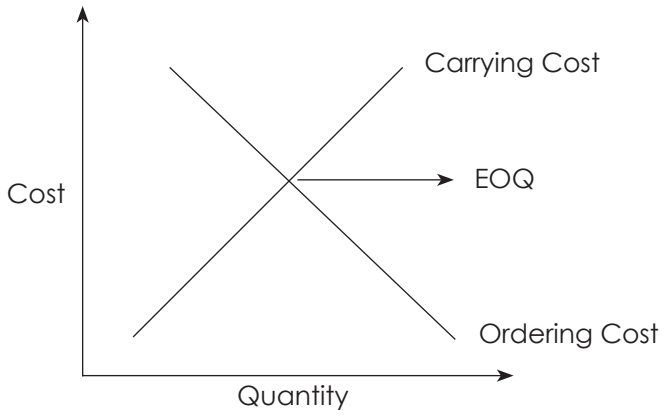


Illustration 1

Calculate the Economic Order Quantity from the following information. Also state the number of orders to be placed in a year.

Consumption of materials per annum	:	10,000 kg
Order placing cost per order	:	₹ 50
Cost per kg. of raw materials	:	₹ 2
Storage costs	:	8% on average inventory

Solution:

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

A = Units consumed during year = 10,000 Kg.

O = Order cost per order = ₹50

C = Inventory carrying cost per unit per annum 2 × 8% = ₹ 0.16

$$EOQ = \sqrt{\frac{2 \times 10,000 \text{ (units)} \times ₹ 50}{₹ 0.16}}$$

EOQ = 2,500 kg.

$$\text{No. of orders to be placed in a year} = \frac{\text{Total consumption of materials per annum}}{EOQ}$$

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

= 4 Orders per year

Illustration 2

The average annual consumption of a material is 18,250 units at a price of ₹ 36.50 per unit. The storage cost is 20% on an average inventory and the cost of placing an order is ₹ 50. How much quantity is to be purchased at a time?

Solution:

$$EOQ = \sqrt{\frac{2 \times 18,250 \text{ (units)} \times ₹ 50}{20\% \text{ of } ₹ 36.50}}$$

$$= \sqrt{\frac{18,25,000}{7.3}}$$

= 500 Units

Material Storage & Control:

Once the material is received, it is the responsibility of the stores-in-charge, to ensure that material movements in and out of stores are done only against the authorized documents. Stores-in-charge is responsible for proper utilization of storage space & exercise better control over the material in the stores to ensure that the material is well protected against all losses such as theft, pilferage, fire, misappropriation ...etc.

Duties of store keeper:

The duties of store-keeper are as follows :-

(a) To exercise general control over all activities in stores department.

(b) To ensure safe storage of the materials.

(c) To maintain proper records.

(d) To initiate purchase requisitions for the replacement of stock of all regular materials, whenever the stock level of any item in the store reaches the Minimum Level.

(e) To initiate the action for stoppage of further purchasing when the stock level approaches the Maximum Level.

(f) To issue materials only in required quantities against authorized requisition documents.

(g) To check and receive purchased materials forwarded by the receiving department and to arrange for storage in appropriate places.

Different classes of stores:-

Broadly speaking, there are three classes of stores

(a) Central Stores

(b) Decentralized stores

(c) Sub-Store (Imprest Store)

Centralized stores:

The usual practice in most of the concerns is to have a central store. Separate store to meet the requirements of each production department are not popular because of the heavy expenditure involved. In case of centralized stores materials are received by and issued from one stores department. All materials are kept at one central store. The advantages and disadvantages of this type of store are set out as follows:

Advantages of centralized stores:

(a) Better control can be exercised over stores because all stores are housed in one department. The risk of obsolescence of stores can be minimised.

(b) The economy of staff-experts, or clerical, floor space, records and stationery are available.

(c) Better supervision is certainly possible.

(d) Obsolescence of the stores items can be kept under strict vigil and control.

(e) Centralized material handling system can be put into operation thus further economising on space, personnel and equipments.

(f) Investment in stocks can be minimized.

Disadvantages of centralized stores:

(a) The transportation costs of the materials may increase because the movements of the stores may be for a greater distance since the storing is centralized.

(b) If the user departments are far away from the stores there may be delay in receipt of the stores by those departments.

(c) Breakdown of inter-departmental transport system may hold up the entire process, and similarly labour problem in the centralized stores may bring the entire concern to standstill.

(d) There is greater chance of losses through fire, burglary or some other unhappy incidents.

(e) It may not be safe to have some hazardous elements bunched together in the centralized stores.

Decentralized stores:

Under this type of stores, independent stores are situated in various departments. Handling of stores is undertaken by the store keeper in each department. The departments requiring stores can draw them from their respective stores situated in their departments. The disadvantages of centralized stores can be eliminated, if there are decentralized stores. But these types of stores are uncommon because of heavy expenditure involved.

Central stores with sub-stores:

In large organizations, factories / workshops may be located at different places which are far from the central stores. So in order to keep the transportation costs and handling charges to the minimum level, sub-stores should be situated near to the factory. For each item of materials a quantity is determined and this should be kept in the stock at the beginning of any period. At the end of a period, the store keepers of each sub-store will requisition from the central stores the quantity of the materials consumed to bring the stock up to the predetermined quantity. In short this type of stores operates in a similar way to a petty cash system, so this system of stores is also known as the imprest system of stores control.

Advantages:

(a) It ensures the prompt issue of stores.

(b) It confines the advantages of centralized stores with sub-stores and at the same time it does not sacrifice the centralized control.

(c) It reduces handling cost of materials.

(d) It avoids the maintenance of elaborate inventory records.

Control of the Stores:

Classification and Codification of Material:

In case of large organizations the number and types of materials used is considerable and unless each item is distinguished and stored separately it would be impossible to find them out when they are required for production or any other operation. It may happen that either one type of material is in excess or another type may be altogether non-existent. It is therefore, essential that a proper system of classification and codification.

Classified into different categories according to their nature or type, viz., mild steel, tool steel, brass, bronze, copper, glass, timber, etc., and then again within such broad classification into rounds; bars, strips; angles, etc. There are two steps in the classification and codification of materials - determination of the number of items, their nature, other characteristics and classification of the items of comparable nature or type into suitable groups or classes.

Various classes of coding are in practice and the common types are stated below:

(a) **Alphabetical Scheme:** Alphabetics are only used for codification. Like Mild Steel Sheets are coded as MSS.

(b) **Numeric Scheme :** In this scheme numericals are used instead of alphabets, For example If steel is given main code of 300 mild steel may be coded as 310 and mild steel sheet may be coded as 311, mild steel bar may be coded as 3112.

(c) **Decimal Scheme:** It is similar to the numeric scheme in which the groups are represented by number and digits after the decimal indicate sub-groups of items. For example, where the steel is coded as 3.00 mild steel may be coded as 3.10 and mild steel sheet can be coded as 3.11 and mild sheet bar as 3.12 and so on.

(d) **Block Scheme:** In this case block of number are allotted for classification of specific groups such as for material classification the block of number 1 to 999 may be reserved, for raw materials; 1000 to 1999 for stores and spares; 2000 to 2999 for finished goods.

(e) **Combination Scheme :** Here the code structure takes in account both alphabetic and numeric schemes and strikes a balance between the two. Mild steel by coded as MS and the sheets, bars, strips, rounds of mild steel may be coded as MS01, MS02, MS04 and so on. This code is most commonly used because this system has got the advantage of both the alphabetic and numeric systems and is quite flexible in nature.

Advantages of Classification & Codification of materials:

(a) The procedure assists in the easy identification and location of the materials because of their classification.

(b) It minimises the recording of the nature/ type of the materials with detailed description on every document relating to the transaction of materials.

(c) Codification is a must in the case of mechanisation of the stores accounting.

(d) The method is simple to operate and definitely saves time and money in respect of both physical location/ identification of materials as well as recording of the materials.

After the material classification and codification is done for all the materials, for each material code we have to fix the Minimum Level, Maximum Level, Re-order Level and Re-order Quantity. It is the storekeeper's responsibility to ensure inventory of any material is maintained between the Minimum Level and Maximum Level.

Maximum Level:

The Maximum Level indicates the maximum quantity of an item of material that can be held in stock at any time. The stock in hand is regulated in such a manner that normally it does not exceed this level. While fixing the level, the following factors are to be taken into consideration:

(a) Maximum requirement of the store for production purpose, at any point of time.

(b) Rate of consumption and lead time.

(c) Nature and properties of the Store: For instance, the maximum level is necessarily kept low for materials that are liable to quick deterioration or obsolescence during storage.

(d) Storage facilities that can be conveniently spared for the item without determinant to the requirements of other items of stores.

(e) Cost of storage and insurance.

(f) Economy in prices: For seasonal supplies purchased in bulk during the season, the maximum level is generally high.

(g) Financial considerations: Availability of funds and the price of the stores are to be kept in view. For costly items, the maximum level should be as low as possible. Another point to be considered is the future market trend. If prices are likely to rise, the concern may like to stock-piling for keeping large stock in reserve for long-term future uses and in such a case, the level is pushed up.

(h) Rules framed by the government for import or procurement. If due to these and other causes materials are difficult to obtain and supplies are irregular the maximum level should be high.

(i) The maximum level is also dependent on the economic ordering quantity.

Maximum Level = Re-Order Level + Re-Order Qty – (Minimum Rate of Consumption X Minimum Re-Order Period)

Minimum Level:

The Minimum Level indicates the lowest quantitative balance of an item of material which must be maintained at all times so that there is no stoppage of production due to the material being not available. In fixing the minimum level, the following factors are to be considered :-

(a) Nature of the item: For special material purchased against customer's specific orders, no minimum level is necessary. This applies to other levels also.

(b) The minimum time (normal re-order period) required replenishing supply: This is known as the Lead Time and are defined as the anticipated time lag between the dates of issuing orders and the receipt of materials. Longer the lead time, lower is minimum level, the re-order point remaining constant.

(c) Rate of consumption (normal, minimum or maximum) of the material.

Minimum Level = Re-Order level – (Normal Rate of Consumption X Normal Re-Order Period)

Re-Order Level:

When the stock in hand reach the ordering or re-ordering level, store keeper has to initiate the action for replenish the material. This level is fixed somewhere between the maximum and minimum levels in such a manner that the difference of quantity of the material between the Re-ordering Level and Minimum Level will be sufficient to meet the requirements of production up to the time the fresh supply of material is received.

The basic factors which are taken into consideration in fixing a Re-ordering Level for a store item include minimum quantity of item to be kept, rate of consumption and lead time which are applied for computing of this level.

Re-Ordering level= Minimum Level + Consumption during lead time

= Minimum Level + (Normal Rate of Consumption × Normal Re-order Period)

Another formula for computing the Re-Order level is as below

Re-Order level = Maximum Rate of Consumption X Maximum Re-Order period (lead time)

Danger Level:

It is the level at which normal issue of raw materials are stopped and only emergency issues are only made. This is a level fixed usually below the Minimum Level. When the stock reaches this level very urgent action for purchases is indicated. This presupposed that the minimum level contains a cushion to cover such contingencies. The normal lead time cannot be afforded at this stage. It is necessary to resort to unorthodox hasty purchase procedure resulting in higher purchase cost.

The practice in some firms is to fix danger level below the Re-Ordering Level but above the Minimum Level. In such case, if action for purchase of an item was taken when the stock reached the Re-Ordering Level, the Danger Level is of no significance except that a check with the purchases department may be made as soon as the Danger Level is reached to ensure that everything is all right and that delivery will be made on the scheduled date.

Danger Level = Normal Rate of Consumption × Maximum Reorder Period for emergency purchases

Illustration 3

The components A and B are used as follows:

Normal usage .... 300 units per week each

Maximum usage .... 450 units per week each

Minimum usage .... 150 units per week each

Reorder Quantity .... A 2,400 units; B 3,600 units.

Reorder 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 (d) Average Stock Level.

Solution:

	Particulars	A	B
a)	Reorder Level [Max. Consumption × Max. Re-order Period]	2700 units (450 × 6)	1800 units (450 × 4)
b)	Minimum Level [ROL – (Normal Consumption × Normal Re-order period)]	1200 units [2700 – (300×5)]	900 units [1800 – (300×3)]
c)	Maximum Level [ROL + ROQ – (Min. Consumption × Min. Re-order Period)]	4500 units [2700 + 2400 – (150×4)]	5100 units [1800 + 3600 – (150 × 2)]
d)	Average Stock Level [Min. Level + Max. Level] / 2 OR [Min. Level + ½ Re-order Quantity]	2850 units [4500 + 1200]/2 (or) 2400 units 1200 + ½ (2400)	3000 units [5100 + 900]/2 (or) 2700 units 900 + ½ (3600)

Stores Records

The bin cards and the stores ledger are the two important stores records that are generally kept for making a record of various items.

Bin Card:

Bin Card is a quantitative record of receipts, issues and closing balance of items of stores. Separate bin cards are maintained for each item and are placed in shelves or bins. This card is debited with the quantity of stores received, credited with the quantity of stores issued and the balance of quantity of store is taken after every receipt or issue. The balance quantity of the item may be easily known at any time. To have an up to date balance of stores, the principle of '*before touching the item, bin card should be touched*'. For each item of stores, Material Code, Minimum Quantity, Maximum Quantity, Ordering Quantity, Balance Quantities are stated on the bin card. Bin card is also known as 'Bintag' or 'Stock card'.

BIN CARD OF APHME LTD

Material Code:
Mat. Description:
Location:
Unit of Measurement:

Maximum Level:
Minimum Level:
Re-ordering level:

Date	Doc No.	Received from / Issued to	Receipts	Issue	Balance	Verification with Stores ledger Date & Verified By	

Stores Ledger:

Stores Ledger is maintained by the costing department to make record of all receipts, issues of materials with quantities, values (Sometimes unit rates also). Ledger resembles with bin cards except that receipts, issues and balances are shown along with their money value. The ledger contains an account for every item of stores in which receipts, issues and balances are recorded both in quantity and value.

Stores Ledger of Krishna Engineering Ltd.

Material code:
Bin No:
Material Description:
Location:

Minimum Qty:
Maximum Qty:
Ordering Qty:

Date	Receipts				Issues				Balance		
	GR No	Qty	Rate	Amount	SR No	Qty	Rate	Amount	Qty	Rate	Amount

Difference between Bin Card and Stores Ledger:-

Bin Card	Stores Ledger
(a) It is maintained by the store keeper.	(a) It is maintained in the Costing department.
(b) It contains only quantitative details of materials received, issued and returned to stores.	(b) It contains information both in quantity and value.
(c) Entries are made when transactions take place.	(c) It is always posted after the transaction.
(d) Each transaction is individually posted.	(d) Transactions may be summarized and then posted.
(e) Inter-department transfers do not appear in Bin-card.	(e) Material transfers from one job to another job are recorded for costing purpose.

Reconciliation of Stores ledger and Bin Card:

Normally there should not be any difference between the quantities shown in the Bin Card and the Stores Ledger. However, in practice differences arise mainly due to the following reasons :-

(a) Arithmetical error in working out the balances.

(b) Non-posting of a document either in a bin card or in the stores ledger may be due to non receipt of a document.

(c) Posting in the wrong bin card or in the wrong sheet (code) of the stores ledger.

(d) Posting of receipts under issue and vice-versa.

(e) Materials issued or received on loan or for approval are sometimes entered in bin card, but not in stores ledger.

Any difference between the stores ledger and bin card defeats the purpose for which the two separate sets are maintained and renders physical stocking ineffective as the correct book balance for the purpose of comparison with physical balance is not available. So to control or reduce the mismatch between the stores ledger and bin card and maintain the correct balance in the books of accounts various methods are followed.

Perpetual Inventory System:

Perpetual Inventory System may be defined as '*a system of records maintained by the controlling department, which reflects the physical movements of stocks and their current balance*'. Thus it is a system of ascertaining balance after every receipt and issue of materials through stock records to facilitate regular checking and to avoid closing down the firm for stock taking. To ensure the accuracy of the perpetual inventory records (bin card and Stores ledger), physical verification of stores is made by a programme of continuous stock taking.

The operation of the perpetual inventory system may be as follows :-

(a) The stock records are maintained and up to date posting of transactions are made there in so that current balance may be known at any time.

(b) Different sections of the stores are taken up by rotation for physical checking. Every day some items are checked so that every item may be checked for a number of times during the year.

(c) Stores received but awaiting quality inspection are not mixed up with the regular stores at the time of physical verification, because entries relating to such stores have not yet been made in the stock records.

(d) The physical stock available in the store, after counting, weighing, measuring or listing as the case may be, is properly recorded in the bin cards / Inventory tags and stock verification sheets.

Perpetual inventory system should not be confused with continuous stock taking; Continuous stock taking is an essential feature of perpetual inventory system. *Perpetual inventory means the system of stock records and continuous stock taking, where as continuous stock taking means only the physical verification of the stock records with actual stocks.*

In continuous stock taking, physical verification is spread throughout the year. Everyday 10 to 15 items are taken at random by rotation and checked so that the surprise element in stock verification may be maintained and each item may be checked for a number of times each year. On the other hand the surprise element is missing in case of periodical checking, because checking is usually done at the end of year.

Advantages of perpetual inventory system:

(a) The system obviates the need for the physical checking of all items of stock and stores at the end of the year.

(b) It avoids the dislocation of the routine activities of the organisation including production and despatch.

(c) A reliable and detailed check on the stores is maintained.

(d) Errors, irregularities and loss of stock through other methods are quickly detached and through necessary action recurrence of such things in future is minimised.

(e) As the work is carried out systematically and without undue haste the figures are readily available.

(f) Actual stock can be compared with the authorised maximum and minimum levels, thus keeping the stocks within the prescribed limits. The disadvantages of excess stocks are avoided and capitalised up in stores materials cannot exceed the budget.

(g) The recorder level of various items of stores are readily available thus facilitating the work of procurement of stores.

(h) For monthly or quarterly financial statements like Profit and Loss Account and Balance Sheet the stock figures are readily available and it is not necessary to have physical verification of the balances.

Periodical Stock Verification:

This system envisages physical stock verification at a fixed date/period during the year. Generally under this system the activity takes place at the end of the accounting period or a date close to such date. Usually the system is opened in the following manner :-

(a) A period of 5/7 days, depending on the magnitude of the work is chosen during which all the items under stock are verified physically and such period is known as 'cut-off' period. During this period there are no movements of stock items and neither 'receipts' nor are 'issues permitted.

(b) The items are physically counted/measured depending on their nature and are noted down in records which are signed by the auditors if they are present in stock verification.

(c) The bin cards balances are also checked and initiated. Generally the physical balances and bin card balances of various items should be same unless shortage/excesses are there or the recording/ balancing in the cards are incorrect.

(d) After the physical verification is completed work sheets are countersigned by the godown supervisors and the stock verified.

(e) Thereafter reconciliation statement is prepared item wise where the physical balances and bin card balances are different.

(f) Then the balance as per bin cards and as per stores ledger is also compared and necessary adjustments are made to show the correct position of stock at the year end.

(g) Finally the shortages/excess statement is prepared by the concerned departments and are placed before the higher management for their approval for adjustments.

ABC Analysis:

The "ABC Analysis" is an analytical method of stock control which aims at concentrating efforts on those items where attention is needed most. It is based on the concept that a small number of the items in inventory may typically represent the bulk money value of the total materials used in production process, while a relatively large number of items may present a small portion of the money value of stores used resulting in a small number of items be subjected to greater degree of continuous control.

Under this system, the materials stocked may be classified into a number of categories according to their importance, i.e., their value and frequency of replenishment during a period. The first category (we may call it group 'A' items) may consist of only a small percentage of total items handled but combined value may be a large portion of the total stock value. The second category, naming it as group 'B' items, may be relatively less important. In the third category, consisting of group 'C' items, all the remaining items of stock may be included which are quite large in number but their value is not high.

This concept may be clear by the following example:

Category	No. of Items	% of the Total No. of Items	Value ₹	% of the Total Value Item	Average Value ₹
A	75	6	70,000	70	933
B	375	30	20,000	20	53
C	800	64	10,000	10	12
	1250	100	1,00,000	100	998

Category 'A' items represent 70% of the total investment but as little as only 6% of the number of items. Maximum control must be exercised on these items. Category 'B' is of secondary importance and normal control procedures may be followed. Category 'C' comprising of 64% in quantity but only 10% in value, needs a simpler, less elaborate and economic system of control.

The advantages of ABC analysis are:

(a) Closer and stricter control of those items which represent a major portion of total stock value is maintained.

(b) Investment in inventory can be regulated and funds can be utilized in the best possible manner. 'A' class items are ordered as and when need arises, so that the working capital can be utilized in a best possible way.

(c) With greater control over the inventories, savings in material cost will be realized.

(d) It helps in maintaining enough safety stock for 'C' category of items.

(e) Scientific and selective control helps in the maintenance of high stock turnover ratio.

VED Analysis:

VED stands for Vital, Essential and Desirable- analysis is used primarily for control of spare parts. The spare parts can be classified in to three categories i.e Vital, Essential and Desirable- keeping in view the criticality to production.

Vital: The spares, stock-out of which even for a short time will stop the production for quite some time, and where in the stock-out cost is very high are known as Vital spares. For a car Assembly Company, *Engine* is a vital part, without the engine the assembly activity will not be started.

Essential: The spares or material absence of which cannot be tolerated for more than few hours or a day and the cost of lost production is high and which is essential for production to continue are known as Essential items. For a car assembly company 'Tyres' is an essential item, without fixing the tyres the assembly of car will not be completed.

Desirable: The Desirable spares are those parts which are needed, but their absence for even a week or more also will not lead to stoppage of production. For example, CD player, for a car assembly company.

Some spares though small in value, may be vital for production, requires constant attention. Such spares may not pay attention if the organization adopts ABC analysis.

FSN Analysis:

FSN analysis is the process of classifying the materials based on their movement from inventory for a specified period. All the items are classified in to F-Fast moving, S- Slow moving and N-Non-moving Items based on consumption and average stay in the inventory. Higher the stay of item in the inventory, the slower would be the movement of the material. This analysis helps the store keeper / purchase department to keep the fast moving items always available & take necessary steps to dispose off the non-moving inventory.

Just-in-Time:

Just in time (JIT) is a production strategy that strives to improve a business return on investment by reducing in-process inventory and associated carrying costs. Inventory is seen as incurring costs, or waste, instead of adding and storing value, contrary to traditional accounting. In short, the Just-in-Time inventory system focuses on "the right material, at the right time, at the right place, and in the exact amount" without the safety net of inventory.

The advantages of Just-in-Time system are as follows :-

(a) Increased emphasis on supplier relationships. A company without inventory does not want a supply system problem that creates a part shortage. This makes supplier relationships extremely important.

(b) Supplies come in at regular intervals throughout the production day. Supply is synchronized with production demand and the optimal amount of inventory is on hand at any time. When parts move directly from the truck to the point of assembly, the need for storage facilities is reduced.

(c) Reduces the working capital requirements, as very little inventory is maintained.

(d) Minimizes storage space.

(e) Reduces the chance of inventory obsolescence or damage.

Inventory Turnover Ratio: Inventory Turnover:

Inventory Turnover signifies a ratio of the value of materials consumed during a given period to the average level of inventory held during that period. The ratio is worked out on the basis of the following formula:

$$\text{Inventory Turnover Ratio} = \frac{\text{Value of material consumed during the period}}{\text{Value of average stock held during the period}}$$

The purpose of the above ratio is to ascertain the speed of movement of a particular item. A high ratio indicates that the item is moving fast with a minimum investment involved at any point of time. On the other hand a low ratio indicates the slow moving item. Thus Inventory Turnover Ratio may indicate slow moving dormant and obsolet stock highlighting the need for appropriate managerial actions.

Illustration 4

Compute the Inventory turnover ratio from the following:

Opening Stock - ₹10,000

Closing Stock - ₹16,000

Material Consumed - ₹78,000

Solution:

$$\text{Inventory Turnover Ratio} = \frac{\text{Value of material consumed during the period}}{\text{Value of average stock held during the period}}$$

$$\text{Average Stock} = \frac{\text{Opening Stock} + \text{Closing Stock}}{2}$$

$$= \frac{10,000 + 16,000}{2} = 13,000$$

$$\therefore \text{Inventory Turnover Ratio} = \frac{78,000}{13,000}$$

$$= 6. \text{ (times)}$$

Valuation of Material Receipts:

Principles of valuation of receipt of materials as per CAS-6 (limited Revision 2017)are as follows:-

(a) The material receipt should be valued at purchase price including duties and taxes, freight inwards, insurance and other expenditure directly attributable to procurement (net of trade discounts, rebates, taxes and duties refundable) that can be quantified with reasonable accuracy at the time of acquisition.

(b) Finance costs incurred in connection with the acquisition of materials shall not form part of the material cost.

(c) Self manufactured item shall be valued including the direct material, direct labour, direct expenses, factory overheads, share of administrative overheads relating to the production but excluding share of other administrative overheads, finance cost and marketing overheads. In case of captive consumption, valuation shall be in accordance with Cost Accounting Standard-4.

(d) Spares which are specific to an item of equipment shall not be taken into inventory, but shall be capitalized with cost of specific equipment. Cost of Capital spares and / or insurance spares, whether procured with the equipment or subsequently, shall be amortized over a period, not exceeding the useful life of the equipment.

(e) Normal loss or spoilage of material prior to reaching the factory or at places where the services are provided shall be absorbed in the cost of balance materials net of amounts recoverable from suppliers, insurers, carriers or recoveries from disposal.

(f) Losses due to shrinkage or evaporation and gain due to elongation or absorption or moisture ...etc before the material is received is absorbed in material cost to the extent they are normal, with corresponding adjustment in quantity.

(g) The foreign exchange component of imported material cost is converted at the rate on the date of transaction (material / service recording in books of accounts). Any subsequent change in the exchange rate till payment or otherwise shall not form part of the material cost.

(h) Any demurrage or detention charges, or penalty levied by transport or other authorities shall not form part of the cost of materials.

(i) Subsidy/grant/incentive and any such payment received / receivable with respect to any material shall be reduced from cost for ascertainment of the cost of the cost object to which such amounts are related.

Valuation of Material Issues:

Principles of valuation of issue of materials as per CAS-6 (Limited Revision, 2017) are as follows :-

(a) Issues shall be valued using appropriate assumptions on cost flow such as FIFO, LIFO, and Weighted average rate. The method of valuation shall be followed on a consistent basis.

(b) Where materials are accounted at standard cost, the price variances related to materials shall be treated as part of material cost.

(c) Any abnormal cost shall be excluded from the material cost.

(d) Wherever the material cost includes the transportation costs, determination of transportation cost shall be based on CAS-5, i.e Equalized Transportation Costs.

(e) Material cost may include imputed costs not considered in Financial Accounts.

(f) Self manufactured components and sub-assemblies item shall be valued including the direct material, direct labour, direct expenses, factory overheads, share of administrative overheads relating to the production but excluding share of other administrative overheads, finance cost and marketing overheads. In case of captive consumption, the valuation shall be in accordance with Cost Accounting Standard-4.

(g) The material cost of normal scrap / defectives which are rejects shall be included in the material cost of goods manufactured. The material cost of actual scrap / defectives, not exceeding the normal shall be adjusted in the material cost of good production. Material cost of abnormal scrap/ defectives should not be included in material cost but treated as loss after giving credit to the realisable value of such scrap / defetives.

Materials issued from stores should be priced at the price at which they are carried in inventory. Material may be purchased from different suppliers at different prices in different situations, where as consumption may happen the entire inventory at a time or at different lots....etc. So issue of materials should be valued after considering the following factors:-

(a) Nature of business and production process.

(b) Management policy relating to the closing stock valuation.

(c) Frequency of purchases and price fluctuations.

Several methods of pricing of material issues have been evolved; these may be classified into the following:-

Cost Price Method

(a) First in First out

(b) Last-in-first out

(c) Base Stock Method

Specific price method

(a) Average Price Method

(b) Simple Average Price Method

(c) Weighted Average Price Method

(d) Moving Simple Average Method

(e) Moving Weighted Average Method

Market Price Methods

(a) Replacement Method

(b) Realisable Price Method

Notional Price Methods:

(a) Standard Price Method

(b) Inflated Price Method

We may now briefly discuss all the above methods

(1) First in – First Out Method:

It is a method of pricing the issue of materials in the order in which they are purchased. In other words the materials are issued in the order in which they arrive in the store. This method is considered suitable in times of falling price because the material cost charged to production will be high while the replacement cost of materials will be low. In case of rising prices this method is not suitable.

Advantages of FIFO:-

(a) It is simple and easy to operate.

(b) In case of falling prices, this method gives better results.

(c) Closing stocks represents the market prices.

Disadvantages:-

(a) If the prices fluctuate frequently, this method may lead to clerical errors.

(b) In case of rising prices this method is not advisable.

(c) The material costs charged to same job are likely to show different rates.

(2) Last-in-First Out Method*:*

Under this method the prices of last received batch (lot) are used for pricing the issues, until it is exhausted and so on. During the inflationary period or period of rising prices, the use of LIFO would help to ensure the cost of production determined approximately on the above basis is approximately the current one. Under LIFO stocks would be valued at old prices, but not represent the current prices.

Advantages:-

(a) The cost of materials issued will be either nearer to and/or will reflect the current market price.

(b) In case of falling prices profit tends to rise due to lower material cost

Disadvantages:

(a) The computations become complicated if too many receipts are there.

(b) Companies having JIT system will face this problem more.

(3) Base Stock Method:

A minimum quantity of stock under this method is always held at a fixed price as reserve in the stock, to meet a state of emergency, if arises. This minimum stock is known as Base Stock and is valued at a price at which the first lot of materials is received and remains unaffected by subsequent price fluctuations. The quantity in excess of the base stock may be valued either on the LIFO basis or FIFO basis. This method is not an independent method as it uses FIFO or LIFO. Its advantages and disadvantages therefore will depend upon the use of the other method.

(4) Specific Price Method:

This method is useful, especially when the materials are purchased for a specific job or work order, and as such these materials are issued subsequently to that specific job or work order at the price at which they were purchased. The cost of materials issued for production purposes to specific jobs represent actual and correct costs. This method is specific for non-standard products. This method is difficult to operate, especially when purchases and issues are numerous.

(5) Simple Average Price Method:

Under this method materials issued are valued at average price, which is computed by dividing the total of all units rate by the number of units.

Material Issue Price = Total of unit prices of each purchase / Total No of Units

This method is useful, when the materials are received in uniform lots of similar quantity and prices do not fluctuate considerably.

(6) Weighted Average Price Method:

This method removes the limitation of Simple Average Method in that it also takes into account the quantities which are used as weights in order to find the issue price. This method uses total cost of material available for issue divided by the quantity available for issue.

Issue Price = Total Cost of Materials in stock / Total Quantity of Materials in stock

(7) Moving Simple Average Price Method:

Under this method the rate for material issue is determined by dividing the total of the periodic simple average prices of a given number of periods by the number of periods. For determining the moving simple average price, it is necessary to fix up first period to be taken for determining the average. Suppose a three monthly period is decided upon and moving average rate for the month of April is to be computed. Under such situation, we have to make a simple list of the simple average price from January to March, add them up, and divide the total by three. To compute the moving average for May, we have to omit simple average rate pertains to January and add the rate relating to the April and divide the total by three.

(8) Moving Weighted Average Price Method:

Under this method, the issue, rate is computed by dividing the total of the periodic weighted average price of a given number of periods by the number of periods.

(9) Replacement Method:

Replacement price is defined as the price at which it is possible to purchase an item, identical to that which is being replaced or revalued. Under this method, materials issued are valued at replacement cost of the items. Advantage of this method is issue cost reflects the current market price. But the difficult involved under this method is determination of market price of material before each issue.

(10) Realisable Price method:

Realisable price means a price at which the material to be issued can be sold in the market. This price may be more or less than the cost price, at which it was originally purchased.

(11) Standard Price Method:

Under this method, materials are priced at some predetermined rate of standard price irrespective of the actual purchase cost of the materials. Standard cost is usually fixed after taking into consideration the current price, anticipated market trends. This method facilitates the control of material cost and task of judging the efficiency of purchase department. But it is very difficult to fix the standard price when the prices fluctuates frequently.

(12) Inflated Price Method:

In case of materials that suffers loss in weight due to natural or climatic factors ex: evaporation...etc the issue price of the materials is inflated to cover up the losses.

Illustration 5

Prepare a statement showing the pricing of issues, on the basis of

(a) Simple Average and

(b) Weighted Average methods from the following information pertaining to Material-D

2016 March 1 Purchased 100 units @ ₹10 each

2 Purchased 200 units @ ₹ 10.2 each.

5 Issued 250 units to Job X vide M.R.No.12

7 Purchased 200 units @ ₹10.50 each

10 Purchased 300 units @ ₹10.80 each

13 Issued 200 units to Job Y vide M.R.No.15

18 Issued 200 units to Job Z vide M.R.No.17

20 Purchased 100 units @ ₹11 each

25 Issued 150 units to Job K vide M.R.No.25

Solution:

(a) Simple Average Method:

Stores Ledger Account

Date	Receipts			Issue			Balance	
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Value ₹
2016 March 1	100	10	1000	--	--	--	100	1000
March 2	200	10.2	2040	--	--	--	300	3040
March 5	--	--	--	250	10.10 (1)	2525	50	515
March 7	200	10.5	2100	--	--	--	250	2615
March 10	300	10.8	3240	--	--	--	550	5855
March 13	--	--	--	200	10.50 (2)	2100	350	3755
March 18	--	--	--	200	10.65 (3)	2130	150	1625
March 20	100	11	1100	--	--	--	250	2725
March 25	--	--	--	150	10.90 (4)	1635	100	1090

Working Notes:

1. Calculation of Price for Issue on March 5th
   = (10 + 10.2) / 2 = ₹10.10
2. Calculation of Price for Issue on March 13th
   = (10.2 + 10.5 + 10.8) / 3 = ₹10.5
3. Calculation of Price for Issue on March 18th
   = (10.5 + 10.8) / 2 = ₹10.65
4. Calculation of Price for Issue on March 25th
   = (10.8 + 11) / 2 = ₹10.90

(b) Weighted Average Method:

Stores Ledger Account

Date	Receipts			Issue			Balance	
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Value ₹
2016								
March 1	100	10	1000	--	--	--	100	1000
March 2	200	10.2	2040	--	--	--	300	3040
March 5	--	--	--	250	10.13 (1)	2533	50	507
March 7	200	10.5	2100	--	--	--	250	2607
March 10	300	10.8	3240	--	--	--	550	5847
March 13	--	--	--	200	10.63 (2)	2126	350	3721
March 18	--	--	--	200	10.63 (3)	2126	150	1595
March 20	100	11	1100	--	--	--	250	2695
March 25	--	--	--	150	10.78 (4)	1617	100	1078

Working Notes:

1. Calculation of price for Issue on March 5th

   = 3040/300 = ₹10.13

2. Calculation of price for Issue on March 13th

   = 5847/550 = ₹10.63

3. Calculation of price for Issue on March 18th

   = 3721/350 = ₹10.63

4. Calculation of price for Issue on March 25th

   = 2695/250 = ₹10.78

Illustration 6

The stock of material held on 1-4-2015 was 400 units @ 50 per unit. The following receipts and issues were recorded. You are required to prepare the Stores Ledger Account, showing how the values of issues would be calculated under Base Stock Method, both through FIFO AND LIFO base being 100 units.

2-4-2015	Purchased 100 units @₹55 per unit
6-4-2015	Issued 400 units
10-4-2015	Purchased 600 units @ ₹55 per unit
13-4-2015	Issued 400 units
20-4-2015	Purchased 500 units @ ₹65 per unit.
25-4-2015	Issued 600 units
10-5-2015	Purchased 800 units @ ₹70 per unit
12-5-2015	Issued 500 units
13-5-2015	Issued 200 units
15-5-2015	Purchased 500 units @ ₹75 per unit
12-6-2015	Issued 400 units
15-6-2015	Purchased 300 units @ ₹ 80 per unit

Solution:

Stores Ledger Account [under Base Stock through FIFO Method]

Date	Receipts			Issue			Balance		
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹
1-4-2015	--	--	--	--	--	--	100	50	5,000
							300	50	15,000
2-4-2015	100	55	5,500	--	--	--	100	50	5,000
							300	50	15,000
							100	55	5,500
6-4-2015	--	--	--	300	50	15,000			
				100	55	5,500	100	50	5,000
10-4-2015	600	55	33,000	--	--	--	100	50	5,000
							600	55	33,000
13-4-2015	--	--	--	400	55	22,000	100	50	5,000
							200	55	11,000
20-4-2015	500	65	32,500	--	--	--	100	50	5,000
							200	55	11,000
							500	65	32,500
25-4-2015	--	--	--	200	55	11,000	100	50	5,000
				400	65	26,000	100	65	6,500
10-5-2015	800	70	56,000	--	--	--	100	50	5,000
							100	65	6,500
							800	70	56,000
12-5-2015	--	--	--	100	65	6,500	100	50	5,000
				400	70	28,000	400	70	28,000
13-5-2012	--	--	--	200	70	14,000	100	50	5,000
							200	70	14,000
15-5-2015	500	75	37,500	--	--	--	100	50	5,000
							200	70	14,000
							500	75	37,500
12-6-2015	--	--	--	200	70	14,000	100	50	5,000
				200	75	15,000	300	75	22,500
15-6-2015	300	80	24,000	--	--	--	100	50	5,000
							300	75	22,500
							300	80	24,000

Stores Ledger Account [under Base Stock through LIFO Method]

Date	Receipts			Issue			Balance		
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹
1-4-2015	--	--	--	--	--	--	100	50	5,000
							300	50	15,000
2-4-2015	100	55	5,500	--	--	--	100	50	5,000
							300	50	15,000
							100	55	5,500
6-4-2015	--	--	--	100	55	5,500			
				300	50	15,000	100	50	5,000
10-4-2015	600	55	33,000	--	--	--	100	50	5,000
							600	55	33,000
13-4-2015	--	--	--	400	55	22,000	100	50	5,000
							200	55	11,000
20-4-2015	500	65	32,500	--	--	--	100	50	5,000
							200	55	11,000
							500	65	32,500
25-4-2015	--	--	--	500	65	32,500	100	50	5,000
				100	55	5,500	100	55	5,500
10-5-2015	800	70	56,000	--	--	--	100	50	5,000
							100	55	5,500
							800	70	56,000
12-5-2015	--	--	--	500	70	35,000	100	50	5,000
							100	55	5,500
							300	70	21,000
13-5-2015	--	--	--	200	70	14,000	100	50	5,000
							100	55	5,500
							100	70	7,000
15-5-2015	500	75	37,500	--	--	--	100	50	5,000
							100	55	5,500
							100	70	7,000
							500	75	37,500
12-6-2015	--	--	--	400	75	30,000	100	50	5,000
							100	55	5,500
							100	70	7,000
							100	75	7,500
15-6-2015	300	80	24,000	--	--	--	100	50	5,000
							100	55	5,500
							100	70	7,000
							100	75	7,500
							300	80	24,000

Other Important concepts under Materials

1. Valuation of Work-in-Progress:

Unlike closing stock of finished goods, which is valued at cost or market price, whichever is lower, work-in-progress is always valued on the basis of cost. The problem arises whether overheads should be included in the costs of work-in-progress.

