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## UNIT 3 PROCUREMENT, STORAGE AND ISSUE

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### 3.0 OBJECTIVES

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After studying this unit you should be able to:

- define and distinguish between direct and indirect materials;
- define material control and state its objectives;
- explain the steps involved in connection with the purchase of materials;
- explain the objectives and functions of storekeeping; and
- explain the procedure involved in connection with the issue of material.

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### 3.1 INTRODUCTION

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Material constitutes an important part of the cost of production of an article. It is, therefore, necessary to exercise proper control over the procurement, storage and issue of materials. In this unit, you will study the procedure and documents involved regarding the purchase of materials, its storage and issue to the various production orders.

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### 3.2 DIRECT AND INDIRECT MATERIALS

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If you analyse the cost of production of any articles, you will find that materials constitute an important component of the cost of production. They

account for nearly 60 per cent of the cost of production of a large number of private and public sector organisations. The materials can be divided into two categories: (1) Direct materials; and (2) Indirect materials.

The materials which can easily be identified and attributed to the individual units are known as 'direct materials'. These materials form part of the finished product. Leather used in the manufacture of shoes and yarn required for the production of cloth are examples of direct materials. All costs which are incurred to obtain direct materials are known as 'direct material cost'. Indirect materials, on the other hand, do not form part of the finished product and cannot be conveniently and accurately allocated to a particular unit of product. Examples of such materials are: consumable stores, cotton waste and lubricating oils, required for the maintenance of machines, etc. Costs associated with indirect materials are known as indirect material costs.'

The grouping of materials into direct and indirect sometimes become a matter of convenience. Materials of small value which should actually be termed as direct may be treated as indirect for the sake of simplicity. For instance, in the manufacture of shirts, the thread forms part of the shirts and hence should be classified as direct materials. But, considering the time and expense involved in measuring the thread required for each shirt, it is desirable that the cost of thread be treated as indirect material cost. Similarly in the manufacture of shoes, the cost of nails used is treated as indirect material cost.

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### 3.3 MATERIAL CONTROL

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As stated earlier, materials constitute an important part of the cost of production of a product. It is, therefore, important to keep a strict control over the cost of materials. Any savings made in the cost of material will go a long way in reducing the cost of production and improving the profitability of the concern. It is essential to keep a proper control over materials and supplies from the time orders for materials are placed with the suppliers until they have been consumed. Proper control of material can make a substantial contribution to the efficiency of a business.

#### 3.3.1 Definition

Material control may be defined as the regulation of the functions of an organisation relating to procurement, storage and usage of materials in such a way as to maintain an even flow of production without excessive investment in material stock. Thus, materials control involves control of three important function viz., procurement, storage and usage. It has been rightly pointed out that just as the handling of cash is of utmost important in the case of a non-manufacturing business, an efficient handling of materials is of vital importance in the case of a manufacturing business.

#### 3.3.2 Objectives

The following are the main objectives of material control.

- 1) There should be a continuous availability of all types of materials in the factory so that production may not be held up for want of any material.
- 2) Over stocking of materials should be avoided. By doing so the various losses caused by overstocking can be avoided.
- 3) Materials should be purchased on the most favourable terms. This helps in effecting maximum economy in the cost of buying of course, the quality should not be sacrificed at the cost of lower price.

- 4) Purchase of materials should be of the right quality consistent with the standards prescribed in respect of the finished product.
- 5) Materials should be properly stored so as to prevent losses during storage.
- 6) The management should be frequently provided with information regarding the cost of materials and the availability of stock.

### 3.3.3 Advantages

The main advantages of a good system of material control are as follows:

- 1) It ensures unrestricted and continuous supply of materials and may be greatly helpful in preventing production delays.
- 2) It minimises capital investment in the stock of materials.
- 3) It considerably reduces the cost of storage and issuing of materials.
- 4) It eliminates wastage and loss of materials arising on account of spoilage, pilferage, theft, etc.
- 5) It is immensely helpful in introducing the system of perpetual inventory control by which accurate ascertainment and valuation of closing stock are facilitated.
- 6) It ensures the purchase of materials at reasonable prices.
- 7) It aids management in initiating and formulating proper purchase policies regarding materials.