There are three ways of valuing work-in-progress.

(a) At Prime Cost :

This is a conservative method of valuation. Overheads are not added to prime cost for valuing work-in-progress. As a result of the exclusion of overheads, the cost of the subsequent period is understated and the cost of production for the current period is inflated to that extent.

(b) Prime Cost plus Variable Overheads:

Under Marginal Costing method, work-in-progress is valued at prime cost plus variable overheads. Fixed overheads are excluded on the basis that these are period costs and should be recovered from revenue, i.e., sales, only.

(c) At Total Cost :

The valuation is done at full costs inclusive of both variable and fixed overheads. The logic behind this method is that work-in-progress should carry the proportionate cost of the overheads and cost of production of completed items should not be burdened. This method is most commonly used.

2. Abnormal and Normal Wastage of Materials

Wastage may be classified as normal or abnormal according to the circumstances.

Normal wastage denotes that part of the wastage which is generally bound to arise in a manufacturing processing on account of evaporation, shrinkage of basic raw materials or on account of typical manufacturing process being involved. Usually such wastage remains within certain normal ratio or percentage of the input.

On the other hand, abnormal wastage is that loss which does not arise in the ordinary course of manufacturing process but is the result of certain adverse circumstances such as power failure, major breakdown of machinery non-availability of the basic raw materials, etc. It is generally not possible to estimate the extent of such wastage before as they are much more than the normal ratio/percentage of loss compared to the input of basic materials.

Since the normal wastage of the materials is an unavoidable and uncontrollable issue, it should be recovered through good production. The cost of such normal wastages will be recovered as production overhead and apportioned on the number of units produced. Necessary allowance should however be made for any amount which the wastage should realize when it is disposed of. On the contrary, the cost of abnormal wastage should be separately collected and charged off to the Costing Profit and Loss Account so as not to vitiate the Production Cost of good units produced.

3. Material Requisition Note:

Material Requisition is a document issued by a department in charge requesting the Storekeeper to issue certain materials to a job or standing order number. It is an important document as it authorises issue of materials from stores and thereby should be authenticated by appropriate authority. It forms the basis of crediting the Marginal Account in the stores ledger as the materials are taken out on the strength of such documents. The corresponding debit to work-in-progress account or Job Account for standing order number is also made on the basis of such documents. This document enables the Accounts Department to value the issue of the materials to find out the cost of materials issued. The storekeeper uses this department to check total item wise issues made by him during a certain period by adding up the details of issue from this document.

4. Material Transfer Note:

Material Transfer Note is a document used for transferring the material from one department to other department or one site to other site or one job to other job. The need for Material Transfer Note arises under the following conditions:

(a) Great urgency for such materials as normal procedure for requisitioning the materials may result in delay in completion of the job.

(b) Where two jobs are being executed side by side or very near to each other and stores department is situated at a great distance, adoption of normal procedure for requisitioning the materials may mean unnecessary expenditure in handling and transportation, especially in cases of heavy materials (e.g. iron rails).

(c) Frequent shifting of materials (for returning to stores and for re-issue) may result in wastage or breakage.

(d) If the goods are of perishable nature (e.g. Vegetable or Fruits) and refrigeration may not keep them fresh for a long time.

Procedure to be followed to transfer the material is as follows:

(a) Transferring supervisor will prepare a Material Transfer Note giving all the details of the materials transferred and will send this note to the supervisor of the job to which materials being transferred.

(b) Transferee supervisor will sign the note in token of receipt of the materials and send it back to the transferring supervisor.

(c) This note will then be send to Cost Office where necessary entries will be passed and respective job accounts debited and credited.

5. Bill of Material:

Bill of Material is a complete schedule of parts and materials required for a particular order prepared by the Drawing Office and issued by it together with necessary blue prints of drawings. For standard products, printed copies of Bill of Material are kept with blank spaces for any special details of modification to be filled in for a particular job/order. The schedule details everything, even to bolts and nuts, sizes and weights. The document solves a number of useful purposes, such as:

(a) It provides a quantitative estimate of budget of material required for a given job, process or operation which might be used for control purposes.

(b) It substitutes material requisitions and expedite issue of materials.

(c) The store-keeper can draw up a programme of material purchases and issue for a given period.

(d) It provides the basis for charging material cost to the respective job/process.

6. Waste:

Definition : This is the residue such a smoke, dust, gases, slag, etc., which arises in course of manufacturing process and practically no measurable sale or utility value. In certain types of processes and operations, some material physically disappears on account of shrinkage, evaporation etc., with the result that the quantity of the output is less than the input. Such wastage is termed invisible waste where the residual instead of fetching any value, creates a problem for its dispose which entails further costs. Special arrangements have to be made for disposal and refuse, effluent, obnoxious gases, etc.

Accounting: As waste has practically no value, its accounting is relatively simple. The effect of the waste is to reduce the quantity of output; In order to arrive at the unit cost of the process, operation, or job, the total cost of the process, etc., is distributed over the reduced output, i.e., the units of good production only. The cost of abnormal waste, should, however, be excluded from the total cost and charged to the Profit and Loss Account.

The actual waste is observed against standards and periodically reported to the management.

7. Scrap:

This is also in the form of incidental material residue coming out of certain types of manufacturing processes but it is usually in small amounts and has low measurable utility or market value, recoverable without further processing. Numerous examples of scrap may be given; scrap may arise in the form of turnings, borings, trimmings, fillings, shavings etc., from metals on which machine operations are carried out; saw dust and trimmings in the timber industry; dead heads and bottom ends in foundries; and cuttings, pieces, and split in leather industries. Scrap should always be physically available unlike waste which may or may not be present in the form of a residue.

Accounting treatment of scrap is as follows:

(a) Sales Credited to Revenue:

In this method, the scrap is not cost and its value does not, therefore, appear separately in the Cost Accounts. Only a quantitative record of the scrap returned to storeroom from the shops is maintained and the sale value realised from time to time is credited to the Profit and Loss Account as miscellaneous revenue.

(b) Credit to Overhead:

In this method and in the following method the scrap is assigned a cost. The cost is usually the sale value of the scrap less selling and distribution costs. If the scrap has no ready market but has only utility or use value, and is taken as a credit to manufacturing overhead. The effect of this credit is to reduce the overhead recovery rate. When predetermined overhead rates are in use, it is more expedient to credit an estimated allowance for the scrap instead of the amount of actual scrap.

(c) Credit to Jobs:

The scrap is assigned a cost and is traced to the job which yielded the scrap. This affords a reasonable amount of credit to the jobs and widely different.

(d) Transfer to Other Jobs:

Scrap arising in one job may be issued for utilization in another job. Such transfers of scrap from one job to another should be affected through Material Transfer Notes. Alternatively, scrap may be returned to store room and subsequently issued to another job for utilization. The latter method is more appropriate when some further processing is required on the scrap before it can be utilized for other jobs.

Control of Scrap:

Scrap is also an unavoidable residue material arising in the process of manufacture. The basic difference between scrap and waste is that while waste may not have any value, scrap must necessarily have a value, though a comparatively small one. Scrap may be sold or re-used in some process. In some industries, arising of scraps of various types in significant quantities is a regular feature and in such cases, it would be worth while having a proper administrative set-up for control of scrap. A Scrap Survey Committee may be constituted which would be responsible for such matters as (1) classifying the various types of scrap; (2) Assessing the quantum of each; and (3) Deciding upon the manner of their use or disposal.

Control of scrap should start from the designing stage of the products. At the designing stage, the type, shape and form of materials which all result in the minimum of waste or the least quantity of scrap in manufacturing process are decided. The quantity of scrap resulting from a process also depends upon the manufacturing equipment used and the efficiency of the operative who performs the work. In order to minimise scrap, production should be planned so that the best possible equipment is used and properly trained personnel are employed on the job.

8. Spoilage :

Definition:

When production does not come up to the standard specifications or quality it has to be rejected outright. The components or materials are so damaged in the manufacturing process that they cannot

be brought back to the normal specifications by repairs or reconditioning. Some spoiled work may be sold as seconds but in most cases, the entire production is sold for small value in the form of scrap or treated as waste if it has no market value. Spoilage involves not only loss of materials but also of labour and manufacturing overhead incurred up to the stage when the spoilage incurred.

Accounting and Control of Spoilage:

Spoilage arises when the production output is damaged in such a manner and to such an extent that it cannot be used for the original purpose for which it was designed but is to be disposed off in some suitable manner without further processing. The distinction between scrap and spoiled work is that while normal scrap arises mostly as a result of the processing of materials, spoilage occurs due to some defect in operations or materials which may or may not be inherent in the manufacturing process or operation. Further, scrap has always a relatively low but some definite value, but the value of spoilage may range from low, if it is a waste, to comparatively high values if the spoilage is to be sold as seconds.

Spoilage involves not only the loss of material but also labour and manufacturing overheads.

9. Treatment of Packing Cost:

Packing materials is of two types - primary and secondary. Primary containers are essential to put the goods in a saleable condition like ink in a bottle, jam in a jar, etc. Secondary containers are required for delivery/transportation like crates, etc., they are returnable and reusable.

The cost of primary containers should be charged off as a production overhead and included in production cost. On the other hand, the cost of secondary containers should charge as a selling and distribution overhead. The cost of reusable container should be charged when they could not be used any more due to damage, wear and tear, etc.

In some cases, the primary packing materials may be made decorative with a view to promote sales, and in such a case a part of the primary packing materials should be apportioned as a selling cost.

10. Carriage and Cartage Expenses:

Carriage and Cartage Expenses are incurred in the course of movement of materials or goods. Materials may mean direct materials or indirect materials. The treatment of the Carriage and Cartage Expenses differ with the kind of materials/goods transported. The carriage and cartage expenses relating to raw materials are treated as a part of direct materials cost and those relating to distribution of materials or finished goods are treated as distribution overhead. In case where the carriage and cartage are abnormal due to any reason the same is charged off to be costing Profit and Loss Account.

11. Treatment of Tools Cost:

Tools may be classified as (i) large tools and (ii) small tools, large tools are normally capitalised and depreciation charged to Factory Overheads. For small tools the following treatment may apply:

(a) Capitalization Method: In line with large tools.

(b) Revaluation Method: At the end of the year revaluation for unused life of the tools is made and the difference between original cost and revalued cost is charged as factory overheads.

(c) Write-off-Method: Whenever such small tools are issued the department is debited with the cost. Alternatively cost of tools issued during a period is accumulated and distributed to various departments on some suitable basis, e.g., hours worked.

12. Treatment of Discount Allowed by Suppliers for Bulk Purchases:

Discounts Allowed on purchases are of two types, viz., Cash Discount and Quantity and Trade Discount. Cash Discount is usually allowed for prompt payment and the Quantity and Trade Discount for heavy purchases. The amount of the latter discount is already credited in the invoice and the net landed cost of the material exclusive of the discount is considered as the material cost.

13. Treatment of Variance Detected at Stock Taking:

If the variances are due to normal causes, i.e., due to normal dry age, shrinkage, evaporation, etc., these are valued at the ruling ledger rates of the items of material concerned and the amount is taken as an item of stores overhead and recovered from production as a percentage of direct material cost consumed. If the variances are due to abnormal causes, viz., theft, fraud, misappropriation etc., these are valued by writing off to Costing Profit and Loss Account.

Illustration 7

Prepare a Stores Ledger Account from the following information adopting FIFO method of pricing of issues of materials.

2016 March
1. Opening Balance 500 tonnes @ ₹200
3. Issue 70 tonnes
4. Issue 100 tonnes
5. Issue 80 tonnes
13. Received from suppliers 200 tonnes @ ₹190
14. Returned from Department A 15 tonnes.
16. Issued 180 tonnes
20. Received from supplier 240 tonnes @ ₹195
24. Issue 300 tonnes
25. Received from supplier 320 tonnes @ ₹200
26. Issue 115 tonnes
27. Returned from Department B 35 tonnes
28. Received from supplier 100 tonnes @ ₹200

Solution:

Stores Ledger Account [FIFO Method]

Date	Receipts			Issue			Balance		
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹
2016 March 1	--	--	--	--	--	--	500	200	1,00,000
March 3	--	--	--	70	200	14,000	430	200	86,000
March 4	--	--	--	100	200	20,000	330	200	66,000
March 5	--	--	--	80	200	16,000	250	200	50,000
March 13	200	190	38,000	--	--	--	250	200	50,000
							200	190	38,000
March 14	15	200	3,000	--	--	--	250	200	50,000
							200	190	38,000
							15	200	3,000
March 16	--	--	--	180	200	36,000	70	200	14,000
							200	190	38,000
							15	200	3,000

March 20	240	195	46,800	--	--	--	70	200	14,000
							200	190	38,000
							15	200	3,000
							240	195	46,800
March 24	--	--	--	70	200	14,000	--	--	--
				200	190	38,000	--	--	--
				15	200	3,000	--	--	--
				15	195	2,925	225	195	43,875
March 25	320	200	64,000	--	--	--	225	195	43,875
							320	200	64,000
March 26	--	--	--	115	195	22,425	110	195	21,450
							320	200	64,000
March 27	35	195	6,825	--	--	--	110	195	21,450
							320	200	64,000
							35	195	6,825
March 28	100	200	20,000	--	--	--	110	195	21,450
							320	200	64,000
							35	195	6,825
							100	200	20,000

Illustration 8

From this information provided as under, you are required to prepare a statement showing how the issues would be priced if LIFO method is followed.

2016 Feb: 1. Opening Balance 100 units at ₹10 each.

2. Received 200 units at ₹10.50 each.

3. Received 300 units at ₹10.60 each.

4. Issued 400 units to Job A vide M.R.No.015.

6. Issued 120 to Job B vide M.R.No.020.

7. Received 400 units at ₹11 each.

8. Issued 200 units to Job B vide M.R.No.031

12. Received 300 units at ₹11.40 each.

13. Received 200 units at ₹11.50 each.

17. Issued 400 units to Job D vide M.R.No.040.

Solution:

Stores Ledger Account [LIFO Method]

Date	Receipts			Issue			Balance		
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹
2016 Feb 1	--	--	--	--	--	--	100	10.00	1,000
Feb 2	200	10.50	2,100	--	--	--	100	10.00	1,000
							200	10.50	2,100
Feb 3	300	10.60	3,180	--	--	--	100	10.00	1,000
							200	10.50	2,100
							300	10.60	3,180
Feb 4	--	--	--	300	10.6	3,180	100	10.00	1,000
				100	10.50	1,050	100	10.5	1,050
Feb 6	--	--	--	100	10.50	1050	--	--	--
				20	10.00	200	80	10.00	800
Feb 7	400	11.00	4,400	--	--	--	80	10.00	800
							400	11.00	4,400
Feb 8	--	--	--	200	11.00	2200	80	10.00	800
							200	11.00	2,200
Feb 12	300	11.40	3,420	--	--	--	80	10.00	800
							200	11.00	2,200
							300	11.40	3,420
Feb 13	200	11.50	2,300	--	--	--	80	10.00	800
							200	11.00	2,200
							300	11.40	3,420
							200	11.50	2,300
Feb 17	--	--	--	200	11.50	2300	80	10.00	800
				200	11.40	2280	200	11.00	2,200
							100	11.40	1,140

Illustration 9

Prepare Stores Ledger Account showing pricing of material issues on Replacement Price basis from the following particulars.

Opening balance 400 units at ₹4 each

10-3-2016 Received 100 units at ₹4.10 each

15-3-2016 Issued 300 units to Job XY vide M.R.No.14 17-3-2016 Received 200 units at ₹4.30 each

20-3-2016 Issued 250 units to Job AB vide M.R.No.20

25-3-2016 Received 400 units @ ₹4.50 each

26-3-2016 Issued 200 units to Job JK vide M.R.No.27 27-3-2016 Received 100 units @₹4.60 each.

30-3-2016 Issued 300 units to Job PQ vide M.R.No.32.

Replacement Price on various dates : 15-3-2016 ₹4.20

20-3-2016 ₹4.40

26-3-2016 ₹4.60 &

30-3-2016 ₹4.80.

Solution:

Stores Ledger Account [Replacement Price Basis]

Date	Receipts			Issue			Balance		
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹
2016 Mar 1	--	--	--	--	--	--	400	4.00	1,600
10-3-2016	100	4.10	410	--	--	--	500	4.02	2,010
15-3-2016	--	--	--	300	4.20	1260	200	3.75	750
17-3-2016	200	4.30	860	--	--	--	400	4.03	1,610
20-3-2016	--	--	--	250	4.40	1,100	150	3.40	510
25-3-2016	400	4.50	1,800	--	--	--	550	4.20	2,310
26-3-2016	--	--	--	200	4.60	920	350	3.97	1,390
27-3-2016	100	4.60	460	--	--	--	450	4.11	1,850
30-3-2016	--	--	--	300	4.80	1,440	150	2.7310	410

Illustration 10

Stocks are issued at a standard price and the following transactions occurred for a specific material:

1st January	Opening Stock	10	tonnes at ₹240 per ton
4th January	Purchased	5	tonnes at ₹260 per ton
5th January	Issued	3	tons
12th January	Issued	4	tons
13thJanuary	Purchased	3	tons at ₹250 per ton
19thJanuary	Issued	4	tons
26thJanuary	Issued	3	tons
30thJanuary	Purchased	4	tons at ₹280 per ton
31stJanuary	Issued	3	tons.

The debit balance of price variation on 1st January was ₹20. Show the stock account for the material for the month of January, indicating how you would deal with the difference in material price variance, when preparing the Profit and Loss Account for the month.

Solution:

$$\text{Standard Price} = \frac{(240 \times 10) + 20}{10}$$

$= ₹ 242$

Stores Ledger Account

Date	Receipts			Issue			Balance	
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Price ₹
1st January	--	--	--	--	--	--	10	2,400
4th January	5	260	1,300	--	--	--	15	3,700
5th January	--	--	--	3	242	726	12	2,974
12th January	--	--	--	4	242	968	8	2,006
13th January	3	250	750	--	--	--	11	2,756
19th January	--	--	--	4	242	968	7	1,788
26th January	--	--	--	3	242	726	4	1,062
30th January	4	280	1,120	--	--	--	8	2,182
31st January	--	--	--	3	242	726	5	1,456

Material price variance is ₹ 246 which is to be transferred to debit of costing P & L A/c.

Working :

Stock at standard price	= 5 x 242	= 1,210
Material Price Variance	= 1,210 – 1,456	= 246 (A)

Illustration 11

Receipts and issues of an item of stores are made as follows: There was no balance before 9th January.

	Receipts		Issues
	Quantity	Price (₹)	Quantity
January 9th	10	17.0	
19th	25	10.0	
20th			10
29th			20
30th	15	8.0	
February 13th	20	12.0	
27th	10	16.9	
28th			40
March 30th	20	20.0	
31st			20

(i) What is the simple average of February receipts ?

(ii) What are the moving monthly simple average price for January -February and February-March?

(iii) If a weighted average is used for pricing issues how does the value of the balance in stock change during January?

(iv) If a weighted average price is calculated at the end of each month and is then used for pricing the issued of that month, what will be the value of the month-end balance?

Solution:

(i) Simple Average Price of February Receipts.

Simple Average Price of February Receipts = (12 + 16.9) / 2 = ₹ 14.45

(ii) Simple Average Price of January Receipts

Simple Average Price of January Receipts = (17 + 10 + 8) / 3 = ₹ 11.67

Moving monthly average for Jan-Feb = (11.67 + 14.45) / 2 = ₹ 13.06

Moving monthly average for Feb-March = (14.45 + 20) / 2 = ₹ 17.225

(iii) Stores Ledger Account (under weighted average method for January)

Date	Receipts			Issue			Balance	
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Value ₹
Jan 9th	10	17	170	--	--	--	10	170
Jan 19th	25	10	250	--	--	--	35	420
Jan 20th	--	--	--	10	12	120	25	300
Jan 29th	--	--	--	20	12	240	5	60
Jan 30th	15	8	120	--	--	--	20	180

(iv) Calculation of the Value of month-end balance

Date	Quantity	Value
Jan 9th	10	170
Jan 19th	25	250
Jan 30th	15	120
	50	540
(-) Issues	30 (10.8)	324
Jan-Balance	20	216
Feb 13th	20	240
Feb 27th	10	169
Feb Balance	50	625
(-) Issues	40 (12.5)	500
	10	125
March 30th	20	400
	30	525
(-) Issues	20 (17.5)	350
Balance	10	175

Illustration 12

Two components A and B are used as follows:

Normal usage = 50 per week each

Re-order quantity = A- 300; B-500

Maximum usage = 75 per week each

Minimum usage = 25 per week each

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; (d) Average stock level.

Solution:

	Particulars	A	B
a)	Reorder Level [Max. Consumption × Max. Re-order Period]	450 units (75 x 6)	300 units (75 x 4)
b)	Minimum Level [ROL – (Normal Consumption x Normal Re-order period)]	200 units [450 – (50x5)]	150 units [300 – (50x3)]
c)	Maximum Level [ROL + ROQ – (Min. Consumption x Min Re-order period)]	650 units [450 + 300 – (25x4)]	750 units [300 + 500 – (25 x 2)]
d)	Average Stock Level [Min. Level + Max. Level] / 2 or [Min. Level + ½ × ROQ]	425 units [200 + 650] / 2 (or) or 350 units 200 + ½ (300)	450 units [150 + 750] / 2 (or) or 400 units 150 + ½ (500)

Illustration 13

Anil company buys its annual requirement of 36,000 units in six installments. Each unit costs ₹1 and the ordering cost is ₹25. The inventory carrying cost is estimated at 20% of unit value. Find the total annual cost of the existing inventory policy. How much money can be saved by using E.O.Q?

Solution:

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

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

$$= \sqrt{\frac{18,00,000}{0.2}}$$

= 3,000 units

Statement Showing computation of comparative inventory cost of existing policy and proposed EOQ policy:

	Particulars	Existing Policy		EOQ	
(i)	Purchase Cost	(36000 x 1)	36000	(36000 x 1)	36000
(ii)	Ordering Cost	[36000/6000 x 25]	150	[36000/3000 x 25]	300
(iii)	Carrying Cost	[1/2 x 6000 x 1 x 20%]	600	[1/2 x 3000 x 1 x 20%]	300
			36,750		36,600

Saving by using EOQ = 36,750 – 36,600 = ₹ 150

Illustration 14

The annual demand for an item is 3,200 units. The units cost is ₹6 and inventory carrying charges is 25% p.a. If the cost of one procurement is ₹150, determine:

(a) E.O.Q (b) No. of orders per year (c) Time between two consecutive orders.

Solution:

(a) $EOQ = \sqrt{\frac{2.A.O}{C}}$

$$= \sqrt{\frac{2 \times 3,200 \text{ (units)} \times ₹ 150}{₹ 6 \times 25\%}}$$

$$= \sqrt{\frac{9,60,000}{1.5}}$$

= 800 units

(b) No. of orders per year = A / EOQ = 3200 / 800 = 4 orders (A = Annual demand)

(c) Time between two consecutive orders = No. of months in years / No. of orders

= 12/4 = 3 Months

Illustration 15

A company manufactures a special product which requires a component 'Alpha'. The following particulars are collected for the year 2015.

1.	Annual demand of Alpha	8,000 units
2.	Cost of placing an order	₹ 200 per order
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 size is 4,000 components at a time.

Required:

(a) Compute the economic order quantity.

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

Solution:

(a) Calculation of Economic Order Quantity

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

$$EOQ = \sqrt{\frac{2 \times 8{,}000 \text{ (units)} \times ₹\ 200}{₹\ 400 \times 20\%}}$$

= 200 units

(b) Evaluation of Profitability of Different Options of Order Quantity

(i) When EOQ is ordered

Purchase Cost	(8,000 units x ₹ 400)	32,00,000
Ordering Cost	[(8,000 units / 200 units) x ₹ 200]	8,000
Carrying Cost	(200 units x ₹ 400 x ½ x 20/100	8,000
Total Cost		32,16,000

(ii) When quantity discount is accepted

Purchase Cost	(8,000 units x ₹ 384)	30,72,000
Ordering Cost	[(8,000 units / 4000 units) x ₹ 200]	400
Carrying Cost	(4000 units x ₹ 384 x ½ x 20/100	1,53,600
Total Cost		32,26,000

Advise:

The total cost of inventory is lower if EOQ is adopted. Hence, the company is advised not to accept the quantity discount.

Illustration 16

From the following particulars with respect to a particular item of materials of a manufacturing company, calculate the best quantity to order:

Ordering quantities (tonne)	**Price per ton ₹**
Less than 250	6.00
250 but less than 800	5.90
800 but less than 2,000	5.80
2,000 but less than 4,000	5.70
4,000 and above	5.60

The annual demand for the material is 4,000 tonnes. Stock holding costs are 20% of material cost p.a. The delivery cost per order is ₹6.00

Solution:

Statement showing computation of total inventory cost at different order sizes (Annual Demand = 4000 tonnes)

		Ordering Quantities				
	Particulars	**200**	**250**	**800**	**2000**	**4000**
(i)	Purchasing cost	24000 (4000×6)	23600 (4000×5.9)	23200 (4000×5.8)	22800 (4000×5.7)	22400 (4000×5.6)
(ii)	No. of orders	20	16	5	2	1
(iii)	Ordering Cost (₹ 6)	120	96	30	12	6
(iv)	Average size of order	100	125	400	1000	2000
(v)	Inventory Carrying cost per unit	1.2 (6x20%)	1.18 (5.9x20%)	1.16 (5.8x20%)	1.14 (5.7x20%)	1.12 (5.6x20%)
(vi)	Inventory carrying cost (iv x v)	120	147.5	464	1140	2240
(vii)	Total Inventory Cost (iii + i + vi)	24240	23843.5	23694	23952	24646

For the above computations the best quantity to order is 800 units.

Illustration 17

The particulars relating to 1,200 kgs. of a certain raw material purchased by a company during June, were as follows:-

Lot prices quoted by supplier and accepted by the Company for placing the purchase order :

Lot upto 1,000 kgs. @ ₹22 per kg.

Between 1,000 - 1,500 kgs, @ ₹20 per kg.

Between 1500 -2000 kgs. @ ₹18 per kg.

Trade discount – 20%.

Additional charge for containers @ ₹10 per drum of 25 kgs.

Credit allowed on return of containers, @ ₹8 per drum.

Sales tax at 10% on raw material and 5% on drums.

Total fright paid by the purchaser ₹240/-

Insurance at 2.5% (on net invoice value) paid by the purchaser.

Stores overhead applied at 5% on total purchase cost of material.

The entire quantity was received and issued to production.

The containers are returned in due course. Draw up a suitable statement to show :-

(a) Total cost of material purchased and

(b) Unit cost of material issued to production.

Solution:

Statement showing computation of total cost of material purchased and unit cost of material issued for production.

Particulars	**Unit Cost** ₹	**Total Cost** ₹ **(1,200 kgs)**
Basic price of material	20.00	24,000.00
(-) Trade discount (20%)	4.00	4,800.00
	16.00	19,200.00
(+) Drum charges (1,200/25 x 10)	0.40	480.00
(+) Sales tax 19,200 x 10% = 1920 480 x 5% = 24 = 1944	1.62	1,944.00
Net Invoice Value	18.02	21,624.00
(+) Insurance (21,624 x 2.5%)	0.4505	540.60
(+) Freight paid	0.2000	240.00
	18.6705	22,404.60
(-) Credit for drums returned (1,200 / 25 x 8)	0.3200	384.00
Total Cost of Material Purchased	18.3505	22,020.60
(+) Stores overhead (22,020.6 x 5%)	0.9200	1,101.03
Material cost issued to production	19.2705	23,121.63

Illustration 18

From the following data for the year ended 31st Dec, 2016, calculate the inventory turnover ratio of the two items, and put forward your comments on them.

	Material A ₹	Material B ₹
Opening stock on 1-1-2016	10,000	9,000
Purchase during the year 2016	52,000	27,000
Closing on 31-12-2016	6,000	11,000

Solution:

$$\text{Material Inventory Turnover Ratio} = \frac{\text{Cost of Material used}}{\text{Average Stock}}$$

$$\text{For A} = \frac{10,000 + 52,000 - 6,000}{(10,000 + 6,000)/2}$$

= 7 times

$$\text{For B} = \frac{9,000 + 27,000 - 11,000}{(9,000 + 11,000)/2}$$

= 25,000 / 10,000

= 2.5 times

Material Inventory turnover ratio indicates the efficiency of the management with which they are able to utilize their inventory. It indicates the existence or non-existence of non moving items, dormant items, slow moving items etc. in inventory. If the ratio is high, the efficiency is said to be high and on the other hand if the ratio is low, the efficiency is said to be low.

In view of above, in the instant case, we may say that Material A used better than Material B.

Illustration 19

From the details given below, calculate:

(i) Re-ordering level

(ii) Maximum level

(iii) Minimum level

(iv) Danger level

Re-ordering quantity is to be calculated on the basis of following information:

(a) Cost of placing a purchase order is ₹ 20

(b) Number of units to be purchased during the year is 5,000

(c) Purchase price per unit inclusive of transportation cost is ₹ 50

(d) Annual cost of storage per units is ₹ 5

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

(f) Rate of consumption: Average: 15 units per day,
Maximum: 20 units per day

Solution:

$$EOQ = \sqrt{\frac{2 \times 5{,}000 \text{ (units)} \times ₹\ 20}{₹\ 5}}$$

= 200 units

Min. Rate of Consumption = (15×2)–20

= 10 units per day

(i)	Re-order Level	= Maximum usage per period x Maximum Re-order Period
	(ROL)	= 20 units per day x 15 days = 300 units
(ii)	Maximum level	= ROL + ROQ – (Min. Rate of Consumption x Min. Re-order Period)
		= 300 units + 200 units – (10 units per day x 6 days)
		= 440 units
(iii)	Minimum level	= ROL – (Average Rate of Consumption x Average Re-order Period)
		= 300 units – (15 units per day x 10 days)
		= 150 units
(iv)	Danger level	= Average Consumption x Lead time for Emergency Purchases
		= 15 units per day x 4 days = 60 units

Illustration 20

M/s Tubes Ltd. are the manufacturers of picture tubes for T.V. The following are the details of their operation during the year 2015:

Average monthly market demand	2,000 Tubes
Ordering Cost	₹100 per order
Inventory carrying cost	20% per annum
Cost of tubes	₹ 500 per tube
Normal usage	100 tubes per week
Minimum usage	50 tubes per week
Maximum usage	200 tubes per week
Lead time to supply	6 – 8 weeks

Compute from the above:

(i) Economic order quantity. If the supplier is willing to supply quarterly 1,500 units at a discount of 5% is it worth accepting?

(ii) Re-order level

(iii) Minimum level of stock

(iv) Maximum level of stock

Solution:

A = Annual usage of tubes = Normal usage per week x 52 weeks

= 100 tubes x 52 weeks = 5,200 tubes

O = Ordering cost per order = ₹ 100 per order

C = Inventory carrying cost per unit per annum

= 20% x ₹ 500 = ₹ 100 per unit, per annum

Economic Order Quantity:

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

If the supplier is willing to supply 1,500 units at a discount of 5% is it worth accepting?

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

$$5{,}200 \text{ units x } ₹ 475 + \left(\frac{5{,}200 \text{ units}}{1{,}500 \text{ units}} \times ₹ 100\right) + (1{,}500 \text{ units} \times 20\% \times ₹ 475) \div 2$$

= ₹ 24,70,000 + ₹ 346.67 + ₹ 71,250

= ₹ 25,41,596.67

Total cost (when order size is 102 units)

$$= 5{,}200 \text{ units} \times ₹ 500 + \left(\frac{5{,}200 \text{ units}}{102 \text{ units}} \times ₹100\right) + (102 \text{ units} \times 20\% \times ₹ 500) \div 2$$

= ₹ 26,00,000 + ₹ 5,098.03 + ₹ 5,100

= ₹ 26,10,198.03

Since the total cost under quarterly supply of 1,500 units with 5% discount is lower than that when order size is 102 units, the offer should be accepted. While accepting this offer capital blocked on order size of 1,500 unit per quarter has been ignored.

Re-order Level:

= Maximum Consumption × Maximum Re-order Period

= 200 units × 8 weeks = 1,600 units.

Minimum level of Stock:

= Re-order Level - Normal Usage × Average Re-order Period

= 1,600 units -100 units × 7 weeks = 900 units.

Maximum level of Stock:

= Re-order Level + Re-order Quantity – Min. Usage x Min.-Re-order Period

= 1,600 units + 102 units – 50 units x 6 weeks

= 1,402 units.

SELF EXAMINATION QUESTIONS:

1. What is the prime objective of material control? It is said that in any system of material control there are always two counteracting or opposing factors. What are these and why do these factors arise?
2. What are the principal forms generally required to be used in connection with purchasing and receiving of stores? Briefly describe them and design any one of the forms that are used.
3. Explain the meaning and importance of material control and mention the main requisites of an adequate system of material control.
4. What is a purchase order? To whom should the copies of a purchase order be sent and why? Give a specimen form of purchase order, assuming the particulars to be filled in.
5. Enumerate the advantages and disadvantages of a centralized stores system.
6. What is Re-ordering Level? Explain its relationships with Maximum and Minimum Stock Levels. What are the factors to be considered in fixing Re-ordering Level and Quantity? Under what circumstances would you recommend revision of levels?
7. What is Bin Card? Give a specimen form of the Bin Card and discuss its utility.
8. "The Perpetual Inventory System is an Integral part of material control". Discuss this statement by bringing out briefly the salient features and the advantages of this system.
9. What is Economic Order Quantity? How is it calculated?
10. What are the main factors which you would consider before selecting a method of pricing material issues?
11. What is meant by Bill of Materials? When will you recommend drawal of stores under Bill of Materials as opposed to individual requisition?
12. What are the stores that normally come under "Packing Materials"? What are the major classifications of packing expenses and how they are treated in cost?

13. How would you deal with the following in Cost Accounts?

    (a) Packing cost

    (b) Cost of Tools

14. Write short notes on the following:

    (a) ABC analysis.

    (b) VED analysis.

    (c) Treatment of Scrap in costing.

    (d) Valuation of work in progress.

    (e) Moving Average Price Method of material issue valuation.

    (f) Just in time

    (g) Bin Card vs. Stores Ledger

    (h) Principles of valuation of receipt of material as per CAS – 6.

15. Which of the following statements are true?

    (a) Perpetual inventory system enables management to ascertain stock at any time without physical inventory being taken.

    (b) Continuous stock taking is not an essential feature to the perpetual inventory system.

    (c) Bin card is a record of both quantities and value.

    (d) VED analysis is used primarily for control of spare parts.

    (e) ABC analysis is not based on the concept of selection inventory management.

    (f) Stores ledger is maintained in the stores department.

    (g) Purchase requisition is usually prepared by the storekeeper.

    (h) In centralized purchasing all purchases are made by the purchasing department.

    (i) Weighted average method of pricing issue of materials involves adding all the different prices and dividing by the number of such prices.

    (j) Material returned note is prepared to keep a record of return of surplus materials to stores.

    (k) Under the average price method of valuing material issues, a new issue price is determined after each purchase.

(Ans: [True: a, d, g, h, j and k]; [False : b, c, e, f, i]

PRACTICE PROBLEMS

16. Your factory buys and used 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 manager 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 makes your recommendations.

Ans: Proposal of the purchase manager not acceptable because it increases cost by ₹ 10; buy 400 units (i.e., EOQ) at a time is not economical.

17. P Ltd. uses three types of materials A, B and C for production of 'X', the final product. The relevant monthly date for the components are as given below:

	A	B	C
Normal usage (in units)	200	150	180
Minimum usage (in units	100	100	90
Maximum usage (in units)	300	250	270
Re-order Quantity (in units)	750	900	720
Re-order period (in months)	2 to 3	3 to 4	2 to 3

Calculate for each component:

(a) Re-order Level

(b) Minimum Level

(c) Maximum Level

(d) Average Stock Level

Ans:

A	900 units	1,000 units	810 units
B	400 units	475 units	360 units
C	1,450 units	1,600 units	1,350 units
D	775 units	925 units	its

The purchases and issues of material X in the month of January 2015, is as follows:

Jan.	3 Purchase	800 units @ ₹ 20 per unit
Jan.	8 Purchase	700 units @ ₹ 18 per unit
Jan.	9 Issue	600 units
Jan.	11 Issue	800 units
Jan.	17 Purchase	800 units @ ₹ 20 per unit
Jan.	25 Purchase	500 units @ ₹ 25 per unit
Jan.	31 Issue	1000 units

The standard price per unit of material is ₹ 20 fixed for the year 2015. Show the Stores Ledger entries and determine the price variance for the month of January.

(**Ans**: Value of Stock on January 31, 2015 ₹ 9,100; Price Variance ₹ 1,100 Un-favourable)

19. XYZ company buys in lots of 500 boxes which is a 3 month supply. The cost per box is ₹125 and the ordering cost is ₹150. The inventory carrying cost is estimated at 20% of unit value.

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

How much money could be saved by employing the economic order quantity? (Ans: Saving by adopting EOQ = ₹ 2,977)

20. Following information in an inventory problem is available:

Annual demand	8,400 units
Unit price (₹)	2.4
Ordering cost (₹)	4.0
Storage cost (₹)	2%
Interest rate	10% p.a.
Lead time	1/2 month

Calculate EOQ, Reorder level and total annual inventory cost. How much does the total inventory cost vary if the unit price is changed to ₹5 ? **(Ans:** Variation in Inventory Cost = 42,201)

21. A cast iron foundry is importing forged steel moulds for making its castings. The moulds are of four different sizes A,B,C and D and their CIF values are US $4,140; 4,160; 6,340, and 7,875 respectively. Customs duty may be assumed at 45% and clearing charges 5% of CIF value. The number of castings that can be made out of each mould it:

A - 1,000 B - 2,000, C - 1,800 and D - 1,500.

The weight of each casting out of A is 300 kg. B - 400 kg. C - 500 kg and D - 700 Kg. The casting suffer a normal rejection of 10%. You are required to calculate the average cost of mould per tonne of saleable casting.

(For conversion assume US $ 1 = ₹ 8)

(**Ans:** Cost per tonne of saleable castings = A = ₹ 184; B = ₹ 69.33; C = ₹ 93.93; D = ₹ 100

22. G Ltd. produces a product which has a monthly demand of 4,000 units. The product required 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: Economic order quantity.

If the minimum lot size to be supplied is 4,000 units. What is the extra cost, the company has to incur?

What is the minimum carrying cost, the company has to incur?

(**Ans**: Minimum carrying cost = ₹ 2,400)

MULTIPLE CHOICE QUESTIONS

1. Which of the following is considered as normal loss of material?
   A. Pilferage B. Loss due to accident C. Loss due to careless handling of material
   D. None of these.
2. The most important element of cost is-
   A. Material B. Labour C. Overheads D. All of these
3. Direct material is a –
   A. Adiministration Cost B. Selling and Distribution cost C. All of these D. None of these
4. Continuous stock taking is a part of-
   A. ABC analysis B. Annual stock taking C. Perpetual Inventory D. None of these
5. Which of the following is considered as accounting record?
   A. Bin Card B. Bill of material C. Store Ledger D. None of these

[Ans: C, A, D, C, C]

State whether the following statement is True (or) False:

1. Waste and Scrap of material have small realization value.
2. Slow moving materials have a high turnover ratio.
3. Bin card are not the part of accounting records.
4. ABC analysis is based on the principle of management by exception.
5. Store ledger is maintained inside the stores by store keeper.

[Ans: F, F, T,T, F]

Fill in the Blanks:

1. Store Ledger is kept and maintained in _____.
2. Goods Received Note is prepared by the _____.
3. Transfer of surplus material from one job or work order is recorded in _____.
4. _____ is discount allowed to the bulk purchaser.
5. _____ is a document which records the return of unused materials.

[Ans: Cost Office, Receiving department, Material Transfer Note, Quantity Discount, Material return Note.]

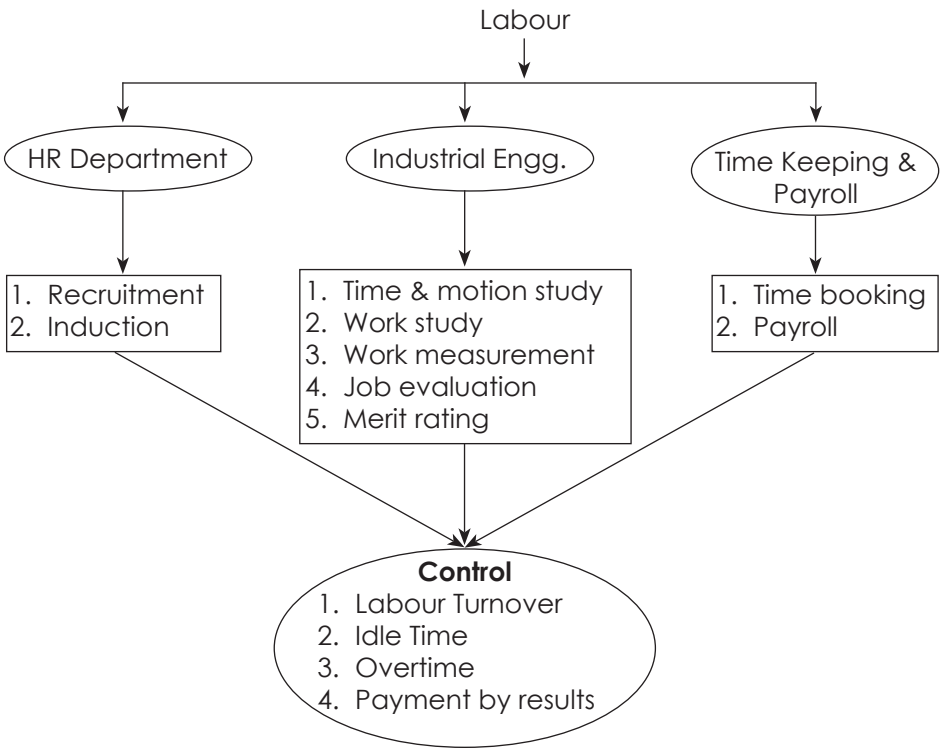
Match the followings:

1	Production strategy	A	ABC Analysis
2	Analytical method of stock control	B	JIT
3	Process of classifying Material	C	Control of Scrap
4	Unavoidable residue material	D	Costing department
5	Store ledger	E	FSN Analysis

[Ans: (1) - (B); (2) - (A); (3) - (E); (4) - (C); (5) - (D).

2.2 EMPLOYEE COSTS (CAS - 7)

Labour is an important element of cost and for overall cost control and cost reduction, Labour Cost is of paramount importance. Labour Cost is also called as Employee Cost. However, for control and reduction of Labour Cost, it is essential to compute the Labour Cost in a scientific manner and hence there should be proper systems and processes and documentation, which will help computation of Labour Cost in a scientific manner. It should be remembered that Labour is not like material as there is a human aspect involved in it. Therefore, there should be a comprehensive study of all related aspects of Labour Cost and then only computation and control over the same will be possible. Attention should also be paid to the productivity aspect. Low productivity results in higher Labour Cost per unit while higher productivity will reduce the Labour Cost per unit. All these aspects of Labour Cost are discussed in detail in this chapter. Study of Labour or Employee Cost can better be explained as follows:



As per CAS-7, (limited Revision - 2017) Employee cost is the benefits paid or payable in all forms of consideration given for the service rendered by employee (including temporary, part time and contract employee) of an entity.

Various aspects of Labour Cost Control

In the modern competitive environment, it is essential to make efforts for controlling and reducing the Labour Cost. Systematic efforts are required in order to achieve this target. The following steps will be useful in controlling and reducing the Labour Cost.

A. Classification of Labour cost:

The first step in the direction of controlling and reducing the Labour Cost is proper classification of the same. The Labour Cost is classified into Direct Cost and Indirect Cost. Direct Labour Cost is the cost that can be identified with a product unit. It can also be described as cost of all Labour incurred for altering the construction, composition or condition of the product. Indirect Labour Cost is the cost, which cannot be identified with a product unit. It represents the amount of wages which is paid to the workers who

are not directly engaged on the production but it includes wages paid to the workers and assistants working in departments like purchasing, store keeping, time office, maintenance, and other service and production departments. In other words, indirect wages are the wages paid to the workers who facilitate the production rather than actually engaged in production. The Direct Labour Cost can be charged directly to the job or product units and is included in the prime cost. Indirect Labour Cost is included in the overhead cost. Direct Labour Cost is variable in nature and can be controlled by strictly adhering to the norms and standards set by the management. Indirect Labour Cost can be controlled by establishing Labour budgets and comparing the actual Indirect Labour Cost with the budgeted Labour Cost. Any difference between the two is analysed carefully and suitable corrective action is taken.

B. Production Planning:

Effective control over the Labour Cost Can be achieved through proper production planning. Production planning includes activities like planning, scheduling, routing, machine loading, product and process engineering, work study etc. With the help of work study, time and motion study can be conducted which will help in fixation of standard time for a particular job. A comparison between the standard time and actual time is constantly made to find out the difference between the two. Suitable corrective action can be taken if it is noted that the actual time taken is constantly more than the standard time allowed for the job.

C. Labour Budget:

Budget and budgetary control are effective tools for cost control and cost reduction. A Labour budget can be prepared which will set the target for the Labour Cost which will again facilitate comparison between the Budgeted Labour Cost and the Actual Labour Cost.

D. Labour Standards:

Standards can be set for Labour Cost against which the Actual Labour Cost can be compared. Standard Labour Cost is the cost, which should have been incurred for producing a particular quantity of production. While fixing the Standard Labour Cost, use of time and motion study is made to fix up the standard time that should be taken for the actual production.

E. Labour Performance Report:

There should be a system of periodic Labour efficiency and utilisation reports. These reports will give an idea about the efficiency and productivity of the Labour.

F. Incentive Schemes:

Improving the Labour productivity is one of the important ways to reduce the Labour Cost per unit. Productivity can be improved by motivating the workers. Offering monetary and non monetary incentives can help to improve the productivity substantially. However, there should be a periodic review of the incentive schemes and therefore incentive schemes report should be prepared at periodic intervals.

G. Labour Cost Accounting:

There should be a proper cost accounting system, which will identify the Direct and Indirect Labour Cost. Similarly the cost accounting department should be able to generate and maintain records for time keeping, time booking, idle and overtime, impact of incentive schemes, per unit of Labour, cost due to Labour Turnover and other relevant records.

Thus from the above mentioned points, it will be clear that there is a need to control the Labour Cost and it can be done by the combined efforts of various departments.

Principles of measurement of Employee (CAS-7) (Limited Revision 2017):

The guide lines for ascertaining the Labour Cost / Employee Cost are as follows :-

(a) Employee Cost shall be ascertained taking into account the gross pay including all allowances payable along with the cost to the employer of all the benefits.

(b) Bonus whether payable as a statutory minimum or on a sharing of surplus shall be treated as part of Employee Cost. Ex-gratia payable in lieu of or in addition to bonus shall also be treated as part of the Employee Cost.

(c) Remuneration payable to managerial personnel including executive directors on board and other officers of a corporate body under a statute will be considered as part of the Employee Cost of the year under reference, whether the whole or part of the remuneration is considered as a percentage of profits.

Explanation: Remunaration paid to non executive directors shall not form part of employee cost but shall form part of administrative overhead.

(d) Separation costs related to voluntary retirement, retrenchment, termination...etc shall be amortized over the period of benefitting from such costs.

(e) Employee Cost shall not be included any Imputed Costs.

(f) Any subsidy, grant, incentive or any such received or receivable with respect to any employee cost shall be reduced from ascertainment of Cost of the cost project to which such amounts are related.

(g) Any abnormal cost where it is material and quantifiable shall not form part of the Employee Cost.

(h) Penalties, damages paid to statutory authorities or other third parties shall not form part of the Employee Cost.

(i) The cost of free housing, free conveyance and any other similar benefits provided to an employee shall be determined at the total cost of all resources consumed in providing such benefits.

(j) Any recovery from employees towards the facilities provided shall be reduced from the Employee Cost.

(k) Cost of idle time is ascertained by the idle hours multiplied by the hourly rate applicable to idle employee or a group of employee.

(l) Where Employee Cost is accounted at standard cost, variances due to normal reasons related to employee cost shall be treated as part of Employee Cost. Variances due to abnormal reasons shall be treated as part of abnormal cost.

(m) Any change in the cost accounting principles applied for the determination of the Employee Cost should be made only if it is required by law or for compliance with Cost Accounting Standard or change would result in a more appropriate way of presentation of Cost Statement.

Control of Labour Cost

Labour cost consists of the total amount of wages paid to the workers and other expenses related thereto. It includes hourly or piece-rates payable to the workers. It may be excessive due to inefficiency of labour force, high idle time and overtime payments, increase in spoilage, waste and defective production due to lack of supervision and inspection, high labour turnover and other matters. Therefore it is clearly seen that the control of labour cost is essential in every organization to cut down the cost of production and to improve the labour productivity/efficiency. The following departments play a vital role in Labour Cost Control :-

(a) Human Resources Department

This department is responsible for the execution of policies regarding appointment, discharge, transfer, promotion, classification of labour, wage and incentive systems, etc, which have been formulated by the board of directors or executive committee. It normally maintain detailed records of attendance, leave records, overtime and shift records from which various calculations of wages, allowances, overtime, incentives are made. Reports concerning labour turnover, recruitment, productivity, utilization, absenteeism as well as reports on labour cost, idle time, various cost ratios etc., are prepared here for submission to higher authorities for necessary action.

(b) Engineering, Industrial Engineering Department

This department helps to maintain control over working conditions, production methods, job performances by preparing plans and specification for each job scheduled for production, maintaining safety and efficient working conditions, initiating and supervising research and development activities, making method study, motion study, and time study, setting piece-rates, making job evaluation, merit rating and job analysis, measuring labour productivity and in general suggesting ways and means to improve labour efficiency/productivity thereby cutting down the effective labour cost.

(c) Time Keeping Department

The function of this department is mainly to keep, maintain the time for which each and every worker has worked including the check-in and check-out time. The records are kept separately for different shift and irregular working periods like overtime period. The records are such kept that the departments wise/product wise/process wise/ batch wise/job wise/operation wise allocation of labour cost is possible. The entire correctness of calculation of payroll, overtime payments, incentive payments, overhead allocation depend on the records maintained by this department and as such the importance of the functions rendered by this department cannot be over emphasised.

(d) Payroll Department

This departments is responsible for preparation of payroll and also basically to maintain records of job classification, department wage rates to prepare each man's earnings, to allocate those earnings to various cost centres to summarise various deductions and employers' share of provident fund, state insurance and other items, and also to summarise overtime payments and incentive payments wherever applicable.

(e) Cost-Accounting Department

This department is responsible for the accumulation and compilation of all cost data relating to the element Labour. It analyses the payroll cost to effectively render routine and special labour, cost reports thereby disclosing the amount of normal, and abnormal idle time, direct labour, indirect labour, overtime and departmental labour costs and variances between actual and standard labour costs. These reports are used by the top management to effectively control the labour cost and also to improve the labour productivity/efficiency.

Time Keeping:

Like Personnel Department, this department also plays an important role in labour cost control through maintaining record of each worker's time in and time out during regular working period and reporting the time of each worker for each department, operation or production order. Thus this department is responsible for recording the attendance time of each worker accurately. This will ensure punctuality and discipline in the company and will have a positive impact on the morale of each worker. Time keeping is a statutory requirement also and therefore accurate recording of time should be ensured. The important role of time keeping from the point of view of labour costing and control can be summarized as given below:

(a) It shows the total number of hours worked by each workman and so the calculation of his wage becomes possible. This is applicable where the workers are paid wages as per the time rate.

(b) Time keeping promotes punctuality and discipline amongst the workers. In the absence of the time keeping system, there will be not only indiscipline amongst them but the workers who are otherwise punctual and disciplined will be frustrated.

(c) Certain benefits like pension, gratuity and leave with pay, provident fund, promotion, and salary scale are linked with the continuity of service. Attendance records in this regard, can be helpful in computation of these benefits.

(d) Computation of Labour hours becomes possible through time keeping records. This will be useful in overhead apportionment and absorption, which may be made on the basis of Labour hours.

(e) Time keeping is a statutory requirement under Labour laws.

(f) The time keeping records can be used for further analysis like for fixation of standard time and finding out idle time as well as the efficiency of Labour. It can be used by researchers as well as by Government Authorities for various purposes.

Methods of Time Keeping

The above-mentioned points highlight the importance of the time keeping. The question that we have to answer now is that what are the methods of time keeping? The answer to this is given in the following paragraphs. The methods of time keeping are explained below.

(1) Time Recording Clocks or Clock Cards: This is mechanized method of time recording. Each worker punches the card given to him when he comes in and goes out. The time and date is automatically recorded in the card. Each week a new card is prepared and given to the worker so that weekly calculation of wages will be possible. If wages are paid on monthly basis, a new card may be given in each month. Due to advancement of technology, giving a new card each month is also not required as the same card continued till the worker either leaves the service or retires from the service. The only limitation of this method, [in fact it is the limitation of all the methods of time keeping] is that though the time in and time out are recorded, the records do not show the productive time of the worker, i.e. how he has spent the time in the factory. Thus if a worker comes in at 8 am and leaves at 5 pm, he has spent 9 hours in the company, which can be ascertained from the time keeping records. However, how he has spent time, is not be shown by these records. For showing the productive time, separate records showing time booking are to be prepared. The time booking records can also be combined with time keeping records so that there is no need to keep dual records.

(2) Disc Method: This is one of the older methods of recording time. A disc, which bears the identification number of each worker, is given to each one. When the worker comes in, he picks up his disc from the tray kept near the gate of the factory and drops in the box or hooks it on a board against his number. Same procedure is followed at the time of leaving the factory. The box is removed at starting time, and the time keeper becomes aware of late arrivals by requiring the workers concerned to report him before starting. The time keeper will record in an Attendance Register any late arrivals and workers leaving early. He will also enter about the absentees in the register on daily basis. The main limitation of this method is that there is a possibility of marking the attendance of a worker by his friend i.e. by a proxy. Secondly if the number of workers is large, there will be a delay in recording time due to manual operation of this system.

(3) Attendance Records: This is the simplest and the oldest method of marking attendance of workers. In this method, every worker signs in an attendance register against his name. Leaves taken by workers as well as late reporting is marked on the attendance register itself. The main limitation of this system is that in case there is large number of workers, there may be large queues for signing the muster. Similarly there is little control over marking the attendance time and hence there may be irregularities in time recording.

Time Booking:

In time keeping we have seen that the basic objective of time keeping is to mark the attendance time, i.e. time in and time out. Time keeping aims at keeping a check on the number of hours spent by a worker in the factory. However, it does not record the productive time of the workers. It means the time keeping methods do not provide information about how the time is spent by the workers in the factory. For example, the time keeping record will show that the worker has reported for duty at 8 am and left at 6 pm, thus, he has spent 10 hours in the company. But the analysis of these 10 hours is not provided by the time keeping. In view of this there is a need to have a system, which will tell about the productive time spent by the workers in the factory. The method, which supplies this information, is known as 'Time Booking Methods' and the recording the time spent by a worker in each job, process or operation is known as 'Time Booking'. The objects of time booking are as follows:-

(i) To determine the productive time spent by the worker on the job or operation. This helps in finding out the idle time and controls the same.

(ii) To determine the quantity and value of work done.

(iii) To determine earnings like wages and bonus.

(iv) To determine the efficiency of workers.

Time Booking Methods

The following methods are used for time booking:-

(1) Daily Time Sheet: In this method, each worker records the time spent by him on the work during the day, for which a sheet is provided to each worker. The time is recorded daily and hence accuracy is maintained. However, the main limitation of this method is lot of paper work is involved as daily sheets are maintained on daily basis by each worker.

(2) Weekly Time Sheets: The only difference between the daily time sheet and weekly time sheet is that these time sheets are maintained on weekly basis. This means that each worker prepares these sheets weekly rather than daily. This helps in reducing the paper work to a great extent.

The only care to be taken is that since the information is filled up on daily basis, there may be inaccuracies and hence filling the information should be done on daily basis only.

(3) Job Ticket: Job tickets are given to all workers where time for commencing the job is recorded as well as the time when the job is completed. The job tickets are given for each job and the recording of the time as mentioned above helps to ascertain the time taken for each job. After completing one job, the worker is given another job.

(4) Labour Cost Card: This card is meant for a job, which involves several operations or stages of completion. Instead of giving one card to each worker, only one card is passed on to all workers and time taken on the job is recorded by each one of them. This card shows the aggregate labour cost of the job or the product.

(5) Time and Job Card: This card is a combined record, which shows both, the time taken for completion of the job as well as the attendance time. Therefore there is no need to keep separate record of both, time taken and attendance time.

Thus *we may distinguish time keeping and time booking, that the time keeping is simply maintaining attendance of the workers i.e the time of arrival and the time of departure and there by the time spent by the worker in the organization is measured, where as time booking is not only maintaining the time spent by the workers in the organization, but also the time spent on each & every job including the idle time with reasons are recorded.*

Work Study

In order to motivate workers, it is necessary to design a proper incentive system of payment of wages. Money is the strongest motivating factor and hence monetary incentive system become essential. In any incentive system, the bonus is paid by comparing the standard performance/production with the actual performance, i.e. actual production. Bonus is paid if the actual performance is higher than the standard one. However, for deciding the standard performance, standard time, i.e. time that is allowed doing a particular job should be fixed against which the actual time taken should be compared. The Work Study which includes, the Job Study, and the Method Study ensures the fixation of standard time to do a particular job and thus has become extremely important in the designing of the incentive system. Work Study components are discussed below.

Method Study

Method Study is done to improve the methods of production and to achieve the most efficient use of the resources like, manpower, machines and materials. Method Study has the following stages:-

(a) Method Study is generally conducted for the jobs, which involve complex operations as well as costly operations. Hence the first step is to select jobs, which are having complexity of operations.

(b) There should be a detailed study of related aspect of the selected job. Information about the job like, purpose, location, sequence, relationship with other work, methods of working, operators, requirement of skilled workers, facilities required etc. should be collected.

(c) The crucial step is that after studying the relevant aspects of the job, there should be development of the improved method of doing the job. An improved method of job might change the location and sequence of the work, methods of production and the layout for the job. The improved method will result in more efficiency, more simplicity and effectiveness and job will be done in a better manner.

(d) The developed method should be applied in doing the job.

(e) For any new method, a follow up is always required. For method study also a constant follow up is necessary to ensure that the method selected is implemented properly. Thus method study ensures efficient use of resources by reducing unnecessary work and helps to achieve highest production.

Work Measurement

The Work Measurement aims at determining the effective time required to perform a job. The ineffective, wasteful or avoidable time is separated from required time to complete the work. The effective time so established in work measurement can be used for the following purposes:-

(a) Incentive wage schemes which require data about the time allowed and time taken for a particular job.

(b) Improving utilization of men, machines and materials.

(c) Assisting in production control.

(d) Assisting in setting labour standards.

(e) Cost control and reduction.

The following stages are involved in work measurement:-

(i) Selection of work.

(ii) Measuring the actual time taken in the work done.

(iii) Making comparison between the standard time and the actual time.

Job Evaluation

It is necessary for the management of any organization to establish proper wage and salary structure for various jobs. For doing this in a scientific manner, it is necessary to determine the relative value of jobs and hence a job evaluation is done. Job Evaluation is a technique of analysis and assessment of jobs to determine their relative value within the firm. It aims at providing a rational and equitable basis for differential salaries and wages for different classes of workers. Job Evaluation has the following objectives:-

(a) It helps in developing a systematic and rational wage structure as well as job structure.

(b) Job Evaluation aims at removing the controversies and disputes relating to salary between the employers and employees. Thus the employees and also the employer remain satisfied.

(c) Another important objective of Job Evaluation is to bring fairness and stability in the wage and salary structure so as to ensure full cooperation of workers in implementing various policies of the employers.

(d) Job Evaluation discloses characteristics and conditions relating to different jobs. This is very useful at the time of recruiting of workers as only suitable workers can be recruited. This avoids square pegs in round holes.

Methods of Job Evaluation

Methods of job evaluation are as follows:-

(1) Point Ranking Method: In this method each job is analyzed in terms of various job factors or characteristics. The characteristics are skills required, efforts involved, working conditions, hazards, responsibility and so on. In other words the job factors are the requirements needed for performing the job effectively. Each job factor is given weightage or points depending upon its value for the job. For example, for certain jobs, maximum value is assigned to experience while for some jobs, education may be the most crucial factor. Finally each job is ranked in the order of points or weights secured by them. The wage structure can be suitably designed according to the points assigned to each job. The method is quite sound in principle but difficulties may be faced assigning the weights to each job.

(2) Ranking Method: In this method, jobs are ranked in order of importance on the basis of skills required, experience requirements, working conditions etc. Jobs are rearranged in an order, which can be either from the lowest to the highest or in the reverse. Wage scales are determined in terms of ranks. Though this method is quite simple to operate and less costly as well as easy for understanding, it is suitable when the size of the organization is small and jobs are few and well defined. In a large organization, where jobs are quite complex, this method is not beneficial.

(3) Grading Method: This method is an improvement over the ranking method. Under this method, each job is analyzed in terms of a predetermined grade and then assigned a grade or class. Grades are established after making an investigation of job factors, such as complexity in the job, supervision, responsibility, education etc.

Merit Rating

Job Evaluation is the rating of the job in order to bring rationality in the wage and salary structure in the organization. On the other hand Merit Rating is the comparative evaluation and analysis of individual merits of the employees. The Merit Rating aims at evaluation and ranking the individual employees in order to plan and implement rational promotional policies in the organization. Merit Rating has the following objectives:-

(a) To evaluate the merit of an employee for the purpose of promotion, increment, reward and other benefits.

(b) To establish and develop a wage system and incentive scheme.

(c) To determine the suitability of an employee for a particular job.

(d) To analyze the merits or limitations of a worker and help him to develop his capability and competence for a job.

(e) To examine characteristics like cooperation, quality of work done, attendance and regularity, education, skill, experience, character and integrity and initiative.

Thus it can be understood that Merit Rating is extremely useful for organizations for evaluating the employees. However the main limitations are that the rating can be subjective which will give rise to the disputes and there is a possibility that past performance of an employee may be given too much importance.

Difference between Merit Rating and Job Evaluation

The difference between the Merit Rating and Job Evaluation are as follows:-

(a) Job Evaluation is the assessment of the relative worth of jobs within a business enterprise and Merit Rating is the assessment of the employees with respect to a job.

(b) Job Evaluation helps in establishing a rational wage and salary structure. On the other hand, Merit Rating helps in fixing fair wages for each worker in terms of his competence and performance.

(c) Job Evaluation brings uniformity in wages and salaries while Merit Rating aims at providing a fair rate of pay for different workers on the basis of their performance.

Time And Motion Study

The study of time and motion is essential for designing an incentive system. Time Study determines

the time to be spent on the job. Standard time is the time that should be taken for completing a particular job under standard or normal working conditions. For fixation of standard time, Motion Study is necessary. Thus, the Motion Study precedes the Time Study. Motion Study means dividing the job into fundamental elements or basic operations of the job or process and studying them in detail to eliminate the unnecessary elements or motions. After investigation all movements in a job, process or operation, the Motion Study aims at finding out the most scientific and systematic way of performing the job. After eliminating unnecessary motions, the time that should be taken to perform these motions is decided with the help of a stop-watch. In the time so fixed, some allowance is added in the same for normal idle time, which is due to fatigue, change of job, change of tools, and preventive maintenance of machines and so on. Thus standard time for a job or process is arrived at. The Time and Motion Study aims at :-

(a) Eliminating unnecessary motions, thereby reducing inefficiency.

(b) Improving methods, procedures, techniques, and processes relating to a job.

(c) Effective utilization of men, material, machines and time.

(d) Improving working environment, layout and design of plant and equipment.

The following are the benefits of Time and Motion Study:-

(a) Effective utilization of resources like men, material, machine and time.

(b) Helps in assessment of labour.

(c) Helps in designing incentive system as many of the incentive systems are based on standard time.

(d) Preparation of labour budget.

(e) Proper planning of production for preparation of production budget.

(f) Helps in improving labour productivity by designing best method for performing a job or process.

(g) Improvement of work methods.

Payroll Department

Roll of Payroll Department is of crucial importance in overall Labour Cost computation and control. The main responsibilities of this department are preparation of payroll from clock cards, job or time tickets, or time sheet. The payroll shows the amount of wages payable to each worker showing the gross wages payable, the deductions and the net wages payable. For doing this calculation, they have to work in collaboration with the time office, personnel department, Cost Accounting department and with the concerned department in which the worker is working. The functions of this department are given below:-

(a) To compute the wages of the employees

(b) To prepare a detailed wages sheet showing the gross wages payable, various deductions and other payroll liabilities.

(c) To maintain individual employee payroll records.

(d) To prepare department wise summaries of wages.

(e) Compilation of Labour statistics for management.

(f) To install and implement an effective internal check system for preventing frauds and irregularities in payment of wages.

(g) To detect and prevent ghost workers.

Cost Accounting Department

The Cost Accounting department is responsible for analyzing the Labour Cost for the purpose of computation and control of the same. It is responsible for the accumulation and classification of all cost data of which Labour Cost is one of the important components. The Cost Accounting department classifies the Labour Cost into direct and indirect, compares the actual Labour Cost with the budgeted cost, compute unit Labour Cost and compiles the data for further analysis of the Labour Cost. The data generated can be useful for the management in taking decisions.

Labour Turnover

Labour Turnover of an organisation is change in the labour force during a specified period measured against a suitable index. The rate of Labour Turnover in an industry depends upon several factors such as, nature of the industry, its size, location and composition of the labour force. A controlled level of Labour Turnover is considered desirable because it helps the firm to adjust the size of its labour force in response to needs such as for seasonal changes or changes in technology.

Causes of Labour Turnovers:

The causes giving rise to high labour turnover may be broadly classified under the following the heads:

(i) **Personnel Causes**: Workers may leave employment purely on personal grounds, e.g.,

(a) Dislike for the job, locality or environments.

(b) Domestic troubles and family responsibilities.

(c) Change of line for betterment.

(d) Retirement due to old age and ill health.

(e) Death.

In all such cases, personal factors count the most and employer can practically do nothing to help the situation.

(ii) **Unavoidable Causes** : In certain circumstances it becomes obligatory on the part of the management to ask some of the workers to leave. These circumstances are:

(a) Retrenchment due to seasonal trade, shortage of any material and other resources, slack market for the product, etc.

(b) Discharge on disciplinary grounds.

(c) Discharge due to continued or long absence.

(iii) **Avoidable Causes**: Under this head, may be grouped the causes which need the attention of the management most so that the turnover may be kept low by taking remedial measures. The main reasons for which workers leave are:

(a) Unsuitability of job.

(b) Low pay and allowance.

(c) Unsatisfactory working conditions.

(d) Unhappy relations with co-workers and unsatisfactory behaviour of superiors.

(e) Dispute between rival trade unions.

(f) Lack of transport, accommodation, medical and other factors.

(g) Lack of amenities like recreational centres, schools, etc.

The above causes may also be classified in a different manner under three heads, viz., Financial Causes, Social and Economic Causes and Psychological Causes relating to human relationship.

Measurement of Labour Turnover:

It is essential for any organisation to measure the Labour Turnover. This is necessary for having an idea about the turnover in the organisation and also to compare the Labour Turnover of the previous period with the current one. The following methods are available for measurement of the Labour Turnover:-

(a) Additions Method: Under this method, number of employees added during a particular period is taken into consideration for computing the Labour Turnover. The method of computing is as follows.

Labour Turnover = (Number of additions/Average number of workers during the period) ×100

(b) Separation Method: In this method, instead of taking the number of employees added, number of employees left during the period is taken into consideration. The method of computation is as follows.

Labour Turnover = Number of separations/Average number of workers during the period)×100

(c) Replacement Method: In this method neither the additions nor the separations are taken into consideration. The number of employees replaced is taken into consideration for computing the Labour turnover.

Labour Turnover = (Number of replacements/Average number of workers during the period)×100

(d) Flux Method: Under this method Labour Turnover is computed by taking into consideration the additions as well as separations. The turnover can also be computed by taking replacements and separations also. Computation is done as per the following methods.

Labour Turnover = ½ [Number of additions + Number of separations] /Average number of workers during the period ×100

Labour Turnover = ½ [Number of replacements + Number of separations] /Average number of workers during the period × 100

Cost of Labour Turnover

Increasing Labour Turnover is a double edged malady. It reduces the productivity of labour and resulting in high costs. The cost of Labour Turnover may be analyzed under two broad headings, Preventive Cost and Replacement Costs. Preventive Costs refer to all those items of expenditure which are incurred in order to keep the workers satisfied and thus to act as discouragement against leaving employment. Replacement Costs are those costs which are incurred for the recruitment and training of new hands and the resulting losses, wastages and lowering of productivity due to the inexperience and inefficiency of the new labour force.

Preventive Costs may be further grouped under the following heads:

1. Personnel administration

Most concerns would have a Personnel Department which is entrusted with recruitment, training, and other problems arising out of the employment of the labour force. Obviously, the entire expenditure of the department cannot be treated as labour turnover costs but a portion of the costs which related to the efforts of the Personnel Manager in maintaining good relationship between the management and the staff should be treated as Preventive Labour Turnover Cost. The labour force remains satisfied if properly looked after and if grievances are sympathetically considered.

2. Medical Service (Preventive and Curative)

Care for own health and that of family members gets prior consideration with the workers who prefer those concerns where medical services are available. Further, a healthy worker is an asset of the firm as he is able to make substantial contribution towards higher efficiency and productivity.

3. Welfare activities and Schemes:

These include facilities like subsidised canteens, co-operative store, laundry and washing services, sports, housing schemes, transport, and educational facilities. These facilities are as good as higher wages offering incentive to the worker to stay with the firm.

4. Miscellaneous Schemes such as Pension or Provident Fund Schemes, Bonus, High Wage and Other Incentive Schemes

Greater the advantage these prerequisites offer, the lower will be the rate of Labour Turnover.

Replacement Costs consist of the following:

1. Loss of output due to delay in obtaining new workers

As suitable workers may not be available readily, there is a time gap before a new worker can replace the old one. During this period, some output may be maintained by retaining surplus labour force to meet such contingencies or by working overtime. All such extra cost should be taken as labour turnover cost.

2. Employment Department Expenses

With the increase in the tempo of recruitment, additional work is thrown on the Employment or Personnel Department. Administrative expenditure is incurred for the selection, test and medical examination of the new hands for writing initial document like service records, fund accounts, etc.

3. Induction Training for new workers

Unless skilled workers are recruited (more likely on higher rates of pay) who can be at right way put on jobs, the average worker has to be given some induction training before he is fit to be put on his assigned work. For certain categories of skilled and highly skilled jobs, intensive training for some period may be essential.

4. Inefficiency of new workers

The efficiency of new hands be generally low, productivity is reduced and cost increases.

5. Cost of tool and machine breakage:

While on training and the initial stages of work after completion of training, the worker is likely to break tools more frequently on account of his inexperience.

6. Cost of Scrap and Defective Work:

A new worker is likely to spoil work and although in most cases responsibility can be fixed on him and no wages paid for the scrapped work, the expenditure incurred on material and wages for the earlier operations done on the job becomes waste.

7. Cost of Accidents:

On account of his inexperience, the new worker is apt to disregard safety rules and he is thus more prone to accidents. It may be noted that the increases in labour costs due to high Labour Turnover contribute to create an inflationary trend in the industry.

Measures to reduce Labour Turnover:

Labour Turnover may be reduced by removing its avoidable causes and taking preventive remedial measures. The various measures may be summarised as follows:

(i) Efficient, sympathetic and impartial personal administration.

(ii) Effective communication system to keep the workers informed on matters that affect them.

(iii) Improving working conditions and placing the right man on the right jobs.

(iv) Job enrichment to reduce boredom and monotony and to provide job satisfaction.

(v) Introducing fair rates of pay and allowance and incentives, pensions, gratuity, etc.

(vi) Strengthening welfare measures.

(vii) Augmenting recreational activities and schemes.

Illustration 1

During October 2015, the following information is obtained from the Personnel Department of a manufacturing company. Labour force at the beginning of the month 1900 and at the end of the month 2100. During the month, 25 people left while 40 persons were discharged. 280 workers were engaged out of which only 30 were appointed in the vacancy created by the number of workers separated and the rest on account of expansion scheme. Calculate the Labour Turnover by different methods.

Solution:

Computation of Labour Turnover

Additions Method:

Number of Additions/Number of average workers during the period = 280 / 2000 X 100 = 14%

Separation Method:

Number of Separations/Number of average workers during the period = (25+40)/2000 × 100 = 3.25%

Replacement Method:

Number of Replacements / Number of average workers during the period=30/2000 X 100 = 1.5%

Flux Method:

½ [Number of Additions + Number of Separations] / Number of average workers during the period = [½(280 + 65) / 2000]×100 = 173/2000 X 100 = 8.63%

Note: Average number of workers in all the above methods is computed by taking Opening number of workers + Closing number of workers / 2 = 1900 + 2100/2 =2000

Illustration 2

The management of XYZ Ltd. is worried about the increasing Labour Turnover in the factory and before analyzing the causes and taking remedial steps; they want to have an idea of the profit foregone as a result of Labour Turnover during the last year. Last year's sales amounted to ₹83, 03,300 and the profit/ volume ratio was 20%. The total number of actual hours worked by the direct Labour force was 4.45 lakhs. As a result of the delays by the Personnel department in filling vacancies due to Labour Turnover, 1,00,000 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 cost incurred consequent on Labour turnover revealed, on analysis the following. Settlement cost due to leaving: ₹43, 820 & Recruitment costs: ₹26,740. Selection costs: ₹12,750, & Training costs: ₹30,490

Assuming that the potential production lost as a consequence of Labour Turnover could have been sold at prevailing prices, find the profit foregone last year on account of Labour Turnover.

Solution:

We will have to calculate the profit foregone by calculating the amount of contribution lost and the additional cost that was incurred as a result of the Labour Turnover. This is done in the following manner.

I. Actual productive hours: Actual hours worked – Unproductive training hours
   = 4,45,000 – 15,000 [50% of 30, 000]
   = 4,30,000 actual productive hours.