### 3.3.4 Basic Requirements

Materials control extends to all spheres of materials management viz., buying, receiving, inspection, storage consumption and accounting. The following are the basic requirements of a good system of materials control:

- 1) There should be proper co-ordination of all departments which are involved in the purchasing, receiving, testing, approving, storage of materials and payment of price.
- 2) The purchase of materials should be centralised.
- 3) Proper forms should be used with regard to receipt, issue and transfer of materials from one job to another.
- 4) There should be a budget for materials and supplies so that economy in purchasing and use of materials is realised.
- 5) A system of internal check should be introduced in order to have proper check on the purchases of materials, and supplies.
- 6) A well organised system of storage of materials should be undertaken in order to avoid deterioration, pilferage, wastage and evaporation of materials.
- 7) There should be a system of perpetual inventory so that it is possible to find out the quantity and value of materials in stock at any point of time.
- 8) Minimum limit for each item of material should be fixed below which the stock is not allowed to drop. Similarly, the maximum limit should be fixed above which the stock should not be kept.
- 9) There should be a proper system for the issue of materials so that there will be delivery of materials on requisition to the department, processes or jobs in the right quantity and at the moment they are needed.

- 10) Information about availability of materials should be made continuously available to the management so that planning of production may be done keeping in view the inventory balances in stores. Information about obsolete and defective stock should also be given to the management from time to time so that steps may be taken for the disposal of such stock.

**Check Your Progress A**

- 1) Select the correct answer in each of the following cases:
- i) In most of the industries, the most important element of cost is:  
a) Material    b) Labour    c) Overheads
  - ii) Direct material is a:  
a) Fixed cost    b) Variable cost    c) Semi-variable cost
  - iii) Direct material is a:  
a) Manufacturing cost    b) Administration cost  
c) Selling and distribution cost    d) Any of the above
  - iv) Which of the following items of cost should not be treated as direct material:  
a) Electricity representing 90% of the total cost  
b) Sand paper used in production  
c) Thread used in stitching garments  
d) All of the above
- 2) Define materials control.

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**3.4 PURCHASE PROCEDURE**

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You should know that purchasing is the most significant step in the process of material control. In order to ensure that the required materials are available at the right time, in the right quantity and at the right price, there should be a separate purchase department under the control of a purchase manager.

Keeping in view the size and the requirements of an organisation. The function of purchasing can be either centralised or decentralised. Let us study these two systems in detail.

**3.4.1 Centralised Purchasing**

Under centralised purchasing purchases are made at one central point for the whole organisation and from that central point materials are issued to respective departments or jobs as and when required. In other words, centralisation of purchasing refers to the placement of authority for the whole purchasing function in the purchasing department headed by the purchase manager. In medium sized and big companies purchasing function is generally centralised.

**Advantages**

- 1) Centralised purchasing brings about economies in purchasing. Higher trade discount or economies in transport can be obtained because the quantity involved will be large.
- 2) The buying staff concentrates on purchases alone and develops specialised knowledge and skill leading to expert and economical buying.

- 3) It ensures consistent policy with regard to purchases. It avoids haphazard buying and the consequent effect on the finances of the concern.
- 4) Centralised purchasing facilitates the maintenance of one complete set of records for purchase transactions which enables the management to exercise a better and effective control over purchases.
- 5) It relieves the departmental heads of the responsibility of procuring variety of materials. They can thus concentrate on the functions assigned to them.
- 6) Centralisation of purchasing is helpful to the vendors. Their selling costs are reduced as they can easily co-ordinate and supply goods to a single buyer instead of large number of buyers.

#### **Disadvantages**

- 1) The procedure adopted for the purchase of materials is less flexible which may cause undue delays in obtaining supplies.
- 2) The administrative cost of setting up a separate purchase department is likely to be quite high.
- 3) There are chances of misunderstanding between the department which requires the material and purchasing department with the result that wrong purchase of material can be made.

#### **3.4.2 Decentralised Purchasing**

Decentralised purchasing is the reverse of centralised purchasing. Each department makes its own purchases. Decentralised purchasing is also known as 'localised purchasing'.

#### **Advantages**

- 1) It is quite flexible and can be quickly adjusted in accordance with the changed requirements of a particular plant.
- 2) In case of emergency, localised purchasing is best suited and purchases can be procured more quickly.
- 3) Technical requirements of each plant can be ascertained.

#### **Disadvantages**

- 1) As compared to centralised buying, it offers lesser economy in purchasing.
- 2) There are problems of co-ordination among various departments of the organisation and it usually leads to unplanned buying.
- 3) Uniformity in prices may not be ensured because every departmental head may not possess the calibre of an expert buyer.

After analysing the merits and demerits of both the systems, it can be said that centralised purchasing is decidedly better than decentralised purchasing. However, neither of them is considered wholly satisfactory in the case of all types of concerns.

Centralised purchasing is eminently suited to a concern operating only one plant. It is also suitable for a concern operating two or more plants located not far away from one another and producing more or less homogeneous products. However, a manufacturing concern which operates several branches or factories at different places and manufactures different products requiring

different types of materials, can have decentralised purchasing and different factories can meet their requirements by making purchases in the local markets.