II. Total hours lost: 1,00,000 hrs
   Sales lost [₹83,03,300 × 1,00,000]/4,30,000 = ₹19,31,000
   Loss of contribution – 20% of ₹19,31,000 = ₹3,86,200

Statement Showing Profit Foregone

	₹
Contribution lost:	3,86,200
Settlement cost due to leaving:	43,820
Recruitment cost:	26,740
Selection cost:	12,750
Training cost:	30,490
Profit foregone:	5,00,000

Overtime Wages / Overtime Premium

The Factories Act provides for payment of overtime wages at double usual rates of wages. Even where the Act is not applicable, the practice is to pay for overtime work at higher rates usually in accordance with a standing agreement between the employer and the workers. Hence, payment of overtime consists of two elements, viz., the normal (i.e., usual) amount and the extra payment, i.e., the premium. As per CAS-7, the overtime. Overtime premium is defined as 'Overtime is the time spent beyond the normal working hours which is usually paid at a higher rate than the normal time rate. The extra amount payable beyond the normal wages & salaries for beyond the normal working hours is called Overtime Premium'.

Treatment of Overtime in Cost Records

As per CAS-7 (Limited Revision 2017), Overtime Premium shall be assigned directly to the cost object or treated as overheads depending on the economic feasibility and specific circumstances requiring such overtime.

When overtime is worked due to exigencies or urgencies of the work, the basic / normal payment is treated as Direct Labour Cost and charged to Production or cost unit on which the worker is employed. Whereas the amount of premium (extra amount) is treated as overhead.

If overtime is spent at the request of the customer, then the entire amount (including overtime premium) is treated as direct wages and should be charged to the job.

When the overtime is worked due to lack of capacity as general policy of the company, then the total amount paid is treated as direct wages which is computed at the estimated rate based on the figures of the previous years.

Overtime worked on account of the abnormal conditions such as flood, earthquake, etc., should not be charged to cost, but to costing Profit and Loss Account if integrated accounts are maintained.

It will thus be seen that overtime involves payment of increased wages and should be resorted to only when extremely essential. The disadvantages attached to overtime working are as follows :

(a) It involves excess labour cost.

(b) There is decrease in productivity. Output is usually proportionate to the excess time worked as efficiency during late hours is diminished.

(c) Work in the evenings increases lighting cost.

(d) Continuous work for long periods leads to fatigue and defective work.

(e) It fells upon the health of the workers.

(f) Overtime work if not properly distributed among the workers may lead to discontentment.

(g) There is an unusual strain on plant and machinery.

(h) Once overtime is resorted to for some time, the workers take the overtime wages as part of their normal earnings and resist future attempts to discontinue overtime work.

(i) There is a tendency to keep the work pending to be done during overtime period or to intentionally slow down in order to compel the management to sanction overtime.

It may, however, be said in favour of overtime work that it increases the productive capacity of the concern as more work is done with the existing resources. Overtime work is particularly useful in pulling up backlog in production arising due to shutdown, breakdown, power failure and such other contingencies.

Though overtime work cannot be completely eliminated, it is essential that proper control should be exercised to keep it to the minimum. The following steps should be taken to control the Overtime:

(a) All overtime work should be duly authorised after investigating the necessity thereof.

(b) Overtime cost should be recorded separately and shown against the department incurring it. This will enable proper investigation and planning of production in future.

(c) If overtime tends to be a permanent feature, the necessity of recruiting more men and shifting working should be considered.

(d) If overtime is due to lack of plant or machinery or other resources, steps may be taken to install more machines, or to give subcontracts alternatively, to restrict production so as to complete it within the normal time.

Idle Time

Idle Time Cost represents the wages paid for the time lost during which the worker does not work, i.e time for which wages are paid, but no work is done. *As per CAS-7 (Limited Revision 2017), Idle Time is 'The difference between the time for which the employees are paid/payable to employees and the employees time booked against the cost object'*. This happens because due to various causes for which he is not responsible, the worker remains idle but full wages are paid to him. Even for workers who are paid on the basis of output, idle time payment may be required to be made.

The causes leading to idle time may be broadly classified into four categories, viz. :-

(i) *Normal, inherent or unavoidable idle time: Time lost* between the gate and place of work, break for tea, time interval between one job and another, time for tool setting, adjustment of machine, etc.

(ii) *Normal idle* time such as waits for jobs, tools, materials or instructions, small power failures, small breakdown of machines and tools, and atmospheric conditions.

(iii) *Abnormal idle time* such as those arising due to breakdown for considerable period, non-availability of raw materials, slack supervision, strikes or lock-outs, fire flood, storm, etc.

(iv) *Concealed idle time* such as manipulation of job breaking, wastage of time due to under-employment, i.e., unnecessary work like cleaning, grass cutting and gardening to employ idle men, and employment of skilled workers on unskilled jobs.

Idle time should not be booked directly to jobs or production orders because such a practice not only increases the cost of direct labour, but also vitiates comparison of idle time costs from time to time. In booking of time, idle or waiting time should not normally record in the job card but on separate idle time cards. Separate cards or registers may be provided for recording idle time according to the causes which give rise to it.

Treatment of Idle Time

As per CAS-7 (Limited Revision 2017), Idle Time Cost shall be assigned direct to the cost object or treated as overheads depending on the economic feasibility and specific circumstances causing such idle time.

Treatment of different categories of Idle Time are as below:-

(a) Unavoidable idle time above would be for insignificant periods. In Cost Accounts, this is allowed to remain merged in the Production Order or Standing Order Number on which the worker was otherwise employed.

(b) Normal Idle Time is booked to factory or works overhead. For the purpose of effective control, each type of idle time, i.e., idle time classified according to the causes is allocated to a separate Standing Order Number.

(c) Abnormal Idle Time would usually be heavy in amount involves longer periods and would mostly be beyond the control of the management. Payment for such idle time is not included in cost and is adjusted through the Costing Profit and Loss Account or included in Profit and Loss Account, when the accounts are integrated.

(d) Tendency to conceal Idle Time should be discouraged. It is a non-effective time and the resultant loss of profit due to reduced production activity but also increases the cost per unit of production as the fixed costs continue to be incurred, irrespective of the reduced quantum of production due to loss of labour time. Idle Time should, therefore, be highlighted prominently so that action can be taken to remove the causes thereof. Although for obvious reasons, it is not possible to record minor details, vigilance is necessary for finding out long-term idleness among the workers.

Idle Time Preventive Measures

Idle Time may be eliminated or reduced to a large extent by taking suitable preventive measures such as (a) proper planning of production in advance, thus reducing imbalances in production facilities, (b) timely provisioning of materials, (c) regular maintenance of machines so as to avoid breakdown, and (d) careful watch over the labour utilization statement. The remedial measure to be taken will, no doubt, depend upon the particular factor or situation which caused the Idle Time.

General principles in designing the system of remuneration to Employee

Remuneration is the reward for labour under normal circumstances and is generally based on either time spent or on the result produced. The former is called "time-related" remuneration and the latter is known as "Piece-related" remuneration. The fixation of method of remuneration in a proper manner is vitally important for any organisation because it deals with the most sensitive item of the input, i.e., Labour.

The general principles which should be considered in designing a proper method of labour remuneration is summarized below:-

(a) The basis should be simple to understand and the various segments of the system, should clearly mention in detail.

(b) The employees should be able to accept the method without any doubts or hesitation in their mind.

(c) The method should be flexible enough to adopt any changes or variation which may become inevitable at a later stage.

(d) The method should be able to cut down/stabilize the labour turnover which is often causes due to unsatisfactory or unacceptable method of remuneration.

(e) The method should assure fair wages to the employees so that both the employers and the employees can gain by such methods, the former by way of higher productivity and the latter by way of higher earnings.

(f) Incentive payments should be a part of the method of remuneration with a view to increase the labour productivity.

(g) The method should be able to minimise the level of absentees so that avoidable wastages in labour cost can be reduced.

(h) The method should ultimately result into higher production and improved quality of the output.

Methods of Wage Payment

One of the important components of Labour Cost Control is the wages system. A system of wage payment, which takes care of both, i.e. providing guarantee of minimum wages as well as offering incentive to efficient workers helps to motivate the workers to a great extent. It should also be remembered that high wages do not necessarily mean high labour cost because it may be observed that due to high wages the productivity of workers is also high and hence the per unit cost of production is actually decreased. On the other hand, if low wages are paid, it may result in lower productivity and hence higher wages do not necessarily mean high cost.

The following are the various methods of payment of wages.

A. Time Rate System

(a) At ordinary levels.

(b) At high wage levels and

(c) Graduated Time Rate.

B. Piece Rate

(a) Straight Piece Rate.

(b) Piece Rate with Guaranteed Day Rates and

(c) Differential Piece Rates.

C. Bonus Systems

(a) Individual Bonus for Direct Workers.

(b) Group Bonus for Direct Workers and

(c) Bonus for Indirect Workers.

D. Indirect Monetary Incentives

(a) Profit Sharing and

(b) Co-partnerships.

E. Non monetary incentives like job security, social and general welfare, sports, medical facilities etc.

These methods are discussed in the following paragraphs:-

A. Time Rate Method

Time Rate at Ordinary Levels

Under this method, rate of payment of wages per hour is fixed and payment is made accordingly on the basis of time worked irrespective of the output produced. However, overtime is paid as per the statutory provisions. The main benefit of this method for the workers is that they get guarantee of minimum income irrespective of the output produced by them. If a worker is not able to work due to genuine reasons like illness or physical disability, he will continue to get the wages on the basis of time taken for a particular job. This method is used in the following situation:-

(a) Where the work requires high skill and quality is more important than the quantity.

(b) Where the output/services is not quantifiable, i.e. where the output/services cannot be measured.

(c) Where the work done by one person is dependent upon other person, in other words where a individual worker has no control over the work.

(d) Where the speed of production is governed by time in process or speed of a machine.

(e) Where the workers are learners or inexperienced.

(f) Where continuous supervision is not possible.

The main advantage of this method is that the worker is assured of minimum income irrespective of the output produced. He can focus on quality as there is no monetary incentive for producing more output. However, the main limitation of this method is that it does not offer any incentive to the efficient workers. Efficient and inefficient workers are paid at the same rate of wages and hence there is a possibility that even an efficient worker may become inefficient due to lack of incentive.

Time Rate at High Wage Levels

This system is a variation of time rate at ordinary levels in the sense that in this system, workers are paid at time rate but the rate is much higher than that is normally paid in the industry or area. In this method, the workers are paid according to the time taken and overtime is not normally allowed. This method offers a very strong incentive to workers and it can attract talented workers in the industry. However, care should be taken that productivity also increases; otherwise the cost will go on increasing.

Graduated Time Rate

Under this method payment is made at time rate, which varies according to personal qualities of the workers. The rate also changes with the official cost of living index.

Thus this method is suitable for both employer and employees.

B. Piece Rate Method

This method is also called as payment by results where the workers are paid as per the production achieved by them. Thus if a worker produces higher output, he can earn higher wages.

Under the piece rate system of wage payment the workers receive a flat rate of wages either for time worked or for units manufactured.

The **advantages** of such a system are summarised below:-

(a) As the workers are paid on the basis of the results, i.e., for each unit produced, job performed or number of operations completed, there is a tendency on their part to increase their production so that they may earn more wages.

(b) The increased production thus achieved results in the reduction of overhead expenses per unit of production even through total overheads may increase. The increase in overheads will be relatively small as compared to the increase in turnover.

(c) The wages being paid on the basis of production, the management know the labour cost per unit or per job.

(d) The workers are rewarded for their efficiency because the inefficient workers will not get as much as the efficient workers.

(e) The workers are very careful in handling their tools and machinery, etc., because on the proper maintenance of these depends their higher efficiency and in turn, their higher wages.

(f) This method is very simple to operate.

The **Disadvantages** on the other hand are as follows:-

(a) It is not easy to determine the piece work rate on an equitable basis. When a rate has been fixed and later on it is found to be too high, it is very difficult to reduce it as its reduction will cause dissatisfaction and friction among the workers.

(b) As the labour cost per unit remains the same, the employees do not gain as a result of increase in productivity except to some extent in the form of reduction in overheads. As such if the overhead expenses per unit are relatively small, the advantage to the employer will not be significant.

(c) Sometimes quantity may increase at the cost of quality. For the reason, a strict inspection has to be maintained in the form of quality control. This will result into additional expenditure.

(d) Materials may be used in excessive quantities and may be handed carelessly on account of the workers' efforts to achieve high output.

(e) This method may cause discontentment amongst those who are slow and those who are paid on time basis.

(f) The workers may in an attempt to increase production, handle the machines carelessly causing major damage or breakdown.

The following are the variations of this method.

Straight Piece Rate

In this method, rate per unit is fixed and the worker is paid according to this rate. For example, if the rate per unit is fixed at ₹10, and the output produced is 300 units, the remuneration to the worker will be ₹10 X 300 units = ₹3, 000. This method thus offers a very strong incentive to the workers and is particularly suitable where the work is repetitive. The benefits of this method are as follows:-

(a) The method is simple and provides a very strong incentive to the workers by linking the monetary reward directly to the results.

(b) Productivity can be increased substantially if the rate of pay includes a really adequate incentive.

(c) Higher productivity will result in lowering the cost per unit.

However, the main limitation of this method is that if a worker is not able to work efficiently due to reasons beyond his control, he will be penalized in the form of lower wages.

Differential Piece Rates

Under these methods, the rate per standard hour of production is increased as the output level rises. The increase in rates may be proportionate to the increase in output or proportionately more or less than that as may be decided. In other words, a worker is paid higher wages for higher productivity as an incentive. The rate per unit will be higher in this case as compared to the rate paid to a worker with lower productivity. For deciding the efficiency, comparison is made between the standard production and actual production of the worker. If the actual production is more, the worker qualifies for higher rate of wages. The Differential Piece Rate methods will be useful when the production is of repetitive type, methods of production are standardized and the output can be identified with individual workers. The following are the major systems of differential piece rate system:-

(i) Taylor (ii) Merrick (iii) Gantt Task and Bonus

Taylor's Differential Piece Rate System

Taylor is regarded as father of scientific management and he has recommended a system of Differential Piece Rate. According to him, there are only two classes of workers, efficient and inefficient. He suggests that while efficient workers should be encouraged to the maximum possible extent, the inefficient workers should be penalized. In order to do this, he has suggested two rates for the two classes of workers. Thus according to Taylor, if the workers are efficient, they should be paid @ 120% of the normal piece rate and if they are inefficient, they should be paid @ 80% of the normal piece rate. For measuring efficiency, each worker will be given a standard production quantity to be produced in the time allowed and the actual production should be compared with the same. If a worker exceeds the standard, he will be regarded as efficient while if he fails to do so, he will be regarded as inefficient. The positive and negative points of this system are as follows:-

Merits:-

(a) There is a very strong incentive to the workers, which helps to achieve higher productivity.

(b) Due to the incentive, best workers are attracted to the company.

(c) This method is quite simple and hence easy to understand.

Limitations:

(a) Slow workers and beginners are penalized severely. Similarly workers get penalized for reasons beyond their control, e.g. medical reasons, accidents etc. Therefore it is said that there is no human element in this system.

(b) In an anxiety to produce more, quality may be neglected in order to achieve higher quantity of production.

Illustration 3

From the following particulars, calculate the earnings of workers X and Y and also comment on the labour cost.

Standard time allowed: 20 units per hour

Normal time rate: ₹30 per hour

Differential Rate to be applied:

80% of piece rate when below standard

120% of piece rate at or above standard

In a particular day of 8 hours, X produces 140 units while Y produces 165 units.

Solution:

Standard production per day is 20 units × 8 hours = 160 units

Worker 'X' produces 140 units which means he is below standard and will get wages @ 80% of the normal piece rate.

X's earnings:

Normal piece rate = ₹30 per hour/20 units = ₹1.5 per unit

80% of the normal piece rate = ₹1.20 per unit

Earnings = ₹1.20 × 140 units = ₹168

Labour cost per unit = ₹168/140 units = ₹1.20

Y's Earnings:

Y has produced more than the standard production of 160 units and hence he will

get wages @ 120% of normal piece rate. His earnings will be as shown below.

Normal piece rate = ₹30 per hour/20 units = ₹1.50 per unit

120% of normal piece rate = ₹1.80 per unit

Earnings = ₹1.80 ×165 units = ₹297

Labour cost per unit = ₹2.97/165 units = ₹1.80

Comment: Labour cost increases from ₹1.20 per unit to ₹1.80 per unit. Taylor's system is resisted on this ground as well as on the ground that it is very harsh on the workers.

Merrick Differential Piece Rate System

Merrick's system is modification of Taylor's system and is comparatively less harsh on the workers. The scale of remunerations is as follows:-

Production Rates of Payment

Up to 83% of production - Normal piece rate

83% to 100% of production - 110% of ordinary piece rate

Above 100% of production - 120% of ordinary piece rate

As mentioned earlier, this method is less harsh on the workers as compared to Taylor's system. It is particularly useful to beginners and also offers an incentive who have potential of higher productivity.

Gantt Task Bonus Plan

In this method, there is a combination of time rate, bonus and piece rate plan. The remuneration is computed as shown below:

Production below standard - Guaranteed time rate

Production at standard - Bonus of 20% [normally] of time rate

Production above standard - High piece rate for the entire output

This method assures minimum wages for even too less efficient workers and hence is a preferred method of payment of wages. It also offers reasonably good incentive to efficient workers. However, the main limitation is that the method is complicated to understand by the workers and hence may create confusion amongst them.

Illustration 4

X, Y and Z are three workers working in a manufacturing company and their output during a particular 40 hours week was 96, 111 and 126 units respectively. The guaranteed rate per hour is ₹10 per hour, low piece rate is ₹4 per unit, and high piece rate is ₹6 per unit. High task is 100 units per week. Compute the total earnings and labour cost per unit under Taylor, Merrick and Gantt Task Bonus Plan.

Solution:

(a) Taylor Plan:

High task is 100 units

Worker X = Actual output is 96 units, which is less than the standard. This means he is inefficient and will get 80% of the normal piece rate i.e. @₹4.80 per unit. His wages will be = ₹4.80 ×96 units = ₹460.80.

Worker Y = Actual output is 111 units which is more than the standard. This means he is efficient and will get 120% of the normal piece rate i.e. ₹7.20 per unit. His wages will be = ₹7.20 × 111 units = ₹799.20

Worker Z = Actual output is 126 units, more than the standard. This means his wages will be = ₹7.20 ×126 units = ₹907.20.

(b) Merrick Plan:

Worker X = High task is 100 units, actual output is 96, this means that the efficiency level is 96%. As per Merrick Plan, wages of X will be 110% of normal piece rate which is ₹6.60 per unit = ₹6.60 × 96 units = ₹633.6

Worker Y = High task is 100 units, actual output is 111 units, efficiency level is 111%. Y will be entitled for wages @ 120% of normal piece rate i.e. @ ₹7.20 per unit. His wages will be, ₹7.20 × 111 units = ₹799.2

Worker Z = High task is 100 units, actual output is 126 units, efficiency level is 126%. Z will get at higher piece rate @ ₹7.20 per unit. His wages will be ₹7.20 × 126 units = ₹907.2

(c) Gantt Task and Bonus Plan:

Worker X = ₹10 × 40 hours = ₹400 [X will get guaranteed time rate as his output is below the high task]

Worker Y = ₹6 × 111 units = ₹666 [High piece rate as output is above standard]

Worker Z = ₹6 × ₹126 units = ₹756 [High piece rate as output is above standard]

Individual Bonus Plans:

We have seen earlier that in the time rate system, the workers are paid according to the time taken while in case of piece rate system, the output produced by the worker decides his wages as rate per unit is fixed rather than rate per hour. In the premium bonus plan, the gain arising out of increased productivity is shared by both, the employer and employee.

The bonus to be paid to the workers is computed on the basis of savings in the hours, i.e. the difference between the time allowed and time taken. The time allowed is the standard time, which is fixed by conducting a time and motion study by the work-study engineers. While fixing the standard time, due allowance is given for physical and mental fatigue as well as for normal idle time. The actual time taken is compared with this standard time and bonus is payable to the worker if the time taken is less than the standard time.

The individual bonus schemes commonly used are as follows.

(a) Halsey Premium Plan

(b) Halsey-Weir Premium Plan

(c) Rowan Plan

(d) Barth Variable Sharing Plan

These methods are discussed below:-

(a) Halsey Premium Plan

This plan was introduced by F.A. Halsey, an American engineer. In this plan, bonus is paid on the basis of time saved. Standard time is fixed for a job and if the actual time taken is less than the same, the worker becomes eligible for bonus. However bonus is paid equal to wages of 50% of the time saved. A worker is assured of time wages if he takes longer time than the allowed time. The formula for computing the total wages is as follows.

Total Earnings = H X R + 50% [S – H] R

Where, H = Hours worked, R = Rate per hour, S = Standard time

Illustration 5

Time allowed for a job is 48 hours; a worker takes 40 hours to complete the job. Time rate per hour is ₹15. Compute the total earnings of the worker.

Solution:

Total Earnings = H X R + 50% [S – H] R

Total Earnings = 40 X ₹15 + 50% [48 – 40] ₹15

Total Earnings = ₹600 + ₹60 = ₹660

(b) Halsey – Weir Plan

Under this method, there is only one difference as compared to the Halsey Plan and that is instead of 50% bonus for the time saved, it is $33\frac{1}{3}$rd % of the time saved. Accordingly the formula for this method is modified as follows.

Total Earnings = H × R + $33\frac{1}{3}$ [S-H]R

H = Hours worked. R = Rate per hour, S = Standard time

(c) Rowan Plan

This premium bonus plan was introduced by Mr. James Rowan. It is similar to that of Halsey Plan in respect of time saved, but bonus hours are calculated as the proportion of the time taken which the time saved bears to the time allowed and they are paid for at time rate. The formula for computation of total earnings is as follows:-

Total Earnings = H × R + [S – H]/S × H × R

Where H = Hours worked, R = Rate per hour, S = Standard time,

(d) Barth Variable Sharing Plan:

In this system, the total earnings are calculated as follows:

Total Earnings = $R \times \sqrt{S \times H}$

H = Hours worked, R = Rate per hour, S = Standard time.

Group Bonus Plan:

The plans described above are all individual bonus plans. Many times output of individuals cannot be measured. Similarly, the output of individual is dependent on the performance of the group. In such cases, rather than implementing individual bonus systems, group bonus system is implemented. The total amount of bonus, which is determined according to productivity, can then be shared equally or in agreed proportion between the group members. The main objects of group bonus system are as follows:-

(a) Creation of team spirit.

(b) Elimination of excessive waste of materials and time.

(c) Recognition of group efforts.

(d) Improving productivity.

Different Group Bonus Schemes in use are as follows:-

(i) **Budgeted Expenses Bonus:** Under this system, bonus is based on the savings in actual total expenditure compared with the budgeted expenditure.

(ii) **Cost Efficiency Bonus:** In this method, standards are set for expenses like material, labour and overheads. The actual expenditure against these standards is measured and if there is a savings in actual expenditure as compared to the standards, a portion of such savings is distributed as bonus amongst the workers.

(iii) **Pristman System:** In this method, production standards are set in units or points and actual production is compared with the standards. If the actual production exceeds the standard, the workers are paid additional wages equal to the percentage of output over standard. Obviously no bonus is payable if actual production does not exceed the standard production. This method is mainly used in foundries.

(iv) **Towne Profit Sharing Plan:** In this method standards are set for costs [mainly labour cost] and the actual cost is compared with the standards. If there is a saving in the costs, the saving is shared by workers and supervisory staff in agreed proportion. The principle behind this method is that if there is a saving in the cost, not only the workers but the supervisory staff should also get the reward because the cost reduction is the joint efforts of both the types of staff. Hence both, workers and supervisors share it.

(v) **Waste Reduction Bonus:** This system of bonus is based on savings in the material cost. If there is a saving in the material cost, the workers share the same in the agreed proportion. This system is generally used in industries where cost of material is very high.

(vi) **Rucker Plan:** The amount of bonus is linked with 'value added' in this system. The 'value added' is obtained by deducting the cost of material and services from sales value. In other words, value added is the total of labour, overheads and profits. Under this plan, employees receive a constant proportion of value added. For example, if the target ratio of labour cost to value added is 70%, and the actual ratio comes to 68%, 2% of the actual value added is distributed as group bonus, so that the ratio of direct labour cost to value added is maintained at 70%. Normally instead of distributing the entire bonus, some proportion is distributed and the remaining is transferred to reserve fund.

(vii) **Scanlon Plan:** This method is similar to the Rucker plan as discussed above except that the ratio of labour cost to the sales is taken instead of direct labour cost to added value. Normally bonus is paid based on average of last three years ratios. A part of the bonus may be transferred to bonus equalization fund for future use when the workers do not get bonus under this scheme.

Bonus System for Indirect Workers:

Indirect workers do not take part in the production process directly but they play important role in the production process. It is difficult to chalk out a bonus system for indirect workers, as there is a difficulty in measuring their output. However it is advisable to plan a bonus system for indirect workers in order to motivate them for better productivity. Bonus to indirect workers is paid on the basis of output of the department, saving in time or expenditure against the budgeted, product quality, reduction of waste and scrap and reduction of labour turnover.

Indirect Monetary Incentives:

These methods aim at giving additional remuneration based on the prosperity of the concern. The following schemes fall in this category:-

(a) **Profit Sharing:** In this system, the profits of the organization are shared by workers in agreed proportion. The Payment of Bonus Act 1965 in India makes it mandatory to pay minimum bonus of 8.33% of salary and maximum bonus of 20% of salary to the workers.

(b) **Co-partnership:** In this system, the workers get an opportunity to participate in the ownership of the organization and to receive the part of share of profits. The employees are given assistance to purchase shares of the company. Thus the employees get dividend and bonus also. These schemes help to boost the morale of workers to a great extent.

Non-Monetary Incentives

These incentives are given in addition to monetary incentives for further boosting the moral of the employees. Though these benefits do not result in additional remuneration, they help to improve productivity by boosting the morale of the employees.

Some of the non-monetary incentives are as follows:-

(a) Free education and training.

(b) Medical benefits.

(c) Subsidized canteens.

(d) Superannuation benefits like pensions, gratuity, life assurance schemes etc.

(e) Sports and recreation facilities, housing facilities, long service awards.

(f) Job security, promotion schemes.

(g) Benevolent funds and welfare fund.

Treatment of some of the Employee Cost items in Costing:

(a) Supervisors salary / Foreman's Salary

The foreman is mainly concerned with the supervision of man and machines in the workshop and so his salary is 'works indirect expenses' and must be charged to Works Expenses Account and included in works overhead. It is apportioned on the basis of degree of supervision required on such machine or men.

If he devotes equal time for all the machines his salary should be equally charged off against all of them. In case he devoted more time to a particular machine or to a particular batch of workers, proportionately higher share of his salary should be borne by that particular machine or batch of workers.

(b) Bonus Under Payment of Bonus Act, 1965

The Payment of Bonus Act, 1965 provides that to the eligible employees a minimum bonus @ 8-1/3% of gross annual earning will have to be paid irrespective of profits made or losses incurred. If there is adequate profit a higher bonus is paid but upto the maximum limit of 20% of gross earnings.

Therefore it is clear that the minimum bonus is a definite charge against profit because even in case of loss this bonus is payable and according to the classification of labour-direct or indirect- should be included in direct labour cost or production overhead. The portion of bonus over and above the minimum is based on profit and should be charged off to Costing Profit and Loss Account and not taken into the cost at all. However, some accountants argued that this portion of bonus should also be taken into the cost in appropriate heads of Direct Labour or Production Overhead. But the former treatment should be taken as more sensible.

(c) Leave Travel Assistance

Leave Travel Assistance is paid to practically all the employees presently and therefore can be considered as a regular element of labour or staff cost as the case may be. This expenditure is of a fixed nature and can be easily predetermined. Depending whether the assistance is payable to direct labour, indirect labour or staff the expenditure should be treated as Direct Labour Cost, Production Overhead Cost or Administrative Selling Overhead Cost and should be appropriately charged.

(d) Night Shift Allowance

It is customary practice that the persons working in night shifts are paid some extra and such an allowance is known as night shift allowance. Such additional expenditure caused by general pressure of work in excess of normal capacity are charged to general production overhead because otherwise job performed during days will be cheaper than the jobs completed during night which by no means a fair proposition. If the additional expenditure is incurred extremely as a result of pressing demands from customers such expenditure should directly be charged to the job concerned. On the other hand if the night shifts are run for a fault of the particular department the night shift allowance should be charged as the departmental overhead applicable to the concerned department.

(e) Fringe Benefits

Fringe benefits are those expenses which are spent by an employer against the individual employees for their welfare. Normally such expenses do not form a part of their pay packet, e.g., ESI contribution made by an employer. Such expenses may be recovered separately as a percentage on labour cost or at an hourly rate. Alternatively, those may be treated as overheads and apportioned to cost centres on the basis of wages/salary cost.

(f) Work on Holidays and Weekly off Days

Usually work on such days is to be paid at a higher rate than the normal days' grace. The extra payment involved is treated in the same manner as in the cases of **overtime premium** as stated before (refer treatment of overtime). Normal wages are charged direct to the work orders/ job/ process handled during the period.

(g) Attendance Bonus

This is paid to workers based on satisfactory attendance over a stated period and is a fringe benefit. The cost is to be collected under a standing order number and charged as a departmental overhead as the expenses cannot be allocated to cost units directly.

In case the cost is disproportionate from months to months, a proportionate amount may be charged in each period to avoid variation in cost.

When the cost is of a regular nature it may be booked as direct wages and charged by an inflated rate over the Direct Labour Cost. But this is however, not a sound policy.

(h) Employer's contribution to Employees' Provident Fund

This is an obligatory charge under the Employees Provident Fund Act of 1952 and the scheme framed there under. This should be treated as part of direct wages of workers. The direct wages

paid should be inflated for the cost involved and the products of jobs charged at an inflated rate. An alternative treatment can be made as such that the contribution for the indirect workers is an item of overhead.

(i) Lost time due to a major overhauling of a machine as result of severe breakdowns

Manufacturing concerns having a number of machines in the factory usually follow a maintenance schedule whereby the entire factory is overhauled once a year. The related cost of such period consisting mainly of fixed cost is estimated and apportioned as a manufacturing/factory overhead over the annual production. But a sudden and severer breakdown may upset the production plan and call for major overhaul of machine. Such an occurrence is certainly abnormal and all costs related to the breakdown and overhaul should be collected through a separate standing order number and transferred to the costing Profit and Loss Account thereby into distorting the normal cost of production

Illustration 6

Calculate the total earnings and effective rate of earnings per hour of three operators under Rowan System and Halsey System from the following particulars.

The standard time fixed for producing 1 dozen articles is 50 hours. The rate of wages is ₹1/- per hour.

The actual time taken by three are as follows:-

A 45 hours

B 40 hours

C 30 hours.

Solution:

Computation of Total Earnings of workers under Halsey Plan

Earnings under Halsey Plan = Hours worked × Rate per hour + (50% × Time saved × Rate per hour)

Worker	Earnings	Effective Rate
A	E = (45 x 1) + 50/100 (50-45) x 1 = 47.5	Effective Rate = 47.5/45 = 1.06
B	E = (40 x 1) + 50/100 (50-40) x 1 = 45	Effective Rate = 45/40 = 1.125
C	E = (30 x 1) + 50/100 (50-30) x 1 = 40	Effective Rate = 40/30 = 1.33

Computation of Total Earnings of workers under Rowan Plan

Earnings under Rowan Plan =

$$\text{Hours worked} \times \text{Rate per hour} + \left(\frac{\text{Time saved}}{\text{Time allowed}} \times \text{Hours worked} \times \text{Rate per hour}\right)$$

	Earnings	Effective Rate
A	E = (45 x 1) + [50-45 / 50] 45 x 1 = 45 + 4.5 = 49.5	Effective Rate = 49.5/45 = 1.1
B	E = (40 x 1) + [50-40 / 50] 40 x 1 = 40 + 8 = 48	Effective Rate = 48/40 = 1.2
C	E = (30 x 1) + [50-30 / 50] 30 x 1 = 30 + 12 = 42	Effective Rate = 42/30 = 1.4

Illustration 7

A workman takes 9 hours to complete a job on daily wages and 6 hours on a scheme of payment by results. His hourly rate is 25 p. The Material cost of the product is ₹4 and factory overheads are recovered at 150% of the total direct wages. Calculate the factory cost of the product under following methods:-

(a) Time rate system (b) Halsey Plan (c) Rowan Plan.

Solution:

Computation of factory cost under three systems:

	Time Rate System ₹	Halsey Plan ₹	Rowan Plan ₹
Material	4.00	4.00	4.00
Labour **(working notes)**	2.25	1.88	2.00
Overheads (150% of total direct wages)	3.38	2.82	3.00
Factory Cost	**9.63**	**8.70**	**9.00**

Working Notes:

	Time Rate System ₹	Halsey Plan ₹	Rowan Plan ₹
Labour	9 x 0.25	6 x 0.25 + 1/2 (9-6) x 0.25	6 x 0.25 + (9-6 / 9) x 6 x 0.25
	2.25	**1.88**	**2.00**

Illustration 8

A worker under the Halsey method of remuneration has a day rate of ₹12 per week of 48 hours, plus a cost of living bonus of 10 p. per hour worked. He is given 8 hours task to perform, which he performs in 6 hours, he is allowed 30% of the time saved as premium bonus. What would be his earnings under Halsey Plan and Rowan Plan.

Solution:

Computation of earnings of worker under Halsey Plan:

Earnings under Halsey Plan = Hours worked × Rate per hour + (30% × Time Saved × Rate per hour)

= (6 x 0.25) + 30/100 (8-6) x 0.25 = 1.65

(+) Cost of Living Bonus (6 x 0.1) = 0.60

Earnings under Halsey Plan = ₹2.25

Computation of earnings of worker under Rowan Plan:

Earnings under Rowan Plan =

$$\text{Hours worked} \times \text{Rate per hour} + \left(\frac{\text{Time saved}}{\text{Time allowed}} \times \text{Hours worked} \times \text{Rate per hour}\right)$$

= (6 × 0.25) + (8-6 / 8) × 6 × 0.25 = 1.88

(+) Cost of Living Bonus (6 × 0.1) = 0.60

= ₹2.48

Earnings under Halsey Plan = ₹2.25

Earnings under Rowan Plan = ₹2.48

Illustration 9

In a factory guaranteed wages at the rate of ₹ 1.80 per hour are paid in a 48 hour week. By time and motion study it is estimated that to manufacture one unit of a particular product 20 minutes are taken, the time allowed is increased by 25% . During the week A produced 180 units of the product. Calculate his wages under the following methods:

(a) Time Rate.

(b) Piece Rate with a guaranteed weekly wage.

(c) Halsey premium Bonus.

(d) Rowan Premium Bonus.

Solution:

(a) Calculation of wages under Time Rate System

Earnings under time wages = TR

= 48 × 1.8 = ₹86.4

(b) Calculation of wages under Piece Rate with a Guaranteed Wage Rate

Normal Time for one unit = 20 minutes

(+) Relaxation allowance @ 25% = 5 minutes

Standard Time = 25 minutes

No. of pieces per hour = 60/25 pieces.

Piece Rate = Hourly Rate / No. of pieces per hour

= 1.8 ÷ (60/25)

= 0.75

Earnings under Piece Rate = 180 x 0.75 = ₹135

(c) Calculation of wages under Halsey Premium Bonus

Standard time for actual production = 180 x 25 / 60 = 75 hours

Earnings under Halsey Plan =

= (48 x 1.8) + 50/100 (75-48) x 1.8

= 86.4 + 24.3 = ₹110.70

(d) Calculation of wages under Rowan Premium Bonus

Standard time for actual production = 180 x 25 / 60 = 75 hours

Earnings under Rowan Plan = (48 x 1.8) + (75-48 / 75) x (48 x 1.8)

= 86.4 + 31.104 = ₹117.50

Illustration 10

Calculate the earnings of workers A and B under Straight Piece Rate system and Taylor's Differential Piece Rate system from the following particulars:-

Normal rate per hour - ₹1.80

Standard time per unit 20 seconds

Differentials to be applies are:

80% of the piece rate below the standard;

120% of the piece rate at or above standard.

A produced 1,300 units per day of 8 hours & B -1,500 units per day of 8 hours.

Solution:

Pieces per minute	= 60/20	= 3 units
Units per hour	= 60 x 3	= 180 units
Normal piece rate	= 1.8 /180	= ₹ 0.01

Standard production in actual time = 8 x 180 = 1440 units

Earnings under Straight Piece Rate:

Earnings of A = 1300 x 0.01 = ₹ 13.00

Earnings of B = 1500 x 0.01 = ₹ 15.00

Earnings under Taylor's Differential Piece Rate:

A's efficiency = 1300 / 1440 x 100 = 90.28%

= < 100%

A's Earnings = 1300 x 0.01 x 80%

= ₹ 10.42

B's efficiency = 1500 / 1440 x 100 = 104.17%

= > 100 %

B's Earnings = 1500 x 0.01 x 120%

= ₹ 18

Illustration 11

The following particulars apply to a particular job:

Standard production per hour	-	6 units
Normal rate per hour	-	₹ 1.20
Mohan produced	32 units	
Ram produces	42 units	
Prasad produces	50 units	

Calculate the wages of these workers under Merrick Differential Piece Rate System.

Solution:

Calculation of wages of workers under Merrick Differential Piece Rate System

Normal Piece rate	= 1.2 / 6	= 0.20	
Standard Production	= 6 x 8 (assumed hrs)	= 48 units	
Mohan's efficiency	= 32/48 x 100	= 66.67%	(< 83%)
Mohan's Earnings	= 32 x 0.2	= ₹ 6.4	
Ram's efficiency	= 42/48 x 100	= 87.5%	(> 83 but < 100%)
Ram's Earnings	= 42 x 0.2 x 110/100	= ₹ 9.24	
Prasad's efficiency	= 50/48 x 100	= 104.17	(> 100%)
Prasad's Earnings	= 50 x 0.20 x 120/100	= ₹ 12	

Illustration 12

In a manufacturing concern the daily wage rate is ₹2.50. The standard output in a 6 day week is 200 units representing 100% efficiency. The daily wage rate is paid without bonus to those workers who show up to 66 2/3% of the efficiency standard. Beyond this there is a bonus payable on a graded scale as below:-

82% efficiency - 5% bonus

90% Efficiency - 9% bonus

100% efficiency - 20% bonus

Further increase of 1% for every 1% further rise in efficiency. In a 6 day week A produced 180 units; B 164 units; C 200 units; D 208 units and E 130 units.

Calculate the earnings of these workers.

Solution:

A's efficiency = (180 / 200) x 100 = 90%

A's Earnings = (6 x 2.5) + 9% of (6 x 2.5) = ₹ 16.35

B's efficiency = (164 / 200) x 100 = 82%

B's Earnings = (6 x 2.5) + 5% of (6 x 2.5) = ₹ 15.75

C's efficiency = (200 / 200) x 100 = 100%

C's Earnings = (6 x 2.5) + 20% of (6 x 2.5) = ₹ 18.00

D's efficiency = (208 / 200) x 100 = 104%

D's Earnings = (6 x 2.5) + 24% of (6 x 2.5) = ₹ 18.60

E's efficiency = (130 / 200) ×100 = 65%

E's Earnings = 6 x 2.5 = ₹ 15.00

Illustration 13

Workmen of a particular grade working on 8 hour shift duty are guarantees a wage of ₹ 32. An incentive scheme is in operation according to which production bonus is earned directly proportional to performance but only after 100% performance is reached. Four workmen A,B,C and D produce 48, 60, 75 and 90 units respectively in 6 hours working on a job which has standard time of 6 minutes per unit as measured work content. Remaining 2 hours of the shift are spent in doing unmeasured work for which no incentive bonus can be paid. Find for each workman:

(a) The production performance level achieved;

(b) Total earnings for the day.

Solution:

Statement showing computation of performance achieved and total earnings of 4 workers:

	Particulars	A	B	C	D
I	Standard output (6 x 60 / 6)	60	60	60	60
II	Actual output	48	60	75	90
III	Performance level	80%	100%	125%	150%
IV	Wages for measured work (6 x 4)	24	24	24	24
V	Bonus [C = 24 x 25%] [D = 24 x 50%]	--	--	6	12
VI	Wages for unmeasured work (2 x 4)	8	8	8	8
VII	Total earnings (IV + V + VI)	32	32	38	44

Illustration 14

The following particulars for the first week of September, 2015 relate to X and Y two workers employed in a factory:

		X	Y
a)	Job Completed — units	3,600	4,200
b)	Out of above output rejected and unsalable	540	420
c)	Time allowed	12 Mts/dozen	3 Hrs./200 units
d)	Basic wage rate per hour	₹ 5	₹ 6
e)	Hours worked	45	50

The normal working hours per week are fixed at 42 hours. Bonus is paid @ 2/3 of the basic wage rate for gross time worked and gross output produced without deduction for rejected output. The rate of overtime for first 4 hours is paid at time plus 1/3 and for next 4 hours is paid at time plus 1/2.

From the above data calculate for each employed

a) Number of bonus hours and amount of bonus earned;

b) Total wages earned including basic wages overtime premium and bonus;

c) Direct wages cost per 100 saleable units.

Solution:

	Particulars	X	Y
1.	No. of units completed	3,600	4,200
2.	Rejected units	540	420
3.	Saleable units	3,060	3,780
4.	Standard time	60 hrs	63 hrs
5.	Actual time worked	45 hrs	50 hrs
6.	Bonus hours	15 hrs	13 hrs
7.	Amount of bonus	50 (15 x 5 x 2/3)	52 (13 x 6 x 2/3)
8.	Overtime wages	20 (3 x 5 x 4/3)	68 [(4 x 6 x 4/3) + (4 x 6x 3/2)]
9.	Basic wages	210 (42 x 5)	252 (42 x 6)
10.	Total wages (7 + 8 + 9)	280	372
11.	Direct wage cost of 100 saleable units.	9.15 (280 / 3060) x 100	9.84 (372 / 3780) x 100

Illustration 15

From the following particulars work out the earnings for the week of a worker under

(a) Straight Piece Rate

(b) Differential Piece Rate

(c) Halsey Premium System

(d) Rowan System

Number of working hours per week — 48

Wages per hour — ₹3.75

Normal time per piece	— 20 Min
Normal output per week	— 120 pieces
Actual output for the week	— 150 pieces
Differential piece rate	— 80% of the piece rate when output is below standard and 120% above standard.

Solution:

Computation of earnings for the week of a worker

(a) Piece rate = (48 x 3.75) / 120 = ₹ 1.5

Earnings under Straight Piece Rate = 150 x 1.5 = ₹ 225

(b) Efficiency = (150 / 120) x 100 = 125% (> 100%)

Earnings under Differential Piece Rate = 150 x 1.5 x 120/100

= ₹ 270

(c) Standard time for actual production = 48 x (150 / 120) = 60 hrs

Earnings under Halsey Plan = (48 x 3.75) + 50/100(60 – 48) x 3.75

= 180 + 22.5 = ₹ 202.5

(d) Earnings under Rowan Plan = (48 x 3.75) + [(60-48 / 60) x (3.75 x 48)]

= 180 + 36 = ₹ 216

Illustration 16

Ten men work as a group. When the weekly production of the group exceeds standard (200 pieces per hour) each man in the group is paid a bonus for the excess production in addition to his wages at hourly rates. The bonus is computed thus:

The percentage of production in excess of the standard amount is found and one-half of this percentage is considered as the men's share. Each man in the group is paid as bonus this percentage of a wage rate of ₹ 3.20 per hour. There is no relationship between the individual workman's hourly rate and the bonus rate. The following is the week's records.

	Hours Worked	Production
Monday	90	22,100
Tuesday	88	22,600
Wednesday	90	24,200
Thursday	84	20,100
Friday	88	20,400
Saturday	40	10,200
	480	1,19,600

(a) Compute the rate and amount of bonus for the week;

(b) Compute the total pay of Jones who worked 41 ½ hours and was paid ₹2 per hour basic and of Smith who worked 44 ½ hours and was paid ₹ 2.50 per hour basic.

Solution:

Standard production in actual time = 480 x 200 = 96,000

Excess of actual production over standard = 1,19,600 – 96,000 = 23,600.

% of excess over standard = (23,600 / 96,000) x 100 = 24.58%

% of bonus = 1/2 x 24.58 = 12.29%

Bonus rate per hour = 3.2 x 12.29% = 0.393

Total bonus for week = 480 x 0.393 = ₹ 188.64

Computation of Total Earnings of Jones & Smith:

Particulars		Jones		Smith
Basic wages	41.5 x 2	83.00	44.5 x 2.5	111.25
Bonus	41.5 x 0.393	16.31	44.5 x 0.393	17.49
Total Earnings		**99.31**		**128.74**

Illustration 17

A manufacturer introduces a new machinery into his factory with the result that production per worker is increased. The workers are paid by results and it is agreed for every 2% increases in average individual output, an increase of 1% on the rate of wages will be paid.

At the time the machinery is installed the selling price of the products falls by 8-1/3%. Show the net saving in production costs which would be required to offset the losses expected from the turnover and bonus paid to workers.

	Ist period	IInd period
No.of workers	175	125
Number of articles produced	16,800	14,000
Wages paid	33,600	
Total Sales	75,600	

Solution:

No. of units per worker in period I — = 16,800 / 175 = 96

No. of units per worker in period II — = 14,000 / 125 = 112

Increase in production per worker — = 16 units

% of increase in output = 16/96 x 100 — = 16 2/3 %

Wages in Period I = 33,600

Wages in Period II = 33,600 x (125 / 175) = 24,000

Increase in wages = 24,000 x 8.33% [16.67 x ½ = 8.33] = 2,000

Sales in Period I = 75,600

Sales in Period II = 75,600 x (14,000 / 16,800) = 63,000

Decrease in Sales = 63,000 x 8 1/3 % = 5,250

Total loss due to increase in wages & reduction in sales = 5,250 + 2,000

= 7,250

To offset the loss, the saving in other must be ₹ 7,250

Illustration 18

A work measurement study was carried out in a firm for 10 hours and the following information was generated.

Units produced	:	350
Idle time	:	15%
Performance rating	:	120%
Allowance time	:	10% of standard time.

What is the standard time for task?

Solution:

Calculation of standard time for task

Total time = 10 x 60	= 600 minutes
(-) Down time or Idle time @ 15%	= 90 minutes
Actual time	= 510 minutes
Normal Time = 510 x 120%	= 612 minutes
(+) Relaxation allowance (10% or 1/10 on standard time i.e. 1/9 on normal time)	= 68 minutes
Standard time for job	= 680 minutes

Standard time for each unit = 680/350 = 1.943 minutes

Illustration 19

The extracts from the payroll of M/s. Maheswari Bros. is as follows:-

Number of employees at the beginning of 2015	150
" " " " " " end of 2015	200
" " resigned	20
" " discharged	5
" replaced due to resignation and discharges	20

Calculate the Labour Turnover Rate for the factory by different methods.

Solution:

1) Separation Method = 25 ÷ (150 + 200 / 2) x 100
= 0.1429 x 100
= 14.29 %

2) Replacement Method = (20 / 175) x 100
= 11.43%

3) Flux Method = (25 + 20) ÷ 175 x 100
= 25.71%

Illustration 20

In a factory bonus to workman is paid according to Rowan Plan. Time allotted for a job is 40 hours and the normal rate of wages is ₹ 1.25 per hour. The factory overhead charges are 50 paise per hour for the hours taken.

The factory cost of a work order, executed by a worker is ₹ 161.875. The cost of material in each case is ₹100.

Calculate the hours of time taken by the workman to complete the work order.

Solution:

Let 'T' be the time taken by worker.

Earnings $= 1.25\ T + [(40\text{-}T) / 40] \times [1.25\ T]$

$= 1.25\ T + [(50T - 1.25\ T^2) / 40]$

$= [50T + 50\ T - 1.25T^2] / 40$

$= [100\ T - 1.25T^2] / 40$

Materials + Wages + Factory Overheads = Factory Cost

$\Rightarrow 100 + [100\ T - 1.25T^2] / 40 + 0.5\ T = 161.875$

$\Rightarrow 4000 + 100\ T - 1.25T^2 + 20T = 6475$

$\Rightarrow 1.25T^2 - 120\ T + 2475 = 0$

$\Rightarrow 5T^2 - 480\ T + 9900 = 0$

$\Rightarrow T^2 - 96T + 1980 = 0$

$$T = \frac{96 \pm \sqrt{9216 - 7920}}{2}$$

$$T = \frac{96 \pm 36}{2}$$

T = 66 (or) 30

T = 30 hours (because actual time should not be more than standard time).

Illustration 21

Two fitters, a labourer and a boy undertake a job on piece rate basis for ₹1,290. The time spent by each of them is 220 ordinary working hours. The rates of pay on time rate basis, are ₹1.50 per hour for each of the two fitters, ₹1 per hour for the labourer and ₹0.50 per hour for the boy.

The amount of piece-work premium and the share of each worker, when the piece -work premium is divided proportionately to the wages paid.

Compute the selling price of the above job on the basis of the following additional data:-

Cost of the direct material ₹2,010; works overhead at 20% of prime cost; selling overhead at 10% of works cost and profit at 25% on cost of sales.

Solution:

Statement showing computation of earnings of each person

₹

Particulars	F_1	F_2	Labourer	Boy	Total
Basic wages	330 (220x1.5)	330	220 (220x1)	110 (220x0.5)	990
Bonus	100	100	67	33	300
	430	430	287	143	1290

Computation of Selling Price of Job

Particulars	Amount (₹)
Materials	2,010
Labour	1,290
Prime Cost	3,300
(+) Works Overhead @ 20%	660
Works cost	3,960
(+) S & D overheads @ 10%	396
Cost of sales (or) Total Cost	4,356
(+) Profit @ 25%	1,089
Selling Price	5,445

Illustration 22

Two workmen, Vishnu and Shiva, produce the same product using the same material. Their normal wage rate is also the same. Vishnu is paid bonus according to the Rowan System, while Shiva is paid bonus according to Halsey System. The time allowed to make the product is 100 hours. Vishnu takes 60 hours while Shiva takes 80 hours to complete the product. The factory overhead rate is ₹10 per man-hour actually worked. The factory cost for the product for Vishnu is ₹7,280 and for Shiva it is ₹ 7,600.

You are required:-

(a) to find the normal rate of wages;

(b) to find the cost of materials;

(c) to prepare a statement comparing the factory cost of the products as made by the two works men.

Solution:

Let 'R' be the wage rate and 'M' be the material cost.

Earnings of Vishnu = 60 R + [(100-60) / 100] x [60R]

= 60R + 24R = 84R

Material + Wages + Factory Overheads = Factory Cost.

M + 84R + 600 = 7,280

$\Rightarrow$ M + 84 R = 6,680 $\rightarrow$ (1)

Earnings of Shiva = 80 R + 50% of (100-80) x R

= 80 R + 10 R

= 90 R

Material + Wages + Factory Overheads = Factory Cost.

M + 90R + 800 = 7,600

$\Rightarrow$ M + 90 R = 6,800 $\rightarrow$ (2)

Solving Equation (1) & (2), we get

M + 84 R = 6,680

M + 90 R = 6,800

- 6R = -120

R = 20

Substitute the value of 'R' in Equation (2), we get

M + 90 R = 6,800

$\Rightarrow$ M + 90 (20) = 6,800

$\Rightarrow$ M + 1800 = 6,800

$\Rightarrow$ M = 5,000

Wages of Vishnu = (60 x 20) + [(100-60) / 100] x [60 x 20]

= 1200 + 480 = ₹1680

Wages of Shiva = (80 x 20) + 50% (100 – 80) x 20

= 1600 + 200 = ₹1800

(a) Normal Rate of wages = ₹ 20

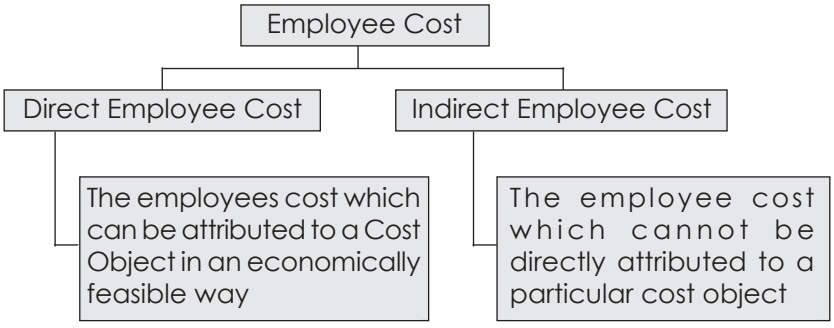
(b) Material Cost = ₹ 5,000

(c) Statement comparing the factory cost of the products as made by the two worksmen.

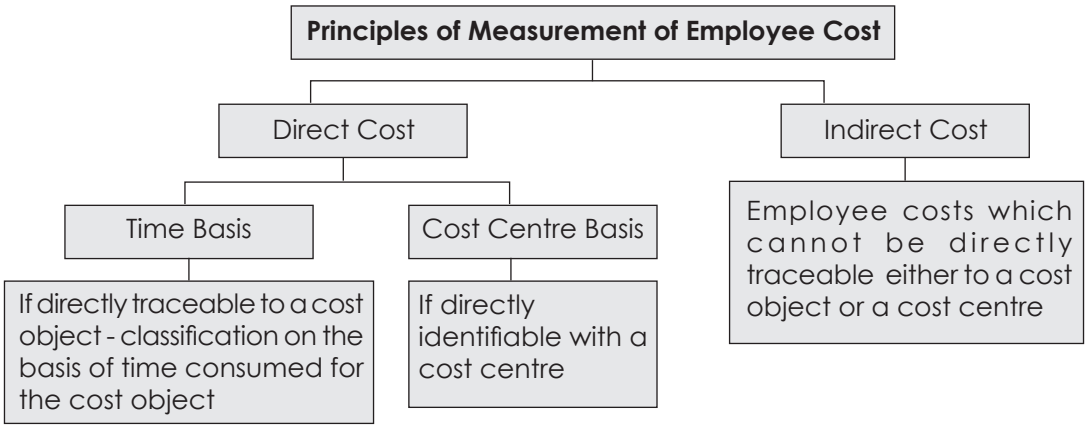
Particulars	**Vishnu**	**Shiva**
Material	5,000	5,000
Labour	1,680	1,800
Overheads	600	800
Factory Cost	7,280	7,600

COST ACCOUNTING STANDARD-7 (Limited Revision 2017): EMPLOYEE COST

Employee cost: The aggregate of all kinds of consideration paid, payable and provisions made for future payments for the services rendered by employees of an enterprise (including temporary, part time and contract employees). Consideration includes wages, salary, contractual payments and benefits, as applicable or any payment made on behalf of employee. This is also known as Labour Cost.



Principles of Measurement of Employee Cost: The principles to be followed for measurement of employee cost are:



Measurement of Employee Cost: Inclusions and Exclusions:

The following items are to be **'included'** for the purpose of measuring employee cost:

(i) Any payment made to an employee either in cash or kind

(ii) Gross payments including all allowances payable and includes all benefits

(iii) Bonus, ex-gratia, sharing of surplus, remuneration payable to Managerial personnel including Executive Directors and other officers

(iv) Any amount of amortization arising out of voluntary retirement, retrenchment, termination, etc

(v) Variance in employee payments/costs, due to normal reasons (if standard costing system is followed)

(vi) Any perquisites provided to an employee by the employer

The following items are to be **'excluded'** for the purpose of measuring employee cost:

(i) Remuneration paid to Non-Executive Director

(ii) Cost of idle time [= Hours spent as idle time x hourly rate]

(iii) Variance in employee payments/costs, due to abnormal reasons (if standard costing system is followed)

(iv) Any abnormal payment to an employee – which are material and quantifiable

(v) Penalties, damages paid to statutory authorities or third parties

(vi) Recoveries from employees towards benefits provided – this should be adjusted/reduced from the employee cost

(vii) Cost related to labour turnover – recruitment cost, training cost and etc

(viii) Unamortized amount related to discontinued operations.

Illustration 23

Measurement of Employee Cost

Basic pay ₹5,00,000; Lease rent paid for accommodation provided to an employee ₹2,00,000, amount recovered from employee ₹40,000, Employer's Contribution to P.F. ₹75,000, Employee's Contribution to P.F. ₹75,000; Reimbursement of Medical expenses ₹67,000, Hospitalisation expenses of employee's family member borne by the employer ₹19,000, Festival Bonus Rs.20,000, Festival Advance ₹30,000. Compute the Employee cost.

Solution:

Computation of Employee Cost

	Particulars	Amount (₹)
	Basic Pay	5,00,000
Add	Net cost to employer towards lease rent paid for accommodation provided to an employee [= lease rent paid less amount recovered from employee] = [2,00,000 (-) 40,000]	1,60,000
Add	Employer's Contribution to PF	75,000
Add	Reimbursement of Medical Expenses	67,000
Add	Hospitalisation expenses of employee's family member paid by the employer	19,000
Add	Festival Bonus	20,000
	Employee Cost	**8,41,000**

Note:

(i) Festival advance is a recoverable amount, hence not included in employee cost.

(ii) Employee's contribution to PF is not a cost to the employer, hence not considered.

Illustration 24

Measurement of Employee Cost (with special items)

Gross pay ₹10,30,000 (including cost of idle time hours paid to employee ₹25,000); Accommodation provided to employee free of cost [this accommodation is owned by employer, depreciation of accommodation ₹1,00,000, maintenance charges of the accommodation ₹90,000, municipal tax paid for this accommodation ₹3,000], Employer's Contribution to P.F. ₹1,00,000 (including a penalty of ₹2,000 for violation of PF rules), Employee's Contribution to P.F. ₹75,000. Compute the Employee cost.

Solution:

Computation of Employee Cost

	Particulars	Amount (₹)
	Gross Pay (net of cost of idle time) =[10,30,000 (-) 25,000]	10,05,000
Add	Cost of accommodation provided by employer = Depreciation (+) Municipal Tax paid (+) maintenance charges = 1,00,000 + 90,000 + 3,000 = 1,93,000	1,93,000
Add	Employer's Contribution to PF excluding penalty paid to PF authorities [= 1,00,000 (-) 2,000]	98,000
	Employee Cost	**12,96,000**

Note:

(i) Assumed that the entire accommodation is exclusively used by the employee. Hence, cost of accommodation provided includes all related expenses/costs, since these are identifiable/traceable to the cost centre.

(ii) Cost of idle time hours is assumed as abnomal. Since it is already included in the gross pay, hence excluded.

(iii) Penalty paid to PF authorities is not a normal cost. Since, it is included in the amount of contribution, it is excluded.

Illustration 25

Measurement of Employee Cost (with special items)

Trial Balance as on 31.3.2017 ***(relevant extracts only)***

Particulars	Amount (₹)	Particulars	Amount (₹)
Materials consumed	25,00,000		
Salaries	15,00,000	Special Subsidy received from Government towards Employee salary	2,75,000
Employee Training Cost	2,00,000	Recoverable amount from Employee out of perquisites extended	35,000
Perquisites to Employees	4,50,000		
Contribution to Gratuity Fund	4,00,000		
Lease rent for accommodation provided to employees	3,00,000		
Festival Bonus	50,000		
Unamortised amount of Employee cost related to a discontinued operation	90,000		

Solution:

Computation of Employee Cost

	Particulars	Amount (₹)
	Salaries	15,00,000
Add	Net Cost of Perquisites to Employees = Cost of Perquisites (-) amount recoverable from employee = 4,50,000 (-) 35,000	4,15,000
Add	Lease rent paid for accommodation provided to employee	3,00,000
Add	Festival Bonus	50,000
Add	Contribution to Gratuity Fund	4,00,000
Less	Special subsidy received from Government towards employee salary	(2,75,000)
	Employee Cost	**23,90,000**

Note:

(i) Recoverable amount from employee is excluded from the cost of perquisites.

(ii) Employee training cost is not an employee cost. It is to be treated as an Overhead, hence, not included.

(iii) Special subsidy received is to be excluded, as it reduces the cost of the employer.

(iv) Unamortized amount of employee cost related to a discontinued operation is not an includible item of cost.

Employee cost reporting and measurement of efficiency

Employee cost reporting:

1. ***Direct Employee costs shall be presented as a separate cost head in the cost statement:*** Direct employees are those who work on a product directly, either manually or by using machines. They are directly involved in the production of a finished product, that can be easily traced to the product Examples are assembly-line workers in an automobile factory or employee working on spindle / loom in textile industry. Direct Employee cost is to be presented as a separate item in the cost statement.

2. ***Indirect Employee costs shall be presented in cost statements as a part of overheads relating to respective functions e.g. manufacturing, administration, marketing etc:*** Indirect employee cost is not directly traceable to a cost object / product and forms part of overheads. The word 'overheads' is used for a type of cost that cannot be directly allocated to a cost object or product, but can be assigned to cost objects.

   Employees whose services are indirectly related to production include product designers, job supervisors, foreman, product inspectors, and the like. Employee cost of such employees is considered part of Production overheads. Salaries of employees working on administrative activities such as administration, personnel, accounts, and the like are classified as part of administrative overheads. Similarly, salaries of employees engaged in marketing / selling activities and distribution activities are part of Selling and Distribution Overheads.

3. ***The cost statement shall furnish the resources consumed on account of Employee cost, category wise such as wages salaries to permanent, temporary, part time and contract employees piece rate payments, overtime payments, Employee benefits (category wise) etc wherever such items form a material part of the total Employee cost:*** Direct employee cost is to be exhibited as a separate item in the cost statement as per CAS 7 *(Limited Revision 2017)*.

Measurement of efficiency:

For many businesses, including most small businesses, the most significant cost is labour. Salaries and wages comprise the major line-item expense for most retail and small-scale manufacturing companies, but labour also tends to be responsive to productivity improvements. To reduce labour costs, entrepreneurs should consider measuring employee efficiency and setting aggressive performance targets to get most of their Employee Costs.

Measuring Productivity

Productivity is simply the amount of units of a product or service that an employee handles in a defined time frame. An employee who makes mechanical device might make 20 mechanical devices per hour, or an employee at a coffee shop might service 15 customers per hour. Simple productivity is neither good nor bad, and in service industries, it might vary according to factors beyond the employee's control, like the number of customers who present for service. Productivity is the basic measure of employee work output.

Determining Unit of Service (UOS)

Productivity and efficiency require a defined unit of service. UOS analysis is usually job-specific, and is most relevant to employees who have jobs that are repetitive. For example, a spot welder might have "welds completed" or "parts completed" as his UOS, whereas a housekeeper in a hotel might have "rooms cleaned per shift" as her UOS. Some jobs, particularly professional jobs that have variable output, defy reasonable UOS measurements.

Measuring Efficiency

Efficiency is a ratio of an employee's actual time to perform each UOS against the theoretical time needed to complete it. For example, an employee who packages DVDs might put together 80

DVDs in one hour. If the best-practice target is 100 DVDs in an hour--measured by a time study--then the employee is 80 percent effective and has the capacity to produce 20 more units per hour. It is usually helpful to report separately the percentage of an employee's paid time that is actually spent performing direct work. For example, an employee who is paid for working 8.0 hours but because of meetings and lunch breaks only works 6.0 hours only spends 75 percent of her time being "productive" in terms of UOS analysis. Only the six hours spent working should be factored into efficiency scoring.

Benchmarks and Targets

Some industries have basic benchmarks already established. For example, telephone call centers have service levels that identify the ideal amount of time that common transactions should take, that are consistent across industries. However, most companies will have to establish for themselves how long basic tasks should take, and set performance targets accordingly. The task of baseline measuring should be done with a time study, which averages the amount of time that multiple transactions take or assesses the amount of time an average employee performs the task. It may not be ideal to require employees to be 100 percent efficient, particularly when the employees lack control over their own productivity--like in customer-service jobs when employees wait for customers to call or stop by. If an employee can never hit 100 percent, then morale may suffer.

Longitudinal Reporting

The real benefit to measuring employee efficiency is in longitudinal reporting. Calculating efficiency over a period of time can identify opportunities to reorganize staffing, or add or remove employees based on the company's volume of business, and an individual employee's long-term productivity can factor into merit increases and bonuses. Efficiency scoring can also help with predictive modeling. If it takes 90 seconds to produce a mechanical device, and employees are operating at 75 percent efficiency, then instead of producing 40 widgets per hour, only 30 will be produced.

SELF EXAMINATION QUESTIONS:

1. What is Labour Turnover and what are the costs associated with it?
2. What are the causes of Labour Turnover? Suggest remedial measures to reduce the Labour Turnover?
3. How do you measure Labour Turnover?
4. What are the various methods of Time Keeping and Time Booking? Also distinguish Time Keeping and Time Booking.
5. How do you treat idle time in Cost Accounts as per CAS – 7?
6. How do you treat overtime in Cost Accounts?
7. What are the various wage payment methods?
8. What are the essentials of good remuneration system?
9. What are the advantages and disadvantages of Piece Rate System?
10. How do you treat the following in Cost Accounts:
    (a) Supervisor's salary
    (b) Night shift allowance
    (c) Last time due to major overhauling
11. Write short notes on:
    (a) Time and Motion Study
    (b) Works study and Work Measurement.
    (c) Job Evaluation
    (d) Merit Rating
    (e) Straight Piece Rate vs. Differential Piece Rate

(f) Halsey Plan

(g) Rowan Plan

(h) Guide lines for ascertaining the Labour Cost as per CAS – 7

12. State whether the following statements are true or false?

(a) Time recording clocks can be successfully used for recording time of workers in large undertakings.

(b) Outworkers are those who are sent to sites or customer's premises for performing work.

(c) Idle time arises only when workers are paid on time basis.

(d) Personnel department is concerned with proper recruitment, placement and training of workers.

(e) Wages paid for abnormal idle time are added to wages for calculating prime cost.

(f) In India, if a worker works for more than 8 hours on any day or for more than 40 hours in a week, he is treated to be engaged in overtime.

(g) The two principal systems of wage payment are payment on the basis of time and payment on the basis of work done.

(h) The piece rate system of wage payment cannot be successfully applied where quantity of output can be measured.

(i) A good system of wage payment should not ensure equal pay for equal work.

[**Ans:** (True : a; b; c; d; g) (False : e; f; h; i)]

13. How to report the employee cost in the Cost Statement?

14. Discuss the means to measure Employee efficiency?

15. "High wages do not necessarily mean high Labour Cost". Comment.

16. Explain in detail "Work Study".

17. Write a short note on Job Evaluation and Merit rating.

PRACTICE PROBLEMS:

18. What will be the earnings of a worker at 60 paise per hour when he takes 100 hours to do a volume of work for which the standard time is 160 hours the plan of payment for bonus is on a sliding scale as under:

Within the first 10% saving in the Standard time, the Bonus is : 40% of the Time Saved.

Within the second 10% saving in the Standard Time, the bonus is : 50% of the Time Saved.

Within the third 10% saving in the Standard Time, the bonus is : 60% of the Time Saved.

Within the Fourth 10% saving in the Standard Time, the Bonus is : 70% of the Time Saved.

For the rest of the time saved : 75% of the Time Saved.

[Ans: Total earnings ₹ 79.44]

19. Using Taylor's differential piece rate system find out the earnings of X and Y from the following particulars:

Standard time per piece	- 20 minutes
Normal rate per hour	- 90 paise
In a 9 hour day : X produced	- 25 units
Y produced	- 30 units

[Ans: X : ₹ 6.23; Y : ₹ 15.75]

20. The following are particulars applicable to a work process.

Time rate - ₹5 per hour.

High task - 40 units per week.

Piece rate above high task - ₹6.50 per unit.

In a 40 hour week, the production of the workers:

A - 35 units B - 40 Units C - 41 units D - 52 units

Calculate the wages of the workers under Gantt Task Bonus.

Ans: A : ₹ 200; B : ₹ 240; C : ₹ 266.5; D : ₹ 338]

21. In a unit, 10 men work as a group. When the production of the group exceeds the Standard output of 200 pieces per hour, each man is paid an incentive for the excess production in addition to his wages at hourly rates. The incentive is at half the percentage, the excess production over the standard hours bears to the standard production. Each man is paid an incentive at the rate of this percentage of a wage rate of ₹2 per hour. There is no relation between the individual work man's hourly rate and the bonus rate.

In a week, the hours worked are 500 hours and total production is 1,20,000 units.

a) Compute the total amount of bonus for the week.

b) Calculate the total earnings of two workers A and B of the group:

A worked 44 hours and his basic rate per hour was ₹ 2.20

B worked 48 hours and his basic rate per hour was ₹ 1.90

[Ans: a) Total Bonus for the week is ₹ 100

b) Earnings of A : ₹ 105.6; B : ₹ 100.8]

22. In a factory bonus system, bonus hours are credited to the employee in the proportion of time taken which time saved based to time allowed. Jobs are carried forward from one week to another. No overtime is worked and payment is made in full for all units worked, and including those subsequently rejected.

From the following information you are required to Calculate for each employee

(a) The bonus hours and amount of bonus earned;

(b) The total wages cost; and

(c) The wages cost of each good unit produced.

	A (₹)	B (₹)	C (₹)
Basic wage rate/hour	0.25	0.40	0.30
Units produced	2,500	2,200	3,600
Time allowed/100 units	2 hr.36 min	3 hrs.	1 hrs.30 min.
Time taken	52 hrs.	75 hrs.	48 hrs.
Rejects	100 units	40 units	400 units.

[Ans: A : 13 hrs; B : Nil; C : 6 hrs

Amount of bonus A : ₹ 2.6; B : Nil; C : ₹ 1.6

Total wages cost A : ₹ 15.6; B : ₹ 30; C : ₹ 16

Cost of good units produced A : ₹ 0.0065; B : ₹ 0.0139; C : ₹ 0.005]

23. In a factory bonus to workman is paid according to using the Rowan plan. Time allotted for a job is 40 hours and the normal rate of wages is ₹ 1.25 per hour. The factory overhead charges are 50 paise per hour for the hours taken.

The factory cost of a work order executed by a worker is ₹ 155.468. The cost of material is ₹100.

Calculate the hours of time taken by the workman to complete the work order.

[Ans: Actual hrs 25**]**

Multiple Choice Questions

1. In which of the following incentive plan of payment, wages on time basis are not Guaranteed?
   A. Halsey plan
   B. Rowan plan
   C. Taylor's differential piece rate system
   D. Gantt's task and bonus system
2. Under the high wage plan, a worker is paid
   A. At a time rate higher than the usual rate
   B. According to his efficiency
   C. At a double rate for overtime
   D. Normal wages plus bonus
3. Cost of idle time arising due to non availability of raw material is
   A. Charged to costing profit and loss A/c
   B. Charged to factory overheads
   C. Recovered by inflating the wage rate
   D. Ignored
4. When overtime is required for meeting urgent orders, overtime premium should be
   A. Charged to costing profit and loss A/c
   B. Charged to overhead costs
   C. Charged to respective jobs
   D. Ignored
5. Wages sheet is prepared by
   A. Time –keeping department
   B. Personnel department
   C. Payroll department
   D. Engineering department
6. Time and motion study is conducted by the
   A. Time –keeping department
   B. Personnel department
   C. Payroll department
   D. Engineering department
7. Labour turnover is measured by
   A. Number of workers replaced average number of workers
   B. Number of workers left / number in the beginning plus number at the end
   C. Number of workers joining / number in the beginning of the period
   D. All of these
8. Idle time is
   A. Time spent by workers in factory
   B. Time spent by workers in office
   C. Time spent by workers off their work
   D. Time spent by workers on their job
9. Over time is
   A. Actual hours being more than normal time
   B. Actual hours being more than standard time
   C. Standard hours being more than actual hours
   D. Actual hours being less than standard time

10. Time keeping refers to
    A. Time spent by workers on their job
    B. Time spent by workers in factory
    C. Time spent by workers without work
    D. Time spent by workers on their job

[Ans: C,A,A,B,C,D,A,C,A,B]

State whether the following statements are True (or) False:

1. Direct employee cost shall be presented as a seperate cost head in the financial statement.
2. As per the Payment of Bonus Act, 1965 the maximum limit of bonus is 20% of gross earning.
3. Flux method is means for measurement of labour turnover.
4. Is overtime premium is directly assigned to cost object?
5. Idle time represents the wages paid for the time cost during which the workkers not work.

[Ans.: 1. False; 2. True; 3. True; 4. True; 5. True.]

Fill in the Blanks:

1. In a company there were 1200 employee on the rolls at the beginning of a year and 1180 at the end. During the year 120 persons left services and 96 replacements were made. The labour turnover to flux method is _____ %.
2. In _____ systems, two piece rates are set for each job.
3. In _____ Systems, basic of wages payment is the quantity of work.
4. The formula for computing wages under time rate is _____.
5. In Halsey plan, a worker gets bonus equal to _____ of the time saved.
6. Under Grantt Task and Bonus Plan, no bonus is payable to a worker, if his efficiency is less than _____.
7. Wages sheet is prepared by _____ department.
8. Cost of normal idea time is charged to _____.
9. Ideal time arises only when workers are paid on _____ basis.
10. Normal idle time costs shuld be change to _____ which that due to abnormal reasons should be change to _____.

[Ans: 9.08, Gaylor's differential piece rate, Piece rate, Hour worked × rate per hour, 50%, 100%, Pay Roll Department, Factory Overhead, Time, Production overhead + Costing P/L A/c**]**

Match the following:

1	Labour turnvoer	A	8.33% of Salary
2	Barth variable sharing plan	B	Work beyond normal working hours
3	Minimum bonus	C	Merit rating
4	Overtime Premium	D	Replacement method
5	Assessment of employee with respect to a job	E	Total Earnings = $R \times \sqrt{S \times H}$

[Ans.: 1. D; 2. E; 3. A; 4. B; 5. C.

2.3 DIRECT EXPENSES (CAS – 10)

Direct expense or chargeable expense is that which can be allocated to a cost centre or cost unit and indirect expense is that which needs to be apportioned. There may be items of expense direct in relation to some cost centre. Thus rent and rates, heating & lighting, depreciation & insurance are

often allocated or charged directly to the appropriate service cost centre, the totals of service department cost are however, apportioned to other cost centres before being absorbed by cost units as overheads. These costs are direct costs of the first cost centre, but indirect costs of other production cost centres, as well as being indirect cost of cost units.

Direct expenses as defined in CAS-10 (Limited Revision 2017), 'Expenses relating to manufacture of a product or rendering a service, which can be identified or linked with the cost object other than direct material cost and direct employee cost'.

The more a factory is departmentalized, the greater will be the proportion of expenses which can be classified as direct. Thus cost of medicines, first aid, and other expenses in connection with the medical service are direct expenses of medical service department, but if there is no medical service department, the expenses would have been distributed to all the cost centres at the very beginning.

The following expenses may be treated as direct expenses:-

(a) Cost of patents, royalty payment;

(b) Hire charges in respect of special machinery or plant;

(c) Cost of special patterns, cores, designs or tools;

(d) Experimental costs and expenditure in connection with models and pilot schemes;

(e) Architects, surveyors and other consultants fee;

(f) Travelling expenses to sites;

(g) Inward charges and freight charges on special material.

A direct expense in relation to a product forms part of the Prime Cost. Indirect expenses are treated as Overheads. In relation to products, direct material is a material that becomes a part of it and can be physically traced in some form in the finished products, where as the direct expenses are cost providing services or other kinds of special charges, but no trace of them can be obtained in the finished product like raw material. Both the direct material and direct expenses forms part of the Prime Cost.

General principles of measurement of Direct Expenses as per CAS-10:

(a) Identification of direct expenses shall be based on traceability in an economically feasible manner.

(b) Direct expenses incurred for bought out resources shall be determined at invoice price including all taxes and duties and any other expenditure directly attributable there to net of trade discounts, taxes and duties refundable or to be credited.

(c) Direct expenses paid/incurred in lump-sum or which are in the nature of one time payment shall be amortized on the basis of estimated output or benefit to be derived from such expenses.

(d) Finance cost incurred in connection with self generated or procured resources shall not form part of the direct expenses.