**3.4.3 Steps Involved in Purchase**

Although the details of the purchase procedure may vary with individual concerns, the following are the various steps which are usually followed in connection with the purchase of materials.

**1. Purchase Requisition**

A form known as ‘purchase requisition’ is commonly used as a formal request to the purchase department to order goods or services. The purchase requisition serves the dual purpose of authorising the purchasing department to make a purchase and provides a record of the description and quantity of materials required.

The purchase requisition is prepared by the storekeeper for regular stock materials and by the departmental head for special materials not stocked as regular items.

Regular purchase requisitions are prepared when stock is reduced to re-order level, i.e., the level when the order for replenishment should be placed. The requisition is approved by an executive.

Purchase requisitions are generally prepared in triplicate. The original copy is sent to the purchase department, the record is retained by the storekeeper or the executive initiating the purchase requisition and the third copy is sent to the costing department.

The purchase requisition contains the requisition number, date, department, code number, description and quantity of materials required, signature of the person initiating the requisition and signature of one or more executives approving the purchase requisition.

Specimen form of purchase requisition is given in Figure 3.1

**Figure 3.1: Specimen of Purchase Requisition**

**PURCHASE REQUISITION**

No..... Date :.....

Date by which material are  
Required.....

Serial No.	Description	Code No.	Quantity	Remarks

Requested by.....                      Checked by.....                      Approved by.....

**2. Selecting the Supplier**

Having decided to purchase the material, the purchase department invites tenders or quotations for the supply of materials. On receipt of the quotations from the suppliers, a comparative statement known as ‘schedule of quotations’ should be prepared so that a suitable supplier may be selected.

While making the selection, the purchase manager should not mechanically identify the supplier whose quotation is the lowest. He should judiciously decide with whom he has to place the order and in doing so he must consider such factors as price, quality, time of delivery, dependability of the supplier, discount, credit facility, terms of payment, etc.

The specimen of the comparative statement of quotations is given in Figure 3.2

**Figure 3.2: Specimen of Schedule of Quotations**  
**COMPARATIVE STATEMENT OF QUOTATIONS**

Tender No.....

Material .....

Date:.....

Serial No.	Name of the supplier	Quantity	Rate	Terms of delivery	Time of delivery	Remarks

Purchasing clerk \_\_\_\_\_

Purchasing Officer \_\_\_\_\_

**3. Purchase Order**

After choosing the supplier, the purchase department prepares a purchase order for the supply of stores. The order is the written authorisation to the supplier to supply the particular material or materials. The purchase order is an important document not only from the legal point of view, but from the accounting point of view also. It is the evidence of the contract between the buyer and the supplier that binds both the buyer and the supplier to the terms under which the order is placed. It also gives authority to the receiving department to receive the materials, ordered for and to the account department to accept the bill from the supplier for payment.

The purchase order should contain such particulars as date, name and address of the supplier, description and specification of the material, quantity ordered, date, time and place of delivery, price, terms of payment, transport charges, packing and shipping instructions, the name and address of the buyer, and the signature of the purchase manager.

The number of copies of the purchase order depends upon the size of the organisation. A large concern usually issues five copies. Of these the original copy is sent to the supplier, the second to the receiving department, third to the department initiating the purchase requisition, the fourth to the accounts department and the fifth copy is retained in the purchase department. The copy retained in the purchase department is used to check the progress of the order and to ensure that the delivery promises are adhered to.

**Figure 3.3: Specimen of Purchase Order**

**PURCHASE ORDER**

To

(Name and Address of Supplier)

Date : .....

Requisition No.....

Please supply the following items in accordance with the terms and conditions mentioned herein.

Item No.	Description	Quantity	Code No.	Price	Total	Remarks

Packing and dispatching instructions .....

Discount.....

Terms of payment.....

Condition regard empties.....

Excise duty and sales tax.....

For X Y Z Co. Ltd

(Signature )

Chief Purchasing Officer

**4. Receiving and Inspection of Materials**

The receiving department is responsible for taking delivery of packages and to get a physical verification of the contents. When the packages are received, the receiving official gets them opened and makes detailed verification of the contents. After the contents of the packages have been checked, the details of the materials received are entered in a Goods Received Note. Five copies of the note are prepared. One copy is kept by the receiving department while the remaining copies are routed to the purchase department, the department originating the purchase requisition, the stores department, and the accounts department.

The form of the Goods Received Note is given in Figure 3.4.

**Figure 3.4: Specimen of Goods Received Note**

**GOODS RECEIVED NOTE**

Supplier's name.....

G. R