(e) Any subsidy or grant or incentive or any amount received or receivable with respect to any direct expenses shall be reduced for ascertainment of the cost of the cost object.

(f) Penalties / damages paid to statutory authorities or other third parties shall not be form part of the direct expenses.

(g) Any change in the cost accounting principles applied for measurement of the direct expenses should be made only if it is required by law or for compliance with the requirements of a Cost Accounting Standard or a change would result in a more appropriate preparation or presentation of Cost Statement of the organization.

(h) Credit / recoveries relating to direct expenses, material and quantifiable shall be deducted to arive at the net direct expenses.

(i) Any abnormal portion of direct expenses where is material and quantifiable shall not form part of the direct expenses.

The Cost Statement shall disclose the following items of Direct Expenses as per CAS-10 (Limited Revision 2017):

(a) The basis of distribution of direct expenses to cost objects / cost units.

(b) Quantity and rates of items of direct expenses as applicable.

(c) Where direct expenses are accounted at standard cost the price and usage variance.

(d) Direct expenses representing procurement of resources and expenses incurred in connection with resources generated.

(e) Direct expenses paid or payable to related parties.

(f) Direct expenses incurred in foreign currency.

(g) Any subsidy / incentive and any such payment received from direct expenses.

(h) Credits or recoveries relating to the direct expenses.

(i) Any abnormal portion of direct expenses.

(j) Penalties and damages excluded from the direct expenses.

(k) Disclosure shall be made only when material, significant and quantifiable. Disclosures shall be made in the body of the Cost Statement or as a foot note or as a separate schedule.

Cost Accounting Standard-10 (Limited Revision 2017) : Direct Expenses

Direct Expenses: ***Expenses relating to manufacture of a product or rendering a service, which can be identified or linked with the cost object other than direct material cost and direct employee cost.***

Examples of Direct Expenses are royalties charged on production, job charges, hire charges for use of specific equipment for a specific job, cost of special designs or drawings for a job, software services specifically required for a job, travelling Expenses for a specific job.

Measurement of Direct Expenses: Inclusions and Exclusions:

The following items are to be **'included'** for the purpose of measuring employee cost:

(i) Costs which are directly traceable/identifiable with the cost object

(ii) Expenses incurred for the use of bought in resources

(iii) Price variance if such expenses are accounted for at standard cost

The following items are to be **'excluded'** for the purpose of measuring employee cost:

(i) If not traceable/identifiable should be considered as overheads

(ii) Finance cost is not a direct expense

(iii) Imputed cost (example, if the owner of a company engages himself for facilitating the production or gets actively engaged in production or rendering of services, this would be an imputed cost)

(iv) Recoveries, credits, subsidy, grant, incentive or any other which reduces the cost

(v) Penalty, damages paid to statutory authorities

Illustration 1: Measurement of Direct Expenses

Royalty paid on sales ₹30,000; Royalty paid on units produced ₹20,000, hire charges of equipment used for production ₹2,000, Design charges ₹15,000, Software development charges related to production ₹22,000. Compute the Direct Expenses.

Solution:

Computation of Direct Expenses

	Particulars	Amount (₹)
	Royalty paid on Sales	30,000
Add	Royalty paid on units produced	20,000
Add	Hire charges of equipment used for production	2,000
Add	Design Charges	15,000
Add	Software development charges related to production	22,000
	Direct Expenses	**89,000**

Note:

(i) Expenses are related to either manufacturing of the product or rendering of service

(ii) These costs are directly identifiable and can be linked with the cost object and are not related to direct material cost or direct employee cost. Hence, these are considered as Direct Expenses.

Illustration 2: Measurement of Direct Expenses – allocation to cost object products (in a multi-product situation)

A manufacturing unit produces two products X and Y. The following information is furnished:

Particulars	Product X	Product Y
Units produced (Qty)	20,000	15,000
Units Sold (Qty)	15,000	12,000
Machine Hours utilised	10,000	5,000
Design charges	15,000	18,000
Software development charges	24,000	36,000

Royalty paid on sales ₹54,000 [@ ₹2 per unit sold, for both the products]; Royalty paid on units produced ₹35,000 [@ ₹1 per unit purchased, for both the products], Hire charges of equipment used in manufacturing process of Product X only ₹5,000, Compute the Direct Expenses.

Solution:

Computation of Direct Expenses

	Particulars	Product X	Product Y
	Royalty paid on Sales (15000*2) (12000*2)	30,000	24,000
Add	Royalty paid on units produced (20000*1) (15000*1)	20,000	15,000
Add	Hire charges of equipment used in manufacturing process of Product X only	5,000	—
Add	Design Charges	15,000	18,000
Add	Software development charges related to production	24,000	36,000
	Direct Expenses	**94,000**	**93,000**

Note:

(i) Royalty on production and royalty on sales are allocated on the basis of units produced and units sold respectively. These are directly identifiable and traceable to the number of units produced and units sold. Hence, this is not an apportionment.

(ii) No adjustments are made related to units held, i.e. closing stock.

SELF EXAMINATION QUESTIONS:

1. Write a short note on Direct Expenses.
2. What are the disclosure requirements as per CAS-10 (Limited Revision 2017)?
3. List down the principle of measurement of Direct Expenses.
4. Compute the value of Direct Expenses based on the following data Royalty paid on units produced ₹ 50,000, Software development charges relating to production ₹ 36,000, Design charges ₹ 17,500, Hire charges of equipment used for production ₹ 5,500. [Ans: ₹ 1,09,000]

Multiple Choice Questions:

1. Royalty paid on sales ₹ 89,000 and Software development charges related to product is ₹ 22,000. Calculate Direct Expenses.
   A.1,11,100 B. 1,11,000 C. 111,110 D. 1,10,000
2. Direct Expenses ———— includes imputed cost.
   A. Shall B. Shall not C. None of these
3. Direct Expenses does not meet the test of materiality can be ———— part of part of overhead.
   A. Treated B. Not treated C. All of the these D. None of these
4. Example of Direct Expenses.
   A. Rent B. Royalty charged on production C. Bonus to employee D. None of these
5. A manufacturing Industry produces product P, Royalty paid on sales is ₹ 23,500 and design charges paid for the product is 1,500. Compute the Direct Expenses.
   A. 25,000 B. 22,000 C. 26,500 D None of these [Ans: B ,B, A, B, A]

State whether the following statement is True (or) False:

1. If an expense can be identified with a specific cost unit, it is treated as direct expense.
2. Travelling expenses to site is a direct expense.
3. Identification of direct expenses shall be based on traceability in an economically feasible manner.
4. CAS 9 is for Direct Expenses as issued by the Cost Accounting Standards Board (CASB) of the Institute of Cost Accountants of India.
5. Finance Cost shall form part of Direct Expense.

[Ans: T , T, T, F, F]

Fill in the Blanks:

1. Direct Expenses relating to _____ or _____.
2. Penalties/ damages paid to statutory authorities' _____be form part of Direct Expenses.
3. A Direct Expenses related to a _____ form part of the Prime Cost.
4. Direct Expenses incurred for brought out resources shall be determined at _____.
5. Direct Expenses incurred lump-sum shall be _____.

[Ans: Manufacture of a product or rendering of service, Shall Not, Product, Invoice Price, Amortized.]

2.4 OVERHEADS (CAS - 3)

An overhead is the amount which is not identified with any product. The name overhead might have come due to the reason of over and above the normal heads of expenditure. It is the aggregate of indirect material, indirect labour and indirect expenditure. The generic term used to denote indirect material, indirect labour and indirect expenses. Thus overheads forms a class of cost that cannot be allocated or absorbed but can only be apportioned to cost units.

In earlier days, overheads were not given much importance, because the prime cost constitutes 50-80% of the total cost. However, with the modern trend towards the mechanisation, automation, and mass production, overhead costs have grown considerably in size and in many undertakings the proportion of overhead costs to the total costs of products is appreciably high. High overheads do not indicate inefficiency if the increase in overheads is due to the following likely causes:

(a) Improved methods of managerial control like Accountancy, Production Control, Work Study, Cost and Management Accountancy...etc. In the process of reducing costs of other elements, viz. direct material and direct labour, overhead costs are likely to increase.

(b) Large scale production or mass production.

(c) Use of costly machines and equipments increases the amounts of depreciation, maintenance expenditure and similar other items of overhead costs.

(d) Less human efforts are necessary with automatic machines. A major portion of the cost is allocated direct to machines, thus increasing the machine overhead costs.

(e) Increased efficiency and productivity of labour has the effect of pushing up the overhead to direct labour ratio.

According to CIMA, overhead costs are defined as, 'the total cost of indirect materials, indirect labour and indirect expenses'. Thus all indirect costs like indirect materials, indirect labour, and indirect expenses are called as 'overheads'. Examples of overhead expenses are rent, taxes, depreciation, maintenance, repairs, supervision, selling and distribution expenses, marketing expenses, factory lighting, printing stationery etc. **As per CAS-3, overheads are defined as follows 'Overheads comprise costs of indirect materials, indirect employees and indirect expenses which are not directly identifiable or allocable to a cost object in an economically feasible manner'**

Overhead Accounting

The ultimate aim of Overhead Accounting is to absorb them in the product units produced by the firm. Absorption of overhead means charging each unit of a product with an equitable share of overhead expenses. In other words, as overheads are all indirect costs, it becomes difficult to charge them to the product units. In view of this, it becomes necessary to charge them to the product units on some equitably basis which is called as 'Absorption' of overheads. The important steps involved in Overhead Accounting are as follows:-

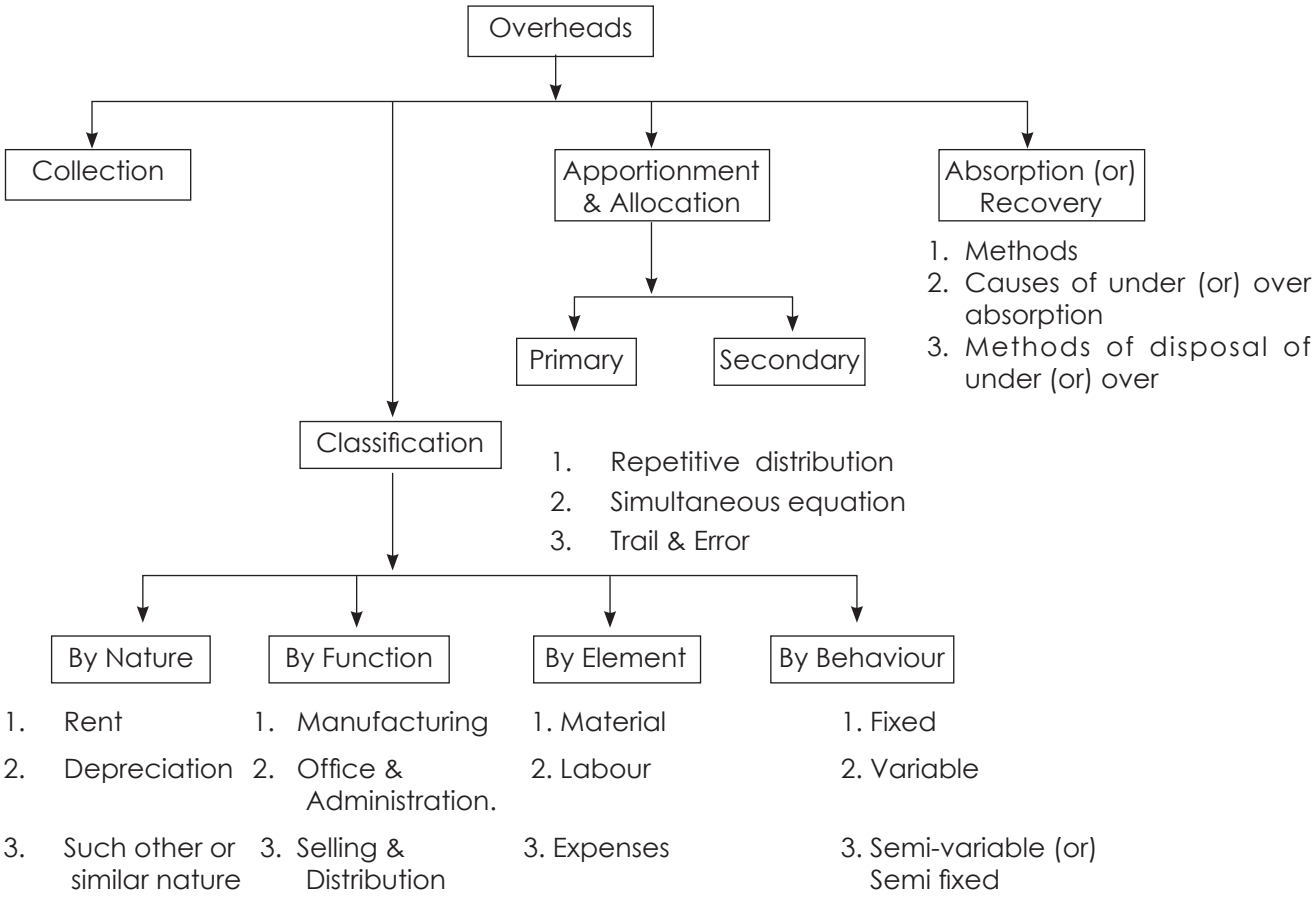
(a) Collection, Classification and Codification of Overheads.

(b) Allocation, Apportionment and Reapportionment of overheads.

(c) Absorption of Overheads.

As mentioned above, the ultimate of Overhead Accounting is 'Absorption' in the product units. This is extremely important as accurate absorption will help in arriving at accurate cost of production. Overheads are indirect costs and hence there are numerous difficulties in charging the overheads to the product units.

Study of Overheads can be better understood from the following diagram:



(a) Collection, Classification and Codification of Overheads: -

These concepts are discussed below:-

Collection of Overheads:

Document	Overhead Costs	Nature
Stores Issue note, purchase voucher	Indirect material	Consumables, lubricants etc.
Payroll sheets, time sheets	Indirect labour	Wages, salaries, contribution to statutory benefits, bonus, incentives, idele time
Cash books	Indirect material, Indirect labour & indirect expenses	All type of costs
Subsidiary records – journal	Indirect material, Indirect labour & indirect expenses	For provisions of costs that are not actually paid for
Other reports	Indirect expenses	Depreciation, scrap, wastage etc.

Overheads collection is the process of recording each item of cost in the records maintained for the purpose of ascertainment of cost of each cost centre or unit.

The following are the source documents for collection of overheads:-

(i) Stores Requisition

(ii) Wages Sheet

(iii) Cash Book

(iv) Purchase Orders and Invoices

(v) Journal Entries

(vi) Other Registers and Records

Source document and the nature of overheads are enumerated as below.

For the purpose of overhead accounting, collection of overheads is very important. It is necessary to identify the indirect expenses and the above mentioned source documents are used for this. Proper collection of overhead expenses will help to understand accurately the total overhead expenses.

Classification of Overheads

Classification is defined by CIMA as, 'the arrangement of items in logical groups having regard to their nature (subjective classification) or the purpose to be fulfilled (Objective classification). In other words, classification is the process of arranging items into groups according to their degree of similarity. Accurate classification of all items is actually a prerequisite to any form of cost analysis and control system. Classification is made according to the following basis:

Based on Elements: Indirect Materials, Indirect labour and Indirect expenses.

Based on Functions of the organisation: Manufacturing overheads, Administrative overheads, Selling and Distribution overheads, Research & Development overheads.

Based on the Behaviour: Fixed Overheads, Variable Overheads & Semi variable overheads.

Classification according to Elements

According to this classification overheads are divided according to their elements. The classification is done as per the following details:-

Indirect Materials

Materials which cannot be identified with the given product unit of cost centre is called as indirect materials. *As per CAS-3 indirect material cost is defined as 'Materials, the cost of which cannot be directly attributed to a particular cost object'*. For example, lubricants used in a machine is an indirect material, similarly thread used to stitch clothes is also indirect material. Small nuts and bolts are also examples of indirect materials.

Indirect Labour

As per CAS-3, indirect employee cost is the employee cost, which cannot be directly attributed to a particular cost object. Wages and salaries paid to indirect workers, i.e. workers who are not directly engaged on the production are examples of indirect wages.

Indirect Expenses

As per CAS-3, Indirect Expenses are expenses, which cannot be directly attributed to a particular cost object. Expenses such as rent and taxes, printing and stationery, power, insurance, electricity, marketing and selling expenses etc. are the examples of indirect expenses.

Functional Classification

Overheads can also be classified according to their functions.

This classification is done as given below:-

Manufacturing Overheads

As per CAS-3, Indirect Cost involved in the production process or in rendering service. Manufacturing overheads has different names such as Production Overheads, Works Overheads, Factory Overheads. Indirect expenses incurred for manufacturing are called as Manufacturing Overheads. For example, factory power, works manager's salary, factory insurance, depreciation of factory machinery and other fixed assets, indirect materials used in production etc. It should be noted that such expenditure is incurred for manufacturing but cannot be identified with the product units.

Manufacturing is a separate function like administration, selling and distribution. The term manufacturing stands for activities, which begin with receipt of order and end with completion of finished product. Manufacturing Overhead represents all manufacturing costs other than direct materials and direct labour. These costs cannot be identified specifically with or traced to cost object in an economically feasible way. In other words, manufacturing overhead are indirect manufacturing costs. The term overhead is peculiar and therefore, there is a growing tendency to prefer the term indirect manufacturing cost to overhead. Following synonyms have been used for Manufacturing Overhead:-

(i) Factory overhead;

(ii) Manufacturing overhead;

(iii) Factory on cost;

(iv) Works on cost;

(v) Factory burden and;

(vi) Manufacturing expenses.

Given below are a few examples of different items included in different groups of manufacturing overhead:

Indirect Material Cost: Glue, thread, nails, rivets, lubricants, cotton waste, etc.

Indirect Labour Cost: Salaries and wages of foremen and supervisors, inspectors, maintenance, labour, general labour; idle time etc.

Indirect Services Costs: Factory Rent, factory insurance, depreciation, repair and maintenance of plant and machinery, first aid, rewards for suggestions for welfare, repair and maintenance of transport system and apportioned administrative expenses etc.

Manufacturing Overhead further explains in apportionment, allocation and absorption.

Administrative Overheads

Indirect expenses incurred for running the administration are known as Administrative Overheads. *As per CAS-3, Administrative Overheads are defined as Cost of all activities relating to general management and administration of an organisation*.

As per the functional classification, Administration Overheads comprise of those indirect costs which are related to the general administrative function in the company. Such functions are related to policy formulation, directing the organisation and controlling the operations of the company. Administration overheads are incurred for the benefit of organisation as a whole. Controlling them is difficult for they do not vary with most of the variables viz. production or sales. Examples of such overheads are, office salaries, printing and stationery, office telephone, office rent, electricity used in the office, salaries of administrative staff etc. The size as well as control over these overheads depends largely on decisions of management. Organisations growing very fast face the problem of controlling Administrative Overheads. Multi-location set up leads to duplication of many administrative costs.

Collection and Absorption of Administration Overheads

The collection of overheads is done firstly by nature of the expenses through the chart of accounts. Administrative departments in an organisation could be Corporate Office, Finance and Accounts,

Company Secretary, Human resources, Legal, General Administration. The overheads that are common to all these departments are apportioned on some suitable basis e.g. in the following manner:

(a) For Office rent, rates & taxes - Floor space as the basis,

(b) For Depreciation on office building - Floor space as the basis

(c) For Legal fees - No of cases handled as the basis

(d) For Salaries of common staff - Ratio of salaries of departments as the basis

(e) For Typist pool - No of documents typed as the basis

Absorption of the Administrative Overheads into cost units is very difficult. Many times it is advised that these overheads may not be absorbed into product units because of the difficulty and non-relevance of them with production activity. Normally, the Administrative Overheads are totalled together and then using a suitable basis, a rate of recovery is arrived at to absorb the same. It could be mostly a percentage of Works cost or factory cost. Based on the principle of '*charging what the traffic can bear*', the absorption could be on the basis of a percentage of gross profit. Whatever method selected, it will be arbitrary and could lead to erroneous conclusions. A Cost Accountant has to use all the experience and history of the organisation before he selects a particular method to adopt.

Treatment of Administration Overheads

There are three different ways of treating the administration overheads as follows:-

1) Apportion between Production and Selling & Distribution functions:

This treatment is based on the logic that the administrative functions are for the entire company and these functions facilitate both production as well as selling. In other words, the absorption of Administration Overheads would happen through Production and Selling Overheads. This means these overheads lose their identity. The problem is of course, selection of basis to divide these overheads over the two principal functions of production and selling.

2) Transfer to P & L Account

This method agrees that administrative costs are all time based costs and as such bear no relation what is produced or what is sold. These are mainly of fixed nature. Hence there is no point in dividing them further to be included in the cost of production or cost of selling. They should be simply charged to the P & L Account. However, this may lead to undervaluation of stocks.

3) Treating as a separate addition to cost of production & sales

In this method, administration is treated as a separate function and is added as a separate line in the cost computation sheet for a job or an order. Here again, the basis for inclusion as a part of cost of a job is a difficult choice. Generally, a percentage of factory cost is taken as a basis. A care needs to be taken to ensure that the Administration Overheads are charged equitably to Cost of Sales, FG stock and WIP as well.

Controlling Administration Overheads

Given the nature of these expenses, they cannot be controlled at the lower level of management. They can be better controlled by top management as they pertain to formulating policy and directing the organisation. The first step in the control mechanism is proper classification of expenses & departmentalisation. The actual expenses are collected for each department and then compared with a bench mark. Deviation are analysed and causes for increase are mitigated by fixing responsibility on the departmental head.

The control benchmarking can be done with respect to:

(i) Figures of the previous year. Expenses could be compared with the figures of previous year and increase or decrease are analysed. However, comparison with previous year may not help as the condition may have totally changed from one year to the other.

(ii) Use of budgets. Budgets are estimates for the current year, and they take into account the changed conditions. They also built in the year's complete plan which would factor all changes in the cost structure. It is advisable to compare budgeted overheads with actual for control purpose.

(iii) Use of standards. Although very scientific, this method is difficult to operate. Administrative activities (being very subjective) cannot be standardised. On a certain level it can be applied e.g. the time taken to process a voucher by accountant can be standardised, or time taken for processing a payment could be standardised.

Selling and Distribution Overheads

As per CAS-3, Selling Overheads, also known as Selling Costs, are the expenses related to sale of products and include all Indirect Expenses in sales management for the organization. Overheads incurred for getting orders from consumers are called as Selling Overheads. On the other hand, overheads incurred for execution of order are called as Distribution Overheads. As per CAS-3, *Distribution Overheads, also known as Distribution Cost, are the cost incurred in handling a product from the time it is ready for dispatch until it reaches the ultimate consumer*. Examples of Selling Overheads are sales promotion expenses, marketing expenses, salesmen's salaries and commission, advertising expenses etc. Examples of Distribution Overheads are warehouse charges, transportation of outgoing goods, packing, commission of middlemen etc.

The magnitude of S & D Overheads in the total cost would depend on many factors such as nature of the product, type of customers, spread of market, statutory restrictions etc. A consumer product needs heavy expense on advertising. A sale to institutions rather than individual customers needs a different selling effort. Distribution Costs will increase if the spread of the market is large. Some activities cannot be advertised at all such as a Doctor, a Cost Accountant. The total magnitude of S & D Costs and the proportion of selling and distribution efforts will decide the treatment thereof and control mechanisms to be used. For some of selling expenses there may not be a direct relationship with the product. If a company incurs expense on advertising, it may be difficult to relate to a specific product unless it's a product advertisement. But further, there may be a substantial time lag between the expense and the benefit arising out of that. In case of Distribution Costs many of them may be possibly linked to the product.

Collection and Absorption of S&D Overheads

While classifying the S & D Costs are properly bifurcated and coded accordingly. This could be done by having separate account codes for Selling Overheads such as: advertising, sale commission, travelling expense, communication, exhibition, market survey, free samples, credit & collection costs, bad debts, and Distribution expenses such as: transportation vehicle related expenses, warehousing and storage at different places, depreciation. Depending upon the size of the organization, there may be proper departmentalization of S&D activities. The departments could be:

- Sales head office
- Sales regional offices
- Depots
- Direct selling department
- Dealers management
- Credit and collection (commercial)

The costs are collected through various source documents under the above heads and for the above departments. For absorption, the basis to be used will have practical difficulties, as one will have to look for a relationship between the expenses and the cost unit. Some expenses like sales commission, shipping costs, and direct selling expenses can be absorbed directly. The other expenses can be absorbed on the basis of either sales value, cost of goods sold, gross profit or number of units sold. Out of these the sales value method is the most commonly used.

Control over S & D Expense

The S & D Expenses are related to sales and distribution activity which is externally focused. The extent of these expenses depend mainly on external factors like consumer profile, changing habits, technology improvements etc. Controlling these expenses does not mean capping them. It aims at increasing the effectiveness of these expenses e.g. getting maximum sales per rupee of S & D Expenses. For control purpose, a great care should be taken to ensure correct classification and collection of S & D Overheads. The collected expenses must be analysed to assess the effect of them on sales. Such analysis could be done as follows:

(a) Analysis of sales and S & D Expenses by geographical locations – This could be regions, zones, domestic and international etc.

(b) Analysis by type of customers - This could be done as institutional, government, retail etc.

(c) Analysis by products or services – This may be done as range of products, the application of products, brands etc.

(d) Analysis by salesmen.

(e) Analysis by channel of distribution – This analysis pertains to wholesalers, retailers, commission agents etc.

The analysis of sales, profits and S & D expenses on the basis of above factors will give a good insight into the performance as well as control over expenses. All these three parameters may be compared with

- Previous year;
- Budget for the current year or
- Standards for the current year

Research and Development Overheads

Research Cost is defined as the cost of searching for new or improved products, new applications of material, or new or improved methods, process, systems or services. In the modern days, firms spend heavily on Research and Development. Expenses incurred on research and development is known as Research and Development Overheads. Research may be of the following types:

(i) Pure or basic research to gain general know-how regarding the production or market, not directed towards any particular product.

(ii) Applied research which applies the basic knowledge in practice. i.e improvement of existing products, new process, exploring of new products, improved measures of safety, etc.

Development cost is the cost of the process which begins with the implementation of the decision to use scientific or technical knowledge to produce a new or improved product or to employ a new or improved method, process, system, etc. and ends with the commencement of formal production of that product by that method. Development starts where the research ends. Development cost is the expenditure incurred for putting the results of research on a practical commercial basis.

Special features of Research & Development Costs

The features are as follows:-

(a) Expenditure is incurred ahead of the actual production and may not be charged to current production.

(b) The amount of expenditure may often substantial.

(c) The expenditure may at times be entirely in fructuous, yielding no tangible results.

(d) Benefit of the expenditure may be realized over a number of years.

(e) Difficulty in fixation of standards for control.

Collection of R&D Overheads

Accumulation of Research and Development Overheads is essential for the following reasons:-

(a) For review cost to date.

(b) For planning the activities subsequent to research.

(c) For evaluation of performance with relation to past performance or for inter-firm comparison.

The collection of R&D Overheads is made through the following documents. Material requisitions, labour time cards, invoices, vouchers (royalty, patent, license. etc). Research & Development expenditure may be identified by its nature i.e basic or applied research or development by the elements of cost, by business sector, by project. Each Research & Development project is allotted a project work order number. Separate series of work orders or codes should be used to distinguish from regular work orders.

R & D overheads can be accumulated as follows:-

(a) All expenditure under the direct elements (direct material, labour and expenses)must be charged to the work orders.

(b) Expenses like supervisor salary, material handling charges, maintenance of equipments can be directly allocated to particular research work order.

(c) Items of general overheads like depreciation of building, depreciation of maintenance equipment, share of purchase department expenses may be suitably apportioned to the research work order.

Accounting of R&D Overheads

Accounting of Research & Development Cost arise due to the following causes:-

(a) The expenditure is in the nature of pre-production costs and there is a considerable time lag between the incidence and expenditure and realization of benefit.

(b) There is no immediate production, or the production is so small that it becomes difficult to charge such costs to products.

It is because of these difficulties that the accounting of Research and Development Costs has been a subject of some controversy. Three methods are available for charging Research and Development Costs as:

(a) Charging off to the current year Profit & Loss Account.

(b) Capitalization so that cost may be amortized on a long term basis.

(c) Deferment and charge-off to costs of the next two or three years-a short/medium term amortization.

Research and Development may be regarded as a function of production and the Research & Development Costs may be charged to costs to be recovered through the general overhead rates. There are many arguments for and against charging the Research & Development Costs in current revenue. The arguments in support of this method are as follows:-

(a) All research & development expenses may not result in new processes or saleable products.

(b) Some of the research & development projects may result in failures.

(c) These expenses may be incurred simply to maintain the present competitive position of the concern.

(d) It is difficult to assess the period over which the know-how or knowledge acquired may be spread over.

(e) It may be more advantageous to recover a substantial portion of the cost immediately, as the life of the new products are uncertain.

(f) In certain cases, the effect of these research costs on future revenues may be doubtful.

The classification used for cost collection is mostly combination of elemental and functional. The behavioural classification cannot be used for booking of costs; it is used only for analysis and decision making.

Elements	**Material**	**Labour**	**Expense**
Factory or production or manufacturing or works overheads	Nuts & bolts, consumables, lubricants, welding electrodes, cleaning materials, nails, threads, ropes etc.	Salaries & wages to foremen, supervisors, inspectors, maintenance labour, idle time	Factory lighting & heating, factory rent, power & electricity, factory insurance, depreciation on machinery, repairs
Administrative Overheads	Printing & stationery, office supplies	Salary of office staff, managers, directors, and other administrative departments as IT, audit, credit, taxation	General office rent, insurance, telephones, fax, travel, legal fees, depreciation on office assets
Selling Overheads	Price lists, catalogues, mailings, advertising material such as leaflets, danglers, samples, free gifts, exhibition material	Salaries of sales staff & managers, commission on sales, bonus on schemes	Sales office expenses, travelling, subscription to sales magazines, bad debts, rent & insurance of showrooms, cash discount, brokerage, market research
Distribution overheads	Secondary packing, material items used in delivery vans	Salaries of delivery staff such as drivers, dispatch clerk, logistic manager	Carriage outwards, forwarding expenses, rent & insurance of warehouses & depots, insurance, running expenses & depreciation of delivery vans

Classification based on behaviour

Fixed Overheads

The amount of overhead tends to remain fixed for all volumes of production within a certain range. Examples of Fixed Overheads are Audit fee, Interest on capital, Depreciation of plant & machinery, Insurance, Rent of buildings, etc. A fixed overhead represents constant expenditure incurred during a period without regarding to the volume of production during that period. Even when production completely ceases in a particular period, this constant amount of expenditure will continue to be incurred partially, if not wholly. Therefore the Fixed Overheads are also known as Period Costs. Sometimes these costs are also termed as Shutdown or Stand-by Costs.

Features of Fixed Costs

Fixed Costs are stated to be by and large uncontrollable, in the sense they are not influenced by the action of a specified member of an undertaking. For example, the supervisor has practically no control over the fixed costs like depreciation of plant & machinery. The production supervisor can only see that the maximum possible utilization of the assets is made.

The fixed overhead amount is constant per period; the cost per unit of production varies with the volume. This variation is inverse since with increase in production, cost per unit decreases as the same amount of fixed overheads is spread over larger units of production.

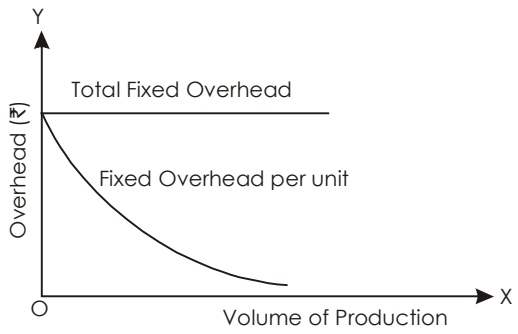
Factors affecting the Fixed Overheads

When a plant or a department is completely idle and there is no production, several items of Fixed Overheads disappear. Fixed Overheads are thus, of two types, viz. a lower standing fixed cost when production is nil and a higher running fixed cost when the plant is running. For instance, maintenance expenditure incurred at plant shutdown has to be increased to a higher level when production starts.

Any long term change in the productive capacity of an undertaking also affects the basic characteristic of fixed overhead. Fixed costs are constant for short term periods only, within a limited range of capacity.

Another factor that affects the fixed nature of fixed overhead is the change in basic price level.

Graphical representation of Fixed Costs is depicted as below:



Fixed Costs may be broadly classified into three basic types:-

(i) Fixed costs that have no casual relationship with the volume of output and are incurred mainly as results of policy decisions of the management. Research, development, design, employee training, advertisement and marketing expenses are examples of this expenditure. Accountants term such costs as discretionary fixed costs (also known as programmed costs or managed costs).

(ii) Fixed costs that do not change significantly in the short term such as depreciation, rent, etc.

(iii) Fixed costs that are fixed for short period for a particular capacity, but change considerably when there is a long-term change in the volume or capacity.

Variable Overheads

Variable Costs are those which vary in total direct proportion to the volume of output. These costs per unit remain relatively constant with changes in production. Thus Variable Costs fluctuate in total amount but tend to remain constant per unit as production activity changes. Examples are indirect material, indirect labour, lubricants, cost of utilities, etc.

The variable overhead costs seldom reveal the characteristics of perfect variability. i.e an expenditure which varies directly with variation in the volume of output. They simply tend to vary rather than vary

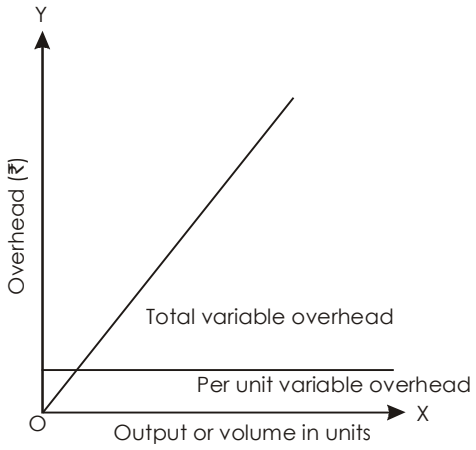
directly in direct proportion of output. We come across three types of variable overhead expenses in actual practice as explained below:-

(i) 100% variable expenses. For all production the variable expenditure remains constant.

(ii) The expense per unit of production is low at lower ranges of output but gradually increases as production goes up.

(iii) The expenses per unit of production are more at lower ranges of output but gradually decrease with the decrease with the increase in production.

Nature of variable expenses is shown as below:-



The relationship of fixed and variable overheads with the volume of output is exhibited in the following table. The range of output is considered as 5000-10000 units. Variable overheads are taken at ₹2 per unit and fixed overheads are assumed to be at the level of ₹25000. Can you check for yourself how the graph will look like for the following figures?

Output units	Fixed Overheads	Variable Overheads	Total Overheads	Overheads per unit		
				Fixed	Variable	Total
5000	25000	10000	35000	5.00	2.00	7.00
6000	25000	12000	37000	4.17	2.00	6.17
7500	25000	15000	40000	3.33	2.00	5.33
8000	25000	16000	41000	3.13	2.00	5.13
9000	25000	18000	43000	2.78	2.00	4.78
10000	25000	20000	45000	2.50	2.00	4.50

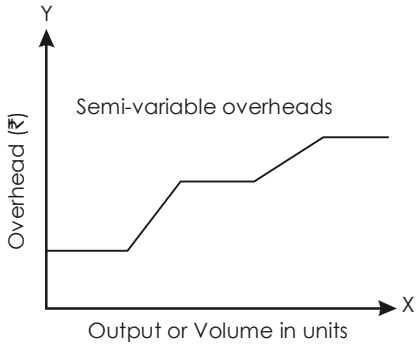
Semi-Variable Overheads:

These are a sort of mixed or hybrid costs, partly fixed and partly variable costs. For example Telephone expenses, include a fixed portion of annual charge plus variable charge according to the calls. Thus total telephone expenses are semi-variable.

Semi-variable overheads are of two types:-

(i) The expenses which change with the change in volume of output, but the variation cost is less than proportionate to change in output. Examples are power & fuel, lighting, repairs and maintenance of buildings, etc.

(ii) The costs tend to remain constant within certain range of output, then jump up and remain constant for another range and so on.



Semi variable cost need to be classifed into fixed and variable due to the following reasons:

(a) **Effective Cost Control:** Fixed costs are in the nature of policy costs or discretionary costs and as such can be controlled by the management. However variable costs can be controlled at lower levels. Separation of two elements facilitate the fixation of responsibility, preparation of overhead budget and exercise effective control.

(b) **Decision Making:** The classification is very useful in management decisions relating to utilization of capacity. If cost information is to be of use in such problems, it is essential that fixed and variable costs which behave differently with changes in volume should be segregated.

(c) **Preparation of Break-even Charts:** Separation of fixed and variable cost is essential for the study of cost volume profit relationship and for the preparation of breakeven charts and profit charts.

(d) **Marginal Costing:** The basic requirement of the technique of Marginal Costing is the separation of fixed and variable costs. While the latter are taken into consideration for the determination of Marginal Cost and contribution, the fixed costs are treated separately.

(e) **Method of Absorption Costing:** Separate method may be adopted for determination of rates for fixed and variable costs for absorption in production. Further a separate fixed overhead rate also serves as a measure of utilization of the facilities of the undertaking; any under recovery or under absorption denotes the idle or surplus capacity or production efficiency.

(f) **Flexible Budget:** In a Flexible Budget, the budgeted amounts vary with the levels of activity & fixed cost remains constant. It is the variable cost that varies. Breakup of overhead cost into fixed and variable is therefore necessary for establishment of budget and for the purpose of variance analysis.

Methods of classification of semi variable cost in fixed and variable

(a) **Graphical Method** – The costs at number of levels are plotted on a graph, x-axis represents the volume and y-axis represents the amount of expenditure. A straight line known as regression line or line of best fit is drawn between the points, plotted in such a manner that there are equal number of points on both the sides of a line and as far as practicable, pairs of points on either side are in equal distance from the line. Points falling far beyond the line are erratic and are not considered. If the regression line is drawn carefully so that most of the plotted points are on the line or not far from it, the scatter chart provides a fairly accurate method for the separation of fixed and variable.

(b) **Simultaneous Equations** – This uses the straight line equation of $y = m x + c$ where y represents total cost, m is variable cost per unit, x is the level of output and c is fixed costs. The total costs at two different volumes are put into these equations which are solved for the values of m and c.

(d) **High and Low Method** – The highest and lowest levels of output and costs are taken and the differential is found. This difference arises only due to variable costs. The remaining portion will be

fixed costs. Under this method the variable cost per unit will be computed first and then the fixed cost will be derived. Variable cost per unit is computed by dividing the difference in cost at highest level and lowest level with the difference in volume between highest and lowest level.

(d) **Least Square Method** – This statistical tool uses straight line equation and finds the line of best fit to solve the equations. Also known as Simple Regression Method. Under this method first the mean of volume and mean of costs are computed. The deviations in volume (x) from the mean and deviation in cost (y) from mean are computed.

Codification of Overheads

It is always advisable to codify the overhead expenses. Codification helps in easy identification of different items of overheads. There are numerous items of overheads and a code number to each one will facilitate identification of these items easily. Codification can be done by allotting numerical codes or alphabetical codes or a combination of both. Whatever system is followed, it should be remembered that the system is simple for understanding and easy to implement without any unnecessary complications.

Cost Centre codes	Department name
1100	Turning department
1200	Grinding Department
1300	Components manufacturing
1400	Assembly
2100	Maintenance
2200	Quality control
2300	Stores
3100	HR & Administration
3200	Accounts

You may observe the logic in giving the codes. All codes starting with 1 are production departments, all codes starting with 2 are factory related services and all codes starting with 3 are general services. This coding helps collection of costs on functional basis and also to identify an item of expense directly to a department or cost centre.

Allocation, Apportionment and Reapportionment of Overheads

After the collection, classification and codification of overheads, the next step is allocation and apportionment of overheads into the product units. The following steps are required to complete this process.

Departmentalization

Before the allocation and apportionment process starts, the first step in this direction is 'Departmentalization' of overhead expenses. Departmentalization means creating departments in the firm so that the overhead expenses can be conveniently allocated or apportioned to these departments. For efficient working and to facilitate the process of allocation, apportionment and reapportionment process, an organization is divided into number of departments like, machining, personnel, fabrication, assembling, maintenance, power, tool room, stores, accounts, costing etc and the overheads are collected, allocated or apportioned to these departments. This process is known as 'departmentalization' of overheads which will help in ascertainment of cost of each department and control of expenses.

Allocation

CIMA defines Cost Allocation as, 'the charging of discrete, identifiable items of cost to cost centres or cost units'. In simple words *complete distribution of an item of overhead to the departments or*

products on logical or equitable basis is called allocation. Where a cost can be clearly identified with a cost centre or cost unit, then it can be allocated to that particular cost centre or unit. In other words, allocation is the process by which cost items are charged directly to a cost unit or cost centre. For example, electricity charges can be allocated to various departments if separate meters are installed, depreciation of machinery can be allocated to various departments as the machines can be identified, salary of stores clerk can be allocated to stores department, cost of coal used in boiler can be directly allocated to boiler house division. Thus allocation is a direct process of identifying overheads to cost units or cost centres. So the term allocation means allotment of whole item of cost to a particular cost centre or cost object without any division.

Apportionment

Cost Apportionment is the allotment of proportions of items to cost centers. Wherever possible, the overheads are to be allocated. However, if it is not possible to charge the overheads to a particular cost centre or cost unit, they are to be apportioned to various departments on some suitable basis. This process is called as 'Apportionment' of overheads. The basis for apportionment is normally predetermined and is decided after a careful study of relationships between the base and the other variables within the organisation. The Cost Accountant must ensure that the selected basis is the most logical. A lot of quantitative information has to be collected and constantly updated for the purpose of apportionment. The basis selected should be applied consistently to avoid vitiations. However, there should be a periodical review of the same to revise the basis if needed.

In simple words, distribution of various items of overheads in portions to the departments or products on logical or equitable basis is called apportionment.

A general example of various bases that may be used for the purpose of apportionment is shown below:

Overhead item	Basis
Rent and building	Floor space occupied by each department
General Lighting	No. of light points in each department
Telephones	No. of extensions in a department
Depreciation of factory building	Floor space
Material handling	No. of material requisitions or Value of material issued

The above list is not exhaustive and depending upon peculiarities of the organisation, it could be extended. *This allocation and/or apportionment is called as* ***primary distribution of overheads.***

Distinction between Allocation & Apportionment

Although the purpose of both allocation and apportionment is identical, i.e to identify or allot the costs to the cost centres or cost unit, both are not the same.

Allocation deals with the whole items of cost and apportionment deals with proportion of items of cost.

Allocation is direct process of departmentalization of overheads, where as apportionment needs a suitable basis for sub-division of the cost.

Whether a particular item of expense can be allocated or apportioned does not depends on the nature of expense, but depends on the relation with the cost centre or cost unit to which it is to be charged.

Principles of Apportionment of Overhead Cost

(i) **Services Rendered**

The principle followed in this method is quite simple. A production department which receives maximum services from service departments should be charged with the largest share of the overheads. Accordingly, the overheads of service departments are charged to the production departments.

(ii) **Ability to Pay**

This method suggests that a large share of service department's overhead costs should be assigned to those producing departments whose product contributes the most to the income of the business firm. However the practical difficulty in this method is that, it is difficult to decide the most paying department and hence difficult to operate.

(iii) **Survey or Analysis Method**

This method is used where a suitable base is difficult to find or it would be too costly to select a method which is considered suitable. For example, the postage cost could be apportioned on a survey of postage used during a year.

(iv) **Efficiency Method**

Under this method, the apportionment of expenses is made on the basis of production targets. If the target is exceeded, the unit cost reduces indicating a more than average efficiency. If the target is not achieved, the unit cost goes up, disclosing there by, the inefficiency of the department.

Illustration 1

A factory has 3 production departments (P1, P2, P3) and 2 service departments (S1 & S2). The following overheads & other information are extracted from the books for the month of January 2016.

Expense	Amount ₹
Rent	6,000
Repair	3,600
Depreciation	2,700
Lighting	600
Supervision	9,000
Fire Insurance for stock	3,000
ESI contribution	900
Power	5,400

Particulars	P1	P2	P3	S1	S2
Area sq ft	400	300	270	150	80
No. of workers	54	48	36	24	18
Wages	18,000	15,000	12,000	9,000	6,000
Value of plant	72,000	54,000	48,000	6,000	
Stock Value	45,000	27,000	18,000		
Horse power of plant	600	400	300	150	50

Allocate or apportion the overheads among the various departments on suitable basis.

Solution:

The primary distribution of overheads is as follows:- ₹

Expense	**Total**	**Basis**	**P1**	**P2**	**P3**	**S1**	**S2**
Rent	6,000	Area sq ft	2,000	1,500	1,350	750	400
Repair	3,600	Plant value	1,440	1,080	960	120	-
Depreciation	2,700	Plant value	1,080	810	720	90	-

Lighting	600	Area sq ft	200	150	135	75	40
Supervision	9,000	No of workers	2,700	2,400	1,800	1,200	900
Fire Insurance for stock	3,000	Stock value	1,500	900	600	-	-
ESI contribution	900	Wages	270	225	180	135	90
Power	5,400	Horse power	2,160	1,440	1,080	540	180
Total	31,200		11,350	8,505	6,825	2,910	1,610

Secondary Distribution of Production Overheads

After the primary distribution as shown above is over, the next step is to re-distribute the service department costs over the production departments. This also needs to be done on some suitable basis, as there may not be a direct linkage between services and production activity. The products actually do not pass through the service departments. So does it mean that the service cost is not a part of cost of production? It very much is the part of production cost! Hence the loading of service costs onto the production departments is necessary. *This process is called secondary distribution of overheads.*

The basis for secondary distribution is dependent on:-

(i) The nature of service given e.g. it may be maintenance department or stores.

(ii) Measurement of service based on surveys or analysis.

(iii) General use indices

In the above Illustration No. 1, the costs of S1 (₹2910) and that of S2 (₹1610) will have to be loaded on to the totals of P1, P2 and P3.

Some examples of the bases that can be used to distribute cost of different service departments:

Service department	**Basis**
Quality	No of inspection done
Maintenance	No of maintenance calls or Material usage for maintenance or Time spent on maintenance
Stores	Indirect material cost or No of issue slips or Quantity of material issued or Value of stock handled
Canteen, welfare	No workers
Internal transport	No. of trucks or trolleys used or Tonne-miles consumed
Payroll office	No. of labour hours
Purchase office	No of purchase orders or Value of material purchased

Again this is not an exhaustive list and could differ from company to company. Many times percentage estimation is also done for such distribution if the service cannot be measured on the basis of any of the above bases. It may be decided that the cost of S1 is to be distributed as P1-40%, P2-25% and P3-35%. Such arbitrary method should be avoided as far as possible.

Methods of Secondary Distribution

(a) Direct Distribution Method

This method is based on the assumption that one service department does not give service to other service department/s. Thus between service departments there is no reciprocal service exchange. Hence under this method, service costs are directly loaded on to the production departments. This is simple, but the assumption may not be correct. Can we say that the canteen service is not available to other service departments like labour office or stores or maintenance department? This is incorrect and thus the method should not be used as far as possible.

In the above example consider that if the S1 and S2 costs are to be distributed on assumption of services rendered as S1 to P1- 40%, P2-30% and P2-10% and the S2 costs are on the basis of 5:3:2, then the table for redistribution of S1 and S2 costs over the production departments P1, P2 and P3 will be as given below.

Department	Total	Basic	P1	P2	P3
Overheads as per primary distribution	26,680		11,350	8,505	6,825
Distribution of S1	2,910	40%;30%;30%	1,164	873	873
Distribution of S2	1,610	5:3:2	805	488	322
Total	31,200		13,319	9,861	8,020

(b) Step Distribution Method

This method does away with the assumption made under above method, but only partly. It recognises that a service department may render service to the other service department, but does not receive service from it. In above example, S1 may render services to S2 but not vice versa, i.e. S2 may not render service to S1. In such situation, cost of that service department will be distributed first which render services to maximum number of other service departments. After this, the cost of service department serving the next large number of departments is distributed. This process is continued till all service departments are over. Because it is done in steps, it is called as Step Method of Distribution.

Illustration 2

A manufacturing company has two production departments Fabrication and Assembly and 3 service departments as Stores, Time Office and Maintenance. The departmental overheads summary for the month of March 2016 is given below:

Fabrication - ₹24000
Assembly - ₹16000
Stores - ₹5000
Time office - ₹4000
Maintenance - ₹3000

Other information relating to the department was:

Particulars	Production departments		Service departments		
	Fabrication	Assembly	Stores	Time office	Maintenance
No of employees	40	30	20	16	10
No of stores requisition slips	24	20			6
Machine Hours	2400	1600			

Apportion the costs of service departments to the production departments.

Solution:

We will have to determine the sequence in which the service departments should be selected for distribution and the bases on which each of them will be distributed. The following logical bases are decided based on the additional information given:

Time office - No of employees

Stores - No of stores requisitions

Maintenance - Machine hours

Also, it can be easily noticed that the time office serves maximum departments (i.e. both production departments, stores & maintenance departments). Stores serve the next larger number of departments (i.e. both production departments and maintenance department).

Maintenance department serves only production departments. Hence the sequence for distribution will be time office, stores and maintenance. This is shown in the following table:

₹

Particulars	Total	Basis	Fabrication	Assembly	Time office	Stores	Maintenance
As per primary distribution	52,000	as given	24,000	16,000	4,000	5,000	3,000
Time office	4,000	no of employees	1,600	1,200	(4,000)	800	400
Stores	5,800	no of req. slips	2,784	2,320		(5,800)	696
Maintenance	4,096	Machine hours	2,458	1,638			(4,096)
		Total	30,842	21,158			

Please notice when we distribute the time office costs first, the charge to stores department is ₹800. This makes the total cost of stores to be distributed as ₹5800 (5000+800).Same is the logic for ₹4096 of Maintenance department.

(c) Reciprocal Service Method: This method takes cognizance of the fact that service departments may actually give as well as receive services from and to the other service departments on reciprocal basis. Such inter-departmental exchange of service is given due weight in the distribution of the overheads. *There are two methods used for distribution under this logic. One is called Repeated Distribution Method and the other Simultaneous Equation Method.*

(d) Repeated Distribution Method: This is a continuous distribution of overhead costs over all departments. The decided ratios are used to distribute the costs of service departments to the production and other service departments. This is continued till the figures of service departments become 'nil' or 'negligible'.

Illustration 3

The summary as per primary distribution is as follows:

Production departments A- ₹2400; B- ₹2100 & C- ₹1500

Service departments X – ₹700; Y- ₹900

Expenses of service departments are distributed in the ratios of:

X dept. : A- 20%, B- 40%, C- 30% and Y- 10%

Y dept. : A- 40%, B- 20%, C- 20% and X- 20%

Show the distribution of service costs among A, B and C under repeated distribution method.

Solution:

₹

Particulars	Production departments			Service departments	
	A	B	C	X	Y
As per primary distribution	2400	2100	1500	700	900
Service dept X	140	280	210	(700)	70
Service dept Y	388	194	194	194	(970)
Service dept X	38.8	77.6	58.2	(194)	19.4
Service dept Y	7.76	3.88	3.88	3.88	(19.4)
Service dept X	0.776	1.552	1.164	(3.88)	0.388
Total	2975.336	2657.032	1967.244	0	0.388

It can be noticed that the undistributed balance in service department is very negligible and thus can be ignored for further distribution

(e) Simultaneous Equations Method: Under this method, simultaneous equations are formed using the service departments' share with each other. Solving the two equations will give the total cost of service departments after loading the inter- departmental exchange of services. These costs are then distributed among production departments in the given ratios.

In the above Illustration No. 3, service dept X gives 10% of its service to Y and receives 20% of Y's service.

Let 'x' be the total expenses of dept X (its own + share of Y) and

'y' be the total expenses of dept Y (its own + share of X)

This can be expressed as:

'x' = 700 + 20% of 'y' and

'y' = 900 + 10% of 'x'

i.e. x = *700 + 0.2y and*

y = 900 + 0.1x

Multiplying both equations by 10, we get

10x = 7000 + 2y i.e. 10x –2y = 7000 and

10y = 9000 + x i.e. -x+10y = 9000

Now multiplying 2nd equation by 10, and then adding the two equations we get,

98y = 97000

Thus y = 990 and x = 898

Based on this we distribute the service department costs over production departments.

Redistribution Statement

	Department				
	A	B	C	X	Y
Primary Distribution	2400	2100	1500	700	900
X	180	359	269	(898)	90
Y	396	198	198	198	(990)
Total	**2976**	**2657**	**1967**	—	—

(f) Trial and Error method

This method is to be followed when the question of distribution of costs of service cost centres which are interlocked among them arises. In the first stage, gross costs of services of service cost centres are determined. In the second stage cost of service centres are apportioned to production cost centres.

Limitations of Apportionment

Whichever method we may use, it still depends on a suitable basis used. The basis will always lead to approximations. If an approximate data is used for analysis, control and decision-making, it may cause erroneous results. Thus one has to be careful in relating the cost data to cost centre or cost unit. The natural relation of most of the indirect costs i.e. overheads is to a time period. In other words, almost all overheads are period costs and hence an attempt to link it to cost unit will always be arbitrary. As such, the traditional methods of allocation and apportionment are often challenged by many in the industry. The techniques like Marginal Costing owe their origin to such limitations of Traditional Costing.

Capacity of Overhead Rate

Influence of activity level on overhead rate

In determination of overhead rate, a good deal depends upon the activity level, which is assumed. In other words, capacity consideration influence overhead rate. Overhead rate will be different at different capacity levels. Efficient utilization of capacity is desirable both for society and management. Following capacity concepts merit consideration for overhead rate determination:-

Theoretical or Maximum Plant Capacity

Maximum Capacity or the Ideal Capacity is the capacity for which plant is designed to operate. It is only Theoretical Capacity. It does not give allowance for waiting, delays and shut-down. The capacity is significant for designing the plant mechanically. For cost considerations, this capacity is not important. Ideal Capacity is never used to determine overhead rates for its disregard to even necessary interruptions in production process.

Practical Capacity

When this capacity is determined, allowance is given for unavoidable interruptions like time lost for repairs, inefficiencies, breakdown, delay in delivery of raw material and supplies, labour shortages and absence, Sunday, holidays, vacation, inventory taking, etc. Thus, Practical Capacity is the maximum Theoretical Capacity with minor unavoidable interruptions. These unavoidable interruptions are based mostly on internal influences and do not consider main external causes like lack of customers orders. The Practical Capacity is determined with reference to nature of industry and circumstances in which a particular factory is situated. Normal unavoidable interruptions account for 15% to 25% of the maximum capacity. The Practical Capacity, thus, ranges between 75% and 85% of maximum capacity after giving allowance for normal unavoidable interruptions.

Normal Capacity

Idle capacity due to long-term sales trend only is reduced from Practical Capacity to get Normal Capacity. Calculation of Normal Capacity of a plant presents considerable problems. Normal Capacity is determined for the business as a whole. Then, it is broken down by plants and departments. For Normal Capacity determination, prime considerations are physical capacity and average sales expectancy. It should be noted that average sales expectancy to be considered for this purpose takes into account a period enough to level out cyclical fluctuations. The determination of Normal Capacity helps in: i) the preparation of flexible budgets and computation of predetermined factory overhead rates. Ii) the use of Standard Costing, iii) estimating sales price etc., iv) scheduling production, v) inventory valuation, vi) determination of breakeven point, vii) controlling costs.

Importance of determining Normal Capacity

The Normal Capacity considerations are important for:

(a) budget preparation;

(b) determination of overhead rate;

(c) determination of standard cost, and

(d) preparation of operation of operational plans.

For determining the Normal Capacity, machinery purchased for future use and outmoded machinery should be excluded for consideration.

Capacity based on Sales Expectancy

Capacity may be based on sales expectancy for the year. The distinction between Normal Capacity and capacity based on sales expectancy should be properly understood. While Normal Capacity considers the long-term trend analysis of sales, which is based on sales of a cycle of years, the capacity based on sales expectancy is based on sales for the year only. When long-term sales trends are determined, cycle of years long enough to even out cyclical fluctuations is considered. Capacity based on sales expectancy is influenced more by general economic conditions and forecast of industry than long term sales trends. The main advantages of determining overhead rate based on sales expectancy are i) Overhead rate is linked with actual sales expectancy, ii) Overhead costs are adequately spread over the production and iii) Overhead rate determined for this purpose is very useful for making decisions like price fixation, etc.

Idle Capacity and Excess Capacity

Practical Capacity is determined after giving allowance to unavoidable interruptions like time lost for repairs, inefficiencies, breakdown and labour shortage, etc., Even this Practical Capacity is not normally fully achieved. Some losses due to idleness of workers and plant facilities to occur even in most carefully administered companies. These losses are not taken into account for determining the Practical Capacity, because for the purpose of determining Practical Capacity only unavoidable interruptions are considered. Thus, the difference between Practical Capacity and Normal Capacity, i.e., the capacity based on long-term sales expectancy is the Idle Capacity. However, if Actual Capacity happens to be different from capacity based on sales expectancy, the idle capacity will represent difference between Practical Capacity and Actual Capacity. Idle Capacity is that part of Practical Capacity which is not utilized due to factors like temporary lack of orders, bottlenecks and machine breakdown, etc. Idle Capacity represents unused productive potential, which fails to be realized due to interruptions that are not unavoidable. Idle capacity is that part of Practical Capacity which is not utilized due to irregular interruptions.

Idle Capacity is different from Excess Capacity. Idle Capacity refers to temporary idleness of available resources due to irregular interruptions. Excess Capacity results either from managerial decision to retain larger production capacity or from unbalanced equipment or machinery within departments. Excess Capacity refers to that portion of Practical Capacity which is available, but no attempt is made for its utilization for strategic or other reasons. If the Excess Capacity results from purchase of assets not required, it will be a prudent policy for company to dispose of the assets which cause Excess Capacity. Alternatively, action should be taken for utilization of resources in the form of Excess Capacity. Excess Capacity also results from imbalance or bottlenecks in certain departments. This situation can be remedied by attempting synchronization in the working of various departments, working overtime, running double shift and temporary off-loading to departments having spare capacity. While overhead rate includes cost of Idle Capacity, Excess Capacity is excluded from overhead rate consideration.

Idle time is distinguished from Idle Capacity and its cost is separated in the accounts. Idle time represents lost time of men and machines arising from lack of business or of material, a breakdown of equipment, faulty supervision or other similar causes whether avoidable on not. Idle Capacity is the difference between Practical Capacity and Actual Capacity and represents the unused production potential.

Idle Capacity costs are represented mostly by the fixed charges of owing and maintaining plant and equipment and of employing services, which are not used to their maximum potential. The principal causes of idle capacity are:

Production Causes

These causes primarily result from poor organization of operational plan. Following production causes often lead to Idle Capacity:-

(a) Repetitive machine adjustment - i) Setup and change-over. ii) Repairs and adjustment.

(b) Lack of materials or tools – i) Internal ii) External

(c) Lack of supervision, inspection and instruction.

(d) Lack of power – i) Internally produced. ii) Externally produced

Administrative Causes:

Sometimes various administrative decisions taken at various level of management result in Idle Capacity. Major administrative causes that lead to Idle Capacity are: a) Excess plant for anticipated expansion, b) Special machines prepared for particular jobs, and c) Strikes / Lockouts.

Economic Causes

Sometimes demand for the goods is seasonal as in case of wool, ice cream and furs and production cannot be evenly distributed. This is especially true, when there exists danger of deterioration of the product or where carrying charges for stock are too large. Thus, seasonal, cyclical and industrial causes also lead to Idle Capacity.

Various practices are followed in different companies for disposing of Idle Capacity cost. It is often agreed in principle that normal production losses should be absorbed in product costs. Abnormal losses should be treated as non-operating expenses in product costs. Abnormal losses should be treated as non-operating expenses by direct debit to Profit and Loss Account. Certain companies follow the practice of computing idle time costs on their leading products by use of statistical techniques. Cost Accountants should particularly analyse the reasons for idle plant and equipment not used during the period for non-con-controllable causes. The review of practices of different companies reveals that Idle Capacity is a somewhat flexible concept. It is an individual problem which should be considered after taking into account the special situations. For the growth and survival of the organisation, the management is keenly interested to know the idleness, its causes, its cost and its available remedies. Normally different companies follow a bit varying restricted accounting concept of Idle Capacity. In many cases unabsorbed fixed overhead represents losses due to managerial decisions and it becomes a subjective matter to refer it as idle capacity cost. Overhead rates of different capacity levels will be different due to influence of fixed overhead.

Absorption of Overheads

Once the steps of primary and secondary distribution are carried out, what we get is total indirect costs of production departments. The next step is to assign these totals to the individual product units. A job or a product passes through all or many production departments before it is formed into a finished saleable product. It is necessary to know the cost of each department it passes through per unit. The absorption of overhead enables a Cost Accountant to recover the overhead cost spent on each product department through each unit produced. Overhead absorption is also known as levy or recovery of overheads. How is this done? Suppose in turning department a total of 1200 tubes are turned and the cost of turning department overheads (after secondary distribution) are ₹72000, then can we say the cost of turning per tube is ₹6/-? Most probably yes. This ₹6 per unit is called as *Overhead Absorption Rate*.

Absorption means 'recording of overheads in Cost Accounts on an estimated basis with the help of a predetermined overhead rate, which is computed at normal or average or maximum capacity'

In general, the formula for overhead absorption rate is give as:-

Overhead Rate = Amount of Overhead / No of units of the base

Overhead Absorption Rates: For the purpose of absorption of overhead in costs of jobs, processes, or products overhead rates related to suitable factors or bases to be determined. There are several methods in use for determining the overhead rates i.e Actual or Predetermined Overhead Rate, Blanket or Multiple Rates.

Actual Overhead Rate

Actual Overhead Rate is obtained by dividing the overhead expenses incurred during the accounting period by actual quantum on the base selected. Assuming that the rates are worked out on a monthly basis the formula is:-

Overhead Rate = Actual overhead during the month ÷ Value/Quantity of the base during the month

Absorption of overheads based on actual rates may not be adopted due to the following reasons:-

(a) Actual overhead rate can be computed only after the accounting period is over.

(b) The incidence of some of the items of expenses like repairs, overhauling, etc is not uniformly spread over all the accounting periods.

(c) Actual overhead rates do not provide any basis for cost control.

Pre-determined Overhead Rate

Predetermined Rate is computed by dividing the budgeted overhead expenses for the accounting period by the budgeted base (quantity, hours, etc)

Overhead Rate= Budgeted overhead expenses for the period / Budgeted Base for the period

Advantages of Predetermined Overhead Rate

(a) Enables prompt preparation of cost estimates, quotations and fixation of selling prices.

(b) Cost data is available to management along with financial data.

(c) In case of Cost –plus contracts prompt billing is possible through pre-determined recovery rates.

(d) In concerns having budgetary control system, no extra clerical efforts are required in computing the pre-determined overhead rate.

Blanket (Single) Overhead Rate

A single overhead rate for the entire factory may be computed for the entire factory. So this is known as factory wide or Blanket Overhead Rate Method.

Blanket Rate = Overhead Cost for the factory / Total Quantum of the base.

Blanket Rate of overheads may be applied suitable in a small size concerns. Blanket Rates are easy to compute. The use of Blanket Rate of overheads gives erroneous and misleading results, where several products passing through number of different departments. With Blanket Rate of overhead, satisfactory level of managerial control is not possible.

Multiple Rates:

This method is most commonly used to determine the multiple overhead rates, i.e separate rates:

(a) For each producing department;

(b) For each service department;

(c) For each Cost Centre; and

(d) For each product line.

The multiple rates are worked out according to the below formula:

Overhead Rate = Overhead cost allocated & apportioned to each product, dept / Corresponding Base

The number of overhead rates a firm may compute would be fixed taking into consideration of two opposing factors viz clerical costs involved and the degree of accuracy level desired.

Production Unit Method

Simply put the concept here is to average out the total overheads on total units produced. In a tube manufacturing unit the total overheads are ₹72000 and total tubes processed are 12000. The overhead absorption rate is: 72000/12000 i.e. ₹6 per tube. If this rate is based on the budgeted costs and number of units, and if the factory now gets an order for 2500 tube processing, the amount of production overheads to be charged to that order will be (2500 * 6) i.e. ₹15000/-

Percentage of Direct Wages

Under this method, overhead for a job is recovered on the basis of a predetermined percentage of direct wages. This method is used when the component of direct wages is higher. If the overhead to be absorbed is ₹120000 and the direct wages are estimated at ₹800000, the predetermined rate will be calculated as (120000/800000) i.e. 15%. If a job is received where direct wages are estimated at ₹9000/- then the production overheads to be absorbed will be 15% of ₹9000 i.e. ₹1350 This method is useful if the direct labour hours can be standardised and the labour rates do not fluctuate too much. However, this method ignores the contribution made by other resources like machinery. The method also ignores the fact that there may be different types or grades of workers and each may cost differently. It also sidelines the fact that most of the production overheads are time-related.

Percentage of Direct Material Cost

Here the absorption rate is expressed as a percentage of direct material cost. This method is useful when the proportion of material cost is very high and that of labour cost is comparatively negligible. It is useful if material grades and rates do not fluctuate too much. If production overhead to be absorbed is ₹2000 and the material cost is expected to be ₹4000, then the absorption rate will be (2000/4000) i.e. Thus 50% of direct material cost. Thus for a job requiring direct material of ₹200, the production overheads to be absorbed will be ₹100 i.e. 50% of ₹200. However, many overhead items bear no relationship with material cost, and also the fact of time dimension of overheads is not taken into account by this method.

Percentage of Prime Cost

This method combines the benefits of direct wages and direct material cost methods as we know prime cost means direct material plus direct wages plus direct expenses. This method could be used when prime cost constitutes a major proportion of the cost and the rates of material & labour are stable. It is needed that the product made is standard product. If the prime cost is expected to be ₹50000 and the production over heads are estimated at ₹2500, then the absorption rate will be 5% of prime cost. If a job has a prime cost of ₹800, then overhead absorbed on that job will be ₹40/-

Direct Labour Hour

Under this method, the absorption rate is calculated by dividing the overhead amount by the actual or predetermined direct labour hours. This is extremely useful when the production is labour intensive. This method is superior to the earlier ones, because it takes cognizance of the time factor. If the direct labour hours for a month amount to 10000 and the overheads to be absorbed are ₹5000, then the absorption rate is ₹0.50 per hour (i.e. 5000/10000). If a job is going to require a labour time of 250 hours, the production overheads to be loaded on the job will be ₹125 (i.e. 250 * 0.50). The data related to labour hours has to be properly collected or estimated. The labour hour rate may be calculated as a single rate or different for different group of workers.

Machine Hour Rate

In the days of mechanised production processes, the most relevant rate to be applied is the machine hour rate. This is the rate calculated by dividing the actual or budgeted overhead cost related to a machine or a group of machines by the appropriate number of machine hours. These hours could be actual hours or budgeted hours. When budgeted hours are used they are taken at average capacity at which a factory normally operates. You cannot take full capacity hours as the factory may not operate at that level and then the absorption rate may be unnecessarily fixed at a lower level. The overheads

in a highly mechanised factory are mostly related to the number of hours a machine runs. Hence this is supposed to be the best method for absorbing overhead costs into the cost unit. If a machine normally runs for 2000 hours in a month and monthly overheads to be absorbed are ₹15000, then the machine hour rate will be calculated as (15000/2000) i.e. ₹7.50 per machine hour. If a job take 75 hours on that machine, then ₹562.50 (75 * 7.5) will have to be loaded as cost of using the machine for that job.

A machine hour rate may be calculated using only those overheads which are directly related to the machine e.g. power, fuel, repairs, maintenance, depreciation etc. These expenses are totalled and then divided by the hours to compute the rate. This is called as *Ordinary Machine Hour Rate*. Whereas, if costs not related to machine are also included (e.g. supervision, rent, lighting, heating etc.) for the rate calculation, such rate is called as *Composite Machine Hour Rate*. While calculating machine hour rate, the wages paid to machine operators may be added to the total costs. This is because these operators directly wok on the machines & thus related to machine operation. At times a factory may have more than one similar machines simultaneously working. In such case, *a group machine hour rate* may be calculated.

Factors influencing the selection of Overhead Recovery Rate

The particular method or methods selected for application in a company would depend upon the factors mentioned below. Selection of the most equitable method is of paramount importance since a method that is not suitable will distort costs and thus make them useless for control and decision making purpose.

Selection of Overhead Recovery Rates depends on the following factors:-

(a) Nature of the product and process of manufacture.

(b) Nature of overhead expenses.

(c) Organisational set-up of the undertaking into departments and or cost centers.

(d) Individual requirements with regard to the circumstances prevailing.

(e) Policy of the management.

(f) Accuracy vis-a-vis cost of operating the method. Some of the methods are comparatively more accurate and provide equitable bases for overhead absorption.

The main features of a satisfactory overhead rate are as follows:-

(a) Simple, easy to operate, practical and accurate;

(b) Economic in application;

(c) Fairly stable so that cost from period to period does not vary;

(d) Related to time factor as far as practical;

(e) Departmental rates are preferable to blanket rates;

(f) Area of activity selected for computation of the rate should be homogeneous cost unit;

(g) Base for the rate should lay stress on the main production element of the concern.

Under-absorption and Over-absorption of Overhead

The amount of overhead absorbed in costs is the sum total of the overhead costs allotted to individual cost units by application of the overhead rate. When a predetermined rate worked out on the basis of anticipated or budgeted overhead and base is applied to the actual base, the amount absorbed may not be identical with the amount of overhead expenses incurred if either the actual base or the actual expenses or both deviate from the estimates or the budget.

If the amount absorbed is less than the amount incurred , which may due to actual expenses exceeding the estimate and / or the output or the hours worked may be less than the estimate, the difference denotes under-absorption.

On the other hand if the amount absorbed is more than the expenditure incurred, which may be due to the expense being less than estimate and / or the output or hours worked may be exceeding the estimate, this would indicate over-absorption, which goes to inflate the costs.

Under or over absorption of overhead may arise due to one or the other of the causes given below:-

(a) Error in estimating overhead expenses.

(b) Error in estimating the level of production, i.e the base.

(c) Major unanticipated changes in the methods of production.

(d) Unforeseen changes in the production capacity.

(e) Seasonal fluctuations in the overhead expenses from period to period.

(f) Overhead rate may be applied to the Normal Capacity which may be less than the full operating capacity of the undertaking.

How does one deal with the situation of over or under absorption. There are three ways to handle it:

(a) *Write-off (in case of under absorption) or write back (in case of over-absorption) to the P & L* Account. This treatment is valid if most of the overhead items are related to time.

(b) *Carry forward to the next period through a reserve account*. This method is not recommended on the logic that it is inconsistent with Accounting Standards.

(c) *Use of supplementary rates* to adjust the effect to the cost of sales, finished stocks and Work in Process stocks. This sounds logical as it does not carry forward the unabsorbed or over absorbed overheads to the next accounting period entirely. It aims at splitting the total effect between the cost of sale (which is charged to current year's profits) and stocks (which get carried forward to the next year).

Illustration 4

Overhead incurred	₹ 1,50,000
Overhead recovered	₹ 1,00,000
Cost of sales	₹ 10,00,000
Finished goods	₹ 8,00,000
Work in process	₹ 7,00,000

Solution:

Here, the overheads under-absorbed are (1,50,000-1,00,000) ₹50,000.

Total of Cost of sales, FG stock & WIP is ₹25,00,000

The supplementary rate will be 50,000/25,00,000 i.e. ₹0.020

This will be distributed as:

₹20,000 to cost of sales (i.e. 10,00,000 x 0.020)

₹16,000 to FG stock (i.e. 8,00,000 x 0.020) and

₹14,000 to WIP (i.e. 7,00,000 x 0.020)

Reporting of overhead costs:

Presentation:

- Overheads shall be presented as separate cost heads like production, administration and marketing.
- Element wise and behavior wise details of the overheads shall be presented, if material.
- Any under-absorption or over-absorption of overheads shall be presented in the reconciliation statement.

Disclosure:

- The basis of assignment of overheads to the cost objects.
- Overheads incurred in foreign exchange.
- Overheads relating to resources received from or supplied to related parties
- Any Subsidy / Grant / Incentive or any amount of similar nature received / receivable reduced from overheads.
- Credits / recoveries relating to the overheads.
- Any abnormal cost not forming part of the overheads.
- Any unabsorbed overheads.

Illustration 5

In an Engineering Factory, the following particulars have been extracted for the quarter ended 31st December, 2015. Compute the departmental overhead rate for each of the production departments, assuming that overheads are recovered as a percentage of direct wages.

	Production Depts.			Service Depts.	
	A	B	C	X	Y
Direct Wages (₹)	30,000	45,000	60,000	15,000	30,000
Direct Material	15,000	30,000	30,000	22,500	22,500
No. of workers	1,500	2,250	2,250	750	750
Electricity KWH	6,000	4,500	3,000	1,500	1,500
Assets Value	60,000	40,000	30,000	10,000	10,000
No. of Light points	10	16	4	6	4
Area Sq. Yards	150	250	50	50	50

The expenses for the period were:

	₹
Power	1,100
Lighting	200
Stores Overhead	800
Welfare of Staff	3,000
Depreciation	30,000
Repairs	6,000
General Overheads	12,000
Rent and Taxes	550

Apportion the expenses of Service Dept. Y according to direct wages and those of Service Department X in the ratio of 5: 3 : 2 to the production departments.

Solution:

Statement showing apportionment of overheads and computation of OH rates:

Particulars	Basis	Total (₹)	A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
Material	Actual	45,000	—	—	—	22,500	22,500
Wages	Actual	45,000	—	—	—	15,000	30,000
Power	KWH (4:3:2:1:1)	1,100	400	300	200	100	100
Lighting	Light Points (5:8:2:3:2)	200	50	80	20	30	20
Stores overhead	Materials (2:4:4:3:3)	800	100	200	200	150	150
Welfare of staff	No. of workers (2:3:3:1:1)	3,000	600	900	900	300	300
Depreciation	Assets Value (6:4:3:1:1)	30,000	12,000	8,000	6,000	2,000	2,000
Repair	Assets Value (6:4:3:1:1)	6,000	2,400	1,600	1,200	400	400
General Over-heads	Direct Wages (2:3:4:1:2)	12,000	2,000	3,000	4,000	1,000	2,000
Rent & Taxes	Area (3:5:1:1:1)	550	150	250	50	50	50
		1,43,650	**17,700**	**14,330**	**12,570**	**41,530**	**57,520**
Costs of 'X'	5:3:2		20,765	12,459	8,306	(41,530)	—
Costs of 'Y'	2:3:4		12,782	19,173	25,565	—	(57,520)
			51,247	**45,962**	**46,441**	—	—

Overhead Rate as % on direct wages

A = [51,247/30,000] x 100 = 170.82%

B = [45,962/45,000] x 100 = 102.14%

C = [46,441/60,000] x 100 = 77.40%

Illustration 6

The New Enterprises Ltd. has three producing departments A,B and C two service Departments D and E. The following figures are extracted from the records of the Co.

	₹
Rent and Rates	5,000
General Lighting	600
Indirect Wages	1,500
Power	1,500
Depreciation on Machinery	10,000
Sundries	10,000

The following further details are available:

	A	B	C	D	E
Floor Space (Sq.Mts.)	2,000	2,500	3,000	2,000	500
Light Points	10	15	20	10	5
Direct Wages	3,000	2,000	3,000	1,500	500
H.P. of machines	60	30	50	10	--
Working hours	6,226	4,028	4,066	--	--
Value of Material	60,000	80,000	1,00,000	--	--
Value of Assets	1,20,000	1,60,000	2,00,000	10,000	10,000

The expenses of D and E are allocated as follows:

	A	B	C	D	E
D	20%	30%	40%	--	10%
E	40%	20%	30%	10%	--

What is the factory cost of an article if its raw material cost is ₹50, labour cost ₹30 and it passes through Departments A, B and C. For 4, 5 & 3 hours respectively.

Solution:

Statement showing apportionment of overheads to departments

Particulars	Basis	Total (₹)	A (₹)	B (₹)	C (₹)	D (₹)	E (₹)
Rent & Rates	Space (4:5:6:4:1)	5,000	1,000	1,250	1,500	1,000	250
Lighting	Light Points (2:3:4:2:1)	600	100	150	200	100	50
Indirect wages	Direct wages (6:4:6:3:1)	1,500	450	300	450	225	75
Power	Horse Power (6:3:5:1)	1,500	600	300	500	100	--
Depreciation	Value of Asset (12:16:20:1:1)	10,000	2,400	3,200	4,000	200	200
Sundries	Direct wages (6:4:6:3:1)	10,000	3,000	2,000	3,000	1,500	500
Wages	Actual	2,000	--	--	--	1,500	500
		30,600	**7,550**	**7,200**	**9,650**	**4,625**	**1,575**

Repetitive Distribution Method ₹

Particulars	A	B	C	D	E
Totals	7,550	7,200	9,650	4,625	1,575
Cost of D (2:3:4:1)	925	1,387	1,850	(4,625)	463
	8,475	8,587	11,500	--	2,038
Cost of E (4:2:3:1)	815	408	611	204	(2,038)
	9,290	8,995	12,111	204	--
Cost of D (2:3:4:1)	41	61	82	(204)	20
	9,331	9,056	12,193	--	20
Cost of E (4:2:3:1)	8	4	6	2	(20)
	9,339	9,060	12,199	2	--
Cost of D (2:3:4:1)	--	1	1	(2)	--
	9,339	**9,061**	**12,200**	**--**	**--**
Working Hours	6,226	4,028	4,066		
Rate per hour	1.5	2.25	3.00		

Computation of Factory Cost of the Article ₹

Particulars	Amount
Material	50.00
Labour	30.00
Overheads	
Dept A (4 x 1.5)	6.00
Dept B (5 x 2.25)	11.25
Dept C (3 x 3)	9.00
Factory Cost	**106.25**

Simultaneous Equation Method

Let total cost of Service Department D be ₹ 'd'.

Let total cost of Service Department E be ₹ 'e'.

$d = 4625 + 10/100\ e$

$e = 1575 + 10/100\ d$

$\Rightarrow 100\ d = 462500 + 10\ e$

$\Rightarrow 100\ d - 10e = 462500 \quad \rightarrow (1)$

$\Rightarrow 100\ e = 157500 + 10\ d$

$\Rightarrow -10\ d + 100\ e = 157500 \quad \rightarrow (2)$

Equ. (1) $100\ d - 10e = 462500$

Equ. (2) x 10 $-100\ d + 1000e = 1575000$

$990e = 2037500$

$e = 2037500 / 990$

$= 2,058$

Substituting the value of 'e' in Equation (1), we get

$\Rightarrow 100\ d - 10\ (2058) = 462500$

$\Rightarrow d = 483080 / 100$

$\Rightarrow d = 4831$

Particulars	A	B	C	D	E
Totals	7,550	7,200	9,650	4,625	1,575
Costs of D (2:3:4:1) (4831)	966	1,450	1,932	(4,831)	483
Costs of E (4:2:3:1) (2,058)	823	412	617	206	(2058)
	9,339	9,062	12,199	--	--

Illustration 7

The following information relates to the activities of a production department of factory for a certain period.

	₹
Material used	36,000
Direct Wages	30,000
Labour hours	12,000
Hours of Machinery-operation	20,000
Overhead Chargeable to the Dept	25,000

On one order carried out in the department during the period the relevant data were:-

Material used (₹)	6,000	
Direct Wages (₹)	4,950	
Labour hours worked	1,650	Hrs.
Machine Hours	1,200	

Calculate the overheads chargeable to the job by four commonly used methods.

Solution:

The four commonly used methods of absorbing or recovering overheads are as follows:

1. % of overheads on material = (25,000 / 36,000) x 100 = 69.44%
2. % of overheads on direct wages = (25,000 / 30,000) x 100 = 83.33%
3. Overhead rate per labour hour = 25,000 / 12,000 = 2.083
4. Machine hour rate method = 25,000 / 20,000 = 1.25

The overheads chargeable to job under the above methods is as follows:

1. Material = 6,000 x 69.44% = 4,166.40
2. Wages = 4,950 x 83.33% = 4,125
3. Labour hour rate = 1650 x 2.083 = ₹ 3,437
4. Machine hour rate = 1,200 x 1.25 = ₹ 1,500

Illustration 8

In a machine department of a factory there are five identical machines. From the particulars given below; prepare the machine hour rate for one of the machines.

Space of the department	10,000	sq.mts.		
Space occupied by the machine	2,000	sq.mts.		
Cost of the machine (₹)	20,000			
Scrap value of the machine (₹)	300			
Estimated life of the machine	13	years		
Depreciation charged at	7 ½ %	p.a		
Normal running of the machine			2,000	hours
Power consumed by the machine as shown by the meter			3,000	p.a

Estimated repairs and maintenance throughout the working life of the machine (₹) 5,200 Sundry supplies including oil, waste etc. charged direct to the machine amount to ₹ 600 p.a.

Other expenses of the department are :	₹
Rent and Rates	9,000
Lighting (to be apportioned according to workers employed)	400
Supervision	1,250
Other charges	5,000

It is ascertained that the degree of supervision required by the machine is 2/5th and 3/5th being devoted to other machines.

There are 16 workers in the department of whom 4 attended to the machine and the remaining to the other machines.

Solution:

Computation of Machine Hour Rate ₹

Particulars		Rate per hr.
Standing Charges		
Rent & Rates	9000 x (2000 / 10000) = 1800	
Lighting	400 x (4 /16) = 100	
Supervision	1250 x (2/5) = 500	
Other Charges	5000 x (1/5) = 1000	
	= 3400	
Standing charges per hour	3,400/ 2,000 =	1.70
Machine Expenses		
Depreciation	(20000 x 7.5%) ÷ 2,000 = 0.750	2.75
Power	(3,000 / 2,000) = 1.500	
Repairs & Maintenance	(5200 / 13) ÷ 2,000 = 0.200	
Sundry Supplies	(600 / 2,000) = 0.300	
Machine Hour Rate =		**4.45**

Illustration 9

From the following particulars given below compute Machine hour rate for a machine.

a. Cost ₹ 24,000

b. Scrap value ₹ 4,000

c. Estimated Working life 40,000 hours

d. Estimated cost of repairs and maintenance during the whole life ₹2,000

e. Standard charges of the shop for 4 weekly period ₹ 3,000

f. Working hours in 4 weekly period 100 hours

g. No.of machines in the shop each of which is liable for equal charge are 30 machines.

h. Power used per hour 4 units @ 10p. per unit.

Solution:

Computation of Machine Hour Rate ₹

Particulars		Rate per hr.
Standing Charges		
Standing Charges	[3,000 / (100 x 30)	1.00
Machine Expenses		
Depreciation	[(24,000 – 4,000) / 40,000] = 0.50	
Repairs	[2,000 / 40,000] = 0.05	
Power	[4 x 0.1] = 0.40	0.95
Machine Hour Rate =		**1.95**

Illustration 10

The following particulars relate to a processing machine treating a typical material. You are required to calculate the machine hour rate.

The cost of the machine	₹ 10,000
Estimated life	10 years
Scrap value	₹1,000
Working time (50 weeks of 44 hrs. each)	2,200 hrs.
Machine maintenance per annum	200 hrs
Setting up time estimated @ 5% of total productive time	
Electricity is 16 units per hour @ 10 paise per unit.	
Chemicals required weekly	₹20
Maintenance cost per year	₹1,200

Two attendants control the operations of the machine together with 6 other machines, their combined weekly wages are ₹ 140. Departmental overhead allocated to this machine per annum ₹ 2,000.

Solution:

Annual Working hours: 50 weeks X 44 hrs.	2,200
Less : Maintenance time	200
Productive hours	2,000
Less : 5% Setting up time	100
Effective hours	1,900

Computation of Machine Hour Rate ₹

Particulars		Rate per hr.
Standing Charges		
Chemical Solution	(50 x 20) = 1,000	
Attendants wages	(140 x 50 x 1/7) = 1,000	
Departmental overheads	= 2,000	
	= 4,000	
Rate per hour	4,000 / 2,200	1.82

Machine Expenses		
Depreciation	[(10,000 – 1,000)/10]÷ 1900 = 0.47	
Maintenance	(1,200 / 1,900) = 0.63	
Power	(16 x 0.1) = 1.60	2.70
Machine Hour Rate =		**4.52**

Illustration 11

Your company uses a historical cost system and applies overheads on the basis of "Predetermined" rates. The following are the figures from the Trial Balance as at 30-9-2015:

	Dr. (₹)	Cr. (₹)
Manufacturing overheads	4,26,544	---
Manufacturing overheads-applied	---	3,65,904
Work-in-progress	1,41,480	---
Finished Goods Stock	2,30,732	---
Cost of Goods Sold	8,40,588	---

Give two methods for the disposal of the under absorbed overheads and show the profit implications of the method.

Solution:

	₹
Overheads incurred	= 4,26,544
Overheads absorbed	= 3,65,904
Under absorption	= 60,640

The following are the 3 methods for disposing off this under absorbed overheads:

1. Transferring to the costing P & L A/c under this method, the profit will decrease by ₹ 60,640.
2. The amount may be disposed off by carrying forward to the next year. In this case, there will be no effect on profit.
3. Applying Supplementary Overhead Rate and further absorbing, which may be shown as follows. Under this method also, the profit will decrease by ₹ 60,640.

Supplementary OH Rate = [60,640 / 12,12,800] x 100

= 5%

₹

		Suppl. OH (5%)	**Total**
Work in Progress	1,41,480	7,074	1,48,554
Finished Goods	2,30,732	11,537	2,42,269
Cost of goods sold	8,40,588	42,029	8,82,617
	12,12,800	60,640	12,73,440

Illustration 12

In a factory the expenses of factory are charged on a fixed percentage basis on wages and office overhead expenses are calculated on the basis of percentage of works cost.

	I Order (₹)	II Order (₹)
Material	12,500	18,000
Wages	10,000	14,000
Selling price	44,850	61,880
Percentage of profit on cost	15%	12%

Find the rate of Factory OH and Office OH.

Solution:

Let 'X' and 'Y' be the % of Works Overhead on wages and Office Overhead on works cost respectively.

Particulars	Order I	Order II
Material	12,500	18,000
Wages	10,000	14,000
Prime Cost	22,500	32,000
(+) Factory OH's	(10,000 x *X*/100) = 100X	(14,000 x *X*/100) = 140X
Works Cost	22,500 + 100X	32,000 + 140X
(+) Office Overheads [(100 X + 22,500) x Y/100] [(140 X + 32,000) x Y/100]	XY + 225Y	1.4XY + 320Y
Total Cost	100X + XY + 225Y + 22,500	140X + 1.4XY + 320Y + 32,000
Cost	44,850 x (100/115) = 39,000	61,880 x (100/112) = 55,250

100X + XY + 225Y + 22,500 = 39,000

$\Rightarrow$ 100X + XY + 225Y = 16,500 $\rightarrow$ Equ. (1)

140X + 1.4XY + 320Y + 32,000 = 55,250

$\Rightarrow$ 140X + 1.4XY + 320Y = 23,250 $\rightarrow$ Equ. (2)

Equ. (1) x 1.4 $\Rightarrow$ 140X + 1.4XY + 315Y = 23,100

Equ. (2) $\Rightarrow$ 140X + 1.4XY + 320Y = 23,250

(–) (–) (–) (–)

5Y = 150

Therefore, Y = 150/50 = 30

Substituting the value of Y in Equ. (1), we get X

100X + 30X + 225 x 30= 16,500 $\rightarrow$ Equ. (1)

130X + 6750 = 16,500

130X = 9,750

X = 9,750/130 = 75

% of Factory OH on wages = 75%

% of Office OH on works cost = 30%

Illustration 13

Self-help Ltd. has gensets and produced its own power Data for power costs are as follows :-

	Production Depts.		Service Depts.	
	A	B	X	Y
Horse Power Hours	10,000	20,000	12,000	8,000
Needed at capacity production used during the month of May	8,000	13,000	7,000	6,000

During the month of May costs for generating power amounted to ₹9,300, of this ₹2,500 was considered to be fixed. Dept x renders service to other Depts. in the ratio of 13:6:1, while Y renders service at A & B in the ratio of 31:3. Given that the direct labour hours in Depts. A and B are 1,650 hours and 2,175 hours respectively, find the power cost per labour hour in each of these two departments.

Solution:

Statement Showing apportionment of power cost and computation of cost per hour ₹

Particulars	**Basis**	**Total**	**A**	**B**	**X**	**Y**
Fixed Cost	(5:10:6:4)	2,500	500	1,000	600	400
Variable Cost (9,300 – 2,500)	(8:13:7:6)	6,800	1,600	2,600	1,400	1,200
		9,300	2,100	3,600	2,000	1,600
Costs of X [(as it renders to more depts. (3)]	(13:6:1)		1,300	600	(2,000)	100
			3,400	4,200	--	1,700
Costs of Y	(31:3)		1,550	150	--	(1,700)
			4,950	4,350	--	--
Labour Hours			1,650	2,175		
Cost of power per labour hour			3	2		

Illustration 14

At Ltd engineering Co. having 25 different types of automatic machines, furnishes you the following data for 2016-17 in respect of machine B:

1. Cost of the machine ₹ 50,000
   Life - 10 years Scrap value is nil
2. Overhead expenses are:
   - Factory Rent ₹ 50,000 p.a.
   - Heating and Lighting ₹ 40,000
   - Supervision ₹ 1,50,000 p.a
   - Reserve equipment of machine B ₹ 5,000 p.a.
   - Area of the factory 80,000 sq.ft.
   - Area occupied by machine B 3,000 sq.ft.
3. Wages of operator is ₹24 per day of 8 hours including all fringe benefits. He attends to one machine when it is under set up and two machines while under operation.

4. Estimated production hours 3,600 p.a.
   Estimated set up time 400 hrs. p.a.
   Power 0.5 per hour

Prepare a schedule of comprehensive machine hour rate and find the cost of the following jobs:

	JOB 1102	JOB 1308
Set up time (Hrs.)	80	40
Operation time (Hrs.)	130	160

Solution:

Computation of machine hour rate when machine is in operation

Particulars		**Amount**
Standing Charges:		
Rent	50,000 x 3/80 = 1875	
Heating & Lighting	40,000 x 3/80 = 1500	
Supervision	1,50,000 x 1/25 = 6000	
Reserve equipment	= 5000	
	= 14375	
Cost per hour	14375/4000	3.59
Machine Expenses:		
Depreciation	[50,000 ÷ (10 x 3600)] = 1.39	3.39
Wages	[24/8 x 1/2] = 1.50	
Power	= 0.50	
Machine Hour Rate		**6.98**

Computation of machine hour rate when machine is under setup

Particulars		**Amount**
Standing Charges:		
Rent	50,000 x 3/80 = 1875	
Heating & Lighting	40,000 x 3/80 = 1500	
Supervision	1,50,000 x 1/25 = 6000	
Reserve equipment		
	= 5000	
	= 14375	
Cost per hour	14375/4000	3.59
Machine Expenses:		
Depreciation	[50,000 x (10 x 3600)] = 1.39	4.39
Wages	[24/8] = 3.00	
Power	= ----	
Machine Hour Rate		**7.98**

Computation of cost of the jobs

Particulars	Job 1102	Job 1308
Setup cost		
Job 1102 : 80 x 7.98	638.40	
Job 1308 : 40 x 7.98		319.20
Operation Cost		
Job 1102 : 130 x 6.98	907.40	
Job 1308 : 160 x 6.98		1,116.80
Total Cost of the Job	**1,545.80**	**1,436.00**

Illustration 15

Ganges Printing Co. has three operating departments:

1. Printing and Binding
2. Lithographing and
3. Engraving.

The company has a job order cost system using a single predetermined expense rate. The management has been made aware of the deficiencies of using such a rate and is now interested in departmentalising factory overhead. A study reveals that:

Department 1 has 3 similar machines representing a large investment and calling for high repairs and depreciation charges.

Department 2 has the workers perform similar tasks and are therefore paid the same hourly wage.

Department 3 however has several classes of workers, each group being paid the same hourly wage.

The estimated factory overhead and production data costs are as follows

	Printing & Binding	Litho-Graphing	Engraving
Factory overhead (₹)	40,000	68,750	1,20,000
Direct labour hours	10,000	20,000	40,000
Direct labour cost (₹)	25,000	55,000	80,000
Machine hours	20,000	NIL	NIL

Required:

1) An analysis to advice the management regarding the types of rates to be used in these departments.
2) A computation of the rates recommenced.

Solution:

1. It is appropriate to use machine hour rate method of absorbing overheads in Dept 1 because there is large investment in machine and therefore they are predominant.

   OH rate per machine hour = 40,000 / 20,000 = ₹ 2 per hour.

2. In Dept 2, it is better and appropriate to use labour hour rate of overheads because all the workers are paid at uniform wage rate.

   OH rate per labour hour = 68,750 / 20,000 = ₹ 3.4375 per hour.

3. In Dept 3, it is better and appropriate to use overhead rate based on certain % of wages because workers are paid at different rates.

   OH % on wages = (1,20,000 / 80,000) x 100 = 150%

Illustration 16

For a department the standard overhead rate is ₹2.50 per hour and the overhead allowances are as follows:

Activity Level (Hours)	Budget overhead Allowance (₹)
3,000	10,000
7,000	18,000
11,000	26,000

Calculate:

a) Fixed cost

b) The standard activity level on the basis of which the standard overhead rate has been worked out.

Solution:

(a) Fixed Cost

$$\text{Variable OH per hour} = \frac{\text{High level cost – Low level cost.}}{\text{High level hours – Low level hours}}$$

= [(26,000-10,000) / (11,000-3,000)]

= ₹ 2 per hour

Fixed Cost = 10,000 – (3,000 x 2) = ₹ 4,000

(b) Standard activity level at which the rate has been determined

Standard activity level at which the rate has been determined

= Fixed Cost / Fixed OH per hour

= 4,000 / (2.5 – 2) = 8,000 hours

Illustration 17

In a certain factory three products are made from different materials by similar process. For a typical period production costs are as under:

	Product A	**Product B**	**Product C**
	₹	₹	₹
Material used	1,600	2,000	800
Direct labour cost	1,200	1,000	400
Overhead (actual)	800	650	350

Overhead is charged to cost of each product at the rate of 25% on prime cost.

Do you see anything wrong in principle in this method of charging overheads? If so, suggest a preferable method.

Solution:

Since, different materials are used for producing products, it is advisable, preferable and appropriate to use the method of absorbing overheads based on % of materials instead of % on prime cost which is shown as follows:

₹

	A	B	C
Materials	1,600	2,000	800
Labour	1,200	1,000	400
Prime Cost	2,800	3,000	1,200
OH @ 25% on prime cost	700	750	300

% of OH on Material Cost:

A = [700/1600 x 100] = 43.75%

B = [750/2000 x 100] = 37.5%

C = [300/800 x 100] = 37.5%

Illustration 18

A company produced a simple product in three sizes A, B and C. Prepare a statement showing the selling and distribution expenses apportioned over these three sizes applying the appropriate basis for such apportionment in each case from the particulars indicated:

Express the total of the costs so apportioned to each size as:

a) Cost per unit sold (nearest paise)

b) A percentage of sales turnover (nearest to two places for decimal).

The Expenses are:

Expenses	Amount ₹	Basis of apportionment
Sales salaries	10,000	Direct charge
Sales commission	6,000	Sales turnover
Sales office expenses	2,096	Number of orders
Advt. General	5,000	Sales turnover
Advt. specific	22,000	Direct charge
Packing	3,000	Total volume cu.ft. product sold
Delivery expenditure	4,000	--- do ---
Warehouse expenses	1,000	--- do ---
Expenses credit collection	1,296	Number of orders

Data available relating to the three sizes are as follows :

		TOTAL	SIZE A	SIZE B	SIZE C
1.	No. of salesmen, all paid same salary	10	4	5	1
2.	Units sold	10,400	3,400	4,000	3,000
3.	No. of orders	1,600	700	800	100
4.	% of specific advt.	100%	30%	40%	30%
5.	Sales turnover	2,00,000	58,000	80,000	62,000
6.	Volume of cu.ft. per unit of finished products	--	5	8	17

Solution:

Statement Showing apportionment of selling expenses over the sizes and computation of cost per unit and % on sales:

₹

Particulars	**Basis**	**Total**	**A**	**B**	**C**
Sales Salaries	(4:5:1)	10,000	4,000	5,000	1,000
Sales Commission	(29:40:31)	6,000	1,740	2,400	1,860
Sales Office expenses	(7:8:1)	2,096	917	1,048	131
Advt. General	(29:40:31)	5,000	1,450	2,000	1,550
Advt. Specific	(3:4:3)	22,000	6,600	8,800	6,600
Packing	(17:32:51)	3,000	510	960	1,530
Delivery	(17:32:51)	4,000	680	1,280	2,040
Warehouse	(17:32:51)	1,000	170	320	510
Credit collection	(7:8:1)	1,296	567	648	81
		54,392	16,634	22,456	15,302

	Particulars	**A**	**B**	**C**
a)	Cost per unit sold	(16,634/3,400) x 100 = 4.89	(22,456/4,000) x 100 = 5.614	(15,302/3,000) x 100 = 5.10
b)	% on sales	(16,634/58,000) x 100 = 28.67%	(22,456/80,000) x 100 = 28.07	(15,302/62,000) x 100 = 24.68

Working:

	A	**B**	**C**
Volume of cu. ft. per unit of finished products	5	8	17
Units sold	3,400	4,000	3,000
Total volume of cu. ft.	17,000	32,000	51,000

Illustration 19

For a production department of a manufacturing company you are required to :

(a) Prepare a fixed budget of overhead;

(b) Prepare a flexible budget of overhead, at 70% and 110% of budget volume;

(c) Calculate a departmental hourly rate of overhead absorption as per (a) and (b) above.

The budgeted level of activity of the department is 5,000 hours per period and the study of the various items of expenditure reveals the following :

		₹	₹ per hour
Indirect wages			0.40
Repairs	upto 2,000 hours	100	
	for each additional 500 hours		
	upto a total of 4,000 hours	35	
	Additional from 4,001 to 5,000 hours	60	
	Additional above 5,000 hours	70	
Rent and Rates		350	
Power	Upto 3,600 hours	0.25	
	for hours above 3,600	0.20	
Consumable supplies			0.24
Supervision	Upto 2,500 hours		400
	Additional for each extra 600 hours		
	above 2,500 and upto 4,900 hours		100
	Additional above 4,900 hours		150
Depreciation	upto 5,000 hours		650
	above 5,000 hours and upto 6,500 hours	820	
Cleaning	upto 4,000 hours	60	
	above 4,000 hours	80	
Heat and	from 2,100 hours to 3,500 hours	120	
lighting	from 3,500 hours to 5,000 hours	150	
	above 5,000 hours	175	

Solution:

Fixed and Flexible Budget showing overhead cost per hour: ₹

Particulars	**(3,500) 70%**	**(5,000) 100%**	**(5,500) 110%**
Indirect wages (0.4 / hrs.)	1,400	2,000	2,200
Repairs	205	300	370
Rent & Rates	350	350	350
Power	875	1,180	1,280

Consumable Supplies	840	1,200	1,320
Supervision	600	950	950
Depreciation	650	650	820
Cleaning	60	80	80
Heating & Lighting	120	150	175
	5,100	6,860	7,545
OH rate per hour	[5,100/3,500] = 1.457	[6,860/5,000] = 1.372	[7,545/5,500] = 1.372

1. If under absorbed OH is 10% or more of actual OH incurred – Supplementary OH rate is applied. (or)
2. If the amount is considerable, supplementary OH rate applied otherwise we may follow, transferring to P & L A/c or carry forward to next year.

Working Notes:

₹

Repairs	100 + (3x35) = 205	100 + (4x35) + 60 = 300	100 + (4x35) + 60 + 70 = 370
Power	(3500 x 0.25) = 875	(900 + 280) = 1,180	900 + 280 + 100 = 1,280
Supervision	400 + (2 x 100) = 600	400 + (4 x 100) + 150 = 950	400 + (4x100) + 150 = 950

Illustration 20

In a manufacturing unit, overhead was recovered at a predetermined rate of ₹25 per man-day. The total factory overhead incurred and the man-days actually worked were ₹ 41,50,000 and 1,50,000 respectively.

Out of the 40,000 units produced during a period 30,000 units were sold. There were also 30,000 uncompleted units which may be reckoned at 66.67% complete.

On analysing the reasons, it was found that 40% of the unabsorbed overheads were due to defective planning and the rest were attributable to increase overhead costs.

How would unabsorbed overhead be treated in Cost Accounts?

Solution:

	₹
Overheads incurred	= 41,50,000
Overheads absorbed (1,50,000 x 25)	= 37,50,000
Under absorption	= 4,00,000

The under absorption of ₹ 4,00,000 being considerable whether due to defective planning or due to increase in prices, would be disposed off by applying supplementary OH rate in the following manner:

$$\text{Supplementary OH rate} = \frac{4,00,000}{30,000 + 10,000 + (30,000 \times \frac{2}{3})}$$

	= 4,00,000 / 60,000	= 20/3
To be absorbed on cost of goods sold	= 30,000 x 20/3	= 2,00,000
To be absorbed on closing stock	= 10,000 x 20/3	= 66,667
To be absorbed on Work in progress	= 30,000 x 2/3 x 20/3	= 1,33,333
	= 4,00,000	

SELF EXAMINATION QUESTIONS:

1. What is meant by classification of overheads and why it should be attempted?
2. What do you understand by Semi-Variable Overheads? Explain the various methods of segregating Fixed and Variable Overhead Costs.
3. What are the main sources of overhead expenses? State with examples the procedure for such collection from these sources.
4. Define Cost Allocation and Cost Apportionment. Explain fully the distinction between Cost Allocation and Cost Apportionment.
5. Explain the various basis of apportionment of overheads to departments with illustrations as to the items of expenses.
6. Briefly describe two ways of dealing with the problem of apportioning service department costs among service departments which, in addition to do work for the main operational departments, also serve one another.
7. How are the following items treated in Cost Accounts?
   a. Defectives due to bad workmanship and bad materials.
   b. Major repairs of a plant to prolong its useful life.
   c. Labour amenities.
   d. ESI contribution
   e. Fringe benefits to workers.
   f. After sales service cost
   g. Losses due to obsolescence.
   h. Lay off wages paid to workers.
8. As a Cost Accountant explain with reasons how would you treat the following items in Cost Accounts:
   a. Bonus payable under the Payment of Bonus Act, 1965.
   b. Bad Debts
   c. Leave Travel Assistance.
   d. Night Shift Allowance.
9. Explain the terms "Practical Capacity", "Normal Capacity", "Idle Capacity", and "Imbalanced Capacity". With reference to any industry with which you are familiar, how will you measure the effect of Idle Capacity?
10. What is Absorption? What are the various methods of absorbing overheads in Cost Accounts?
11. What is Under or Over Absorption? What are the causes for Under or Over Absorption?
12. What are the various methods of disposing off under or over absorbed overheads?
13. Write a note on Supplementary Overhead Rate.
14. How to report overhead cost in the cost statement?
15. Explain the nature of administration overheads. How they are apportioned?
16. On what basis would you analyse selling overheads for the purpose of judging the effectiveness of these expenses?

17. "While manufacturing overheads are part of costs, selling overheads are result of policy". Comment.

18. "Management's interest in overheads is not in the method of their absorption but in their behaviour under various conditions of production" As a CMA please throw light on the above statement.

PRACTICE PROBLEMS

19. The 'Prabhat Ltd.' is divided into two production cost centers A and B, and two service cost centers X and Y. The following is the summary of overhead costs for a particular period. Works Manager's Salary ₹4,000; Power ₹21,000; Contribution to PF ₹9,000; Rent ₹6,000; Plant Maintenance ₹4,000. Canteen expenditure ₹12,,000; Depreciation of Plant and Machinery ₹ 20,000.

    The following information is made available from the various departments.

	DEPT.A	DEPT. B	DEPT. X	DEPT. Y
No. of Employees	16	8	4	4
Area Sq. Ft.	2,000	3,000	500	500
Value of Plant (₹)	75,000	1,00,000	25,000	—
Wages (₹)	40,000	20,000	10,000	5,000
Horse Power	3	3	1	—

    Apportion the costs to the various departments on the most equitable basis.

    [Ans: A : ₹ 32,800; B : ₹ 30,400; X : ₹ 9,700; Y : ₹ 3,100]

20. In a factory there 5 machines, you are required to calculate Machine hour rate from the following data.

Space of the Departments	8,000 Sq.ft.
Cost of machine (₹)	20,000
Space occupied by each machine	1,600 Sq.ft.

    Power consumed as indicated by meter is ₹3,000 p.a. for this machine.

Depreciation	7 ½ % p.a

    Estimated life 10 years (working hours 2,000 p.a)

    Estimated Repairs p.a. for this machine ₹ 520

Rent & Rates	9,000+
Lighting	750+ for all machines
Supervision	1,500
Other charges	4,000+

    2/5 of the supervision is for this machine. There are three mechanics drawing ₹ 50, ₹60, ₹70 p.m respectively.

    [Ans: Machine hour rate ₹ 4.401]

21. You are required to calculate the machine hour rate from the following particulars.

    a. Cost of the machine ₹10,000/- its estimated working life is 10 years and the estimated scrap value at the end of its life is ₹ 1,000. The estimated working time per year (50 weeks of 40 hours each) is 2,000 hours.

b. Electricity used by the machine is 16 units per hour at the cost of ₹0.10 per unit.

c. The machine requires a chemical solution which is replaced at the end of each week at cost of ₹20/- each time.

d. The estimated cost of maintenance per year is ₹1,200.

e. Two attendants control the operation of the machine together with five other identical machines their combined week wages amount to ₹120.

f. Departmental and General works overheads allocated to the machine for the year were ₹2,000.

[Ans: Machine hour rate : ₹ 4.65]

22. XYZ manufactures household pumps which pass through three departments viz. Foundry, Machine Shop and Assembling.

The manufacturing expenses are as follows:

	Foundry	Machine	Assembling	Total
	₹	₹	₹	₹
Direct wages	10,000	50,000	10,000	70,000
Works Overhead	5,000	90,000	10,000	1,05,000

The factory cost of manufacturing a type of 'C' pump was prepared by the company as follows:

	₹
Material	16
Wages: Foundry	2
Machine Shop	4
Assembling	2
	8
Works Overhead:	
150% of Direct Wages	12
	36

It seems that there is some fallacy. Try to correct it.

[Ans: Correct Factory cost ₹ 34.20]

23. The following are the maintenance costs incurred in a machine shop for six months with corresponding machine hours.

MONTH	MACHINE HOURS	MAINTENANCE COSTS (₹)
January	2,000	300
February	2,200	320
March	1,700	270
April	2,400	340
May	1,800	280
June	1,900	290
	12,000	1,800

Analyse the Machine cost which is semi variable into fixed and variable element.

[Ans: Variable cost per machine hour = ₹ 0.10; Fixed cost ₹ 100]

24. From the following data segregate fixed cost and variable costs.

	Level of Activity	
Capacity (%)	80	100
Labour Hours	400	500
Maintenance expenses of a plant (₹)	2,600	2,750

[**Ans**: Variable Cost per hour ₹ 1.5; Fixed Cost ₹ 2,000]

25. In a factory, there are two service departments P and Q and three production departments A, B and C. In April 2015, the departmental expenses were:

Departments	**A**	**B**	**C**	**P**	**Q**
₹	6,50,000	6,00,000	5,00,000	1,20,000	1,00,000

The service department expenses are allotted on a percentage basis as follows:

Service Departments	**Production Departs.**			**Service Departs.**	
	A	B	C	P	Q
P	30	40	15	-	15
Q	40	30	25	5	-

Prepare a statement showing the distribution of the two service departments' expenses to the three departments by a) Simultaneous Equation Method b) Repeated Distribution Method.

[**Ans**: Total Cost: A – ₹ 7,35,340; B – ₹ 6,86,045 and C – ₹ 5,48,615]

26. The monthly budget of a department is as under:

	₹
Direct material	45,000
Direct wages	60,000
Overheads	90,000
Direct labour hours	15,000
Machine hours	30,000

Find out the overhead recovery rate based on at least five different possible methods of absorption of overheads.

[**Ans**: Direct Material Cost method 200%; Direct Labour Cost Method 150%; Prime Cost Method 85.71%; Direct Labour Hour Rate Method ₹ 6; Machine Hour Rate Method ₹ 3]

27. The following particulars were extracted from the records of Epsilon Ltd. on 31st December:

	Dept. A	Dept. B	Dept. C
	₹	₹	₹
Overhead incurred	2,000	1,500	2,500
Overhead absorbed	2,200	1,400	2,250

The departmental loads during the three months to 31st December averaged:

Dept. A	100% of Normal Capacity
Dept. B	75% of Normal Capacity
Dept. C	50% of Normal Capacity

How would you deal with the balances under or over-absorbed? What preliminaries enquiries would you make?

[**Ans**: Dept. A Over-absorbed ₹ 200
Dept. B under-absorbed ₹ 100
Dept. C Under-absorbed ₹ 250]

28. The overhead expenses of a factory are allowed on the machine hour method. You are required to calculate the hourly rate for a certain machine from the following information:

Cost	₹ 58,000
Estimated scrap value	₹ 3,000
Estimated working life	20,000 hours
Estimated cost of maintenance during working life of machine	₹ 12,000
Power used for machine	₹ 1 per hour
Rent, rates etc. per month (10% to be charged for this machine)	₹ 1,500
Normal machine running hours during a month	180 hours
Standing charges other than rent, rates etc. per month	₹ 200

[**Ans:** ₹ 6.30]

Multiple Choice Questions

1. The allotment of whole items of cost of centres or cost unit is called
   A. Cost allocation
   B. Cost apportionment
   C. Overhead absorption
   D. None of the above
2. Packing cost is a
   A. Production of cost
   B. Selling cost
   C. Distribution cost
   D. It may be any or the above
3. Directors remuneration and expenses form a part of
   A. Production overhead
   B. Administration overhead
   C. Selling overhead
   D. Distribution overhead
4. Charging to a cost center those overheads that result solely for the existence of that cost Center is known as
   A. Allocation
   B. Apportionment
   C. Absorption
   D. Allotment
5. Absorption means
   A. Charging or overheads to cost centers
   B. Charging or overheads to cost units
   C. Charging or overheads to cost centers or cost units

6. Which method of absorption of factory overheads do you suggest in a concern which Produces only one uniform time of product
   A. Percentage of direct wages basis
   B. Direct labour rate
   C. Machine hour rate
   D. A rate per units of output
7. When the amount of under-or-over-absorption is significant, it should be disposed of by
   A. Transferring to costing profit and loss A/c
   B. The use of supplementary rates
   C. Carrying over as a deferred charge to the next accounting year
   D. None of above
8. When the amount of overhead absorbed is less than the amount of overhead incurred, It is called
   A. Under- absorption of overhead
   B. Over-absorption of overhead
   C. Proper absorption of overhead
9. Warehouse expense is an example of
   A. Production overhead
   B. Selling overhead
   C. Distribution overhead
   D. None of above
10. Selling and Distribution overhead are absorbed on the basis of
   A. Rate per unit
   B. Percentage on works cost
   C. Percentage on selling price of each unit
   D. Any of these

[Ans: A, D, B, A , B, D, B, A, C, D]

State the statement is true or false:

1. Departments that assist producing Department indirectly are called service departments.
2. Factory overhead cost applied to a job is usually based on a per-determined rate.
3. Variable overhead very with time.
4. When actual overhead are more than absorbed overheads, it is known as over-absorption.
5. Cash discounts are generally excluded completely from the costs.
6. Cost of indirect materials is apportioned to various departments.
7. A blanket overhead rate is a single overhead rate computed for the entire factory.
8. Under-absorption of overhead means that actual overhead are more than absorbed overhead.

9. The principal based used for applying factory overhead are: units of production, material cost, direct wages, direct labour hours and machine hours.
10. Allocation, for overhead implies the identification of overhead cost centres to which they relate.

[Ans: True: 1,2,5,10 False: 3,4,6,7,8,9]

Fill in the Blanks:

1. Overheads are an aggregate of _____ and_____ and _____.
2. Example of after sales services are _____ and _____.
3. Administration overheads are usually absorbed as a percentage of _____.
4. The difference between actual and absorbed factory overhead is called _____.
5. The term used for charging of overheads to cost units is known as _____.
6. The difference between practical capacity and the capacity based on sales expectancy is known as _____.
7. The _____ rate is computed by dividing the overheads by the aggregate of the productive hours of direct workers.
8. Under or over absorption of overheads arises only when overheads are absorbed by _____.
9. Overhead incurred ₹ 16,000 and overhead absorbed ₹ 15,300. There is under absorption of ₹_____.
10. In Absorption Costing _____ cost is added to inventory.

[Ans: Indirect material Indirect Labour and Indirect Expenses, Repair and Maintenance and replacement of Components, Works Cost, under or over absorbed overheads, absorptions, idle capacity, direct labour hour, predetermined overheads rates, ₹ 700, Fixed cost]

Match the following:

	Column "A"		**Column "B"**
1.	Advertisement	**A**	Value of goods in transit
2.	Credit and collection	**B**	Floor area occupied
3.	Warehouse rent	**C**	A percentage of cash collection
4.	Royalties	**D**	No. of orders
5.	Bad debts	**E**	Sales value
6.	Transit insurance	**F**	Direct allocation

[Ans: E, D, B, F, C,A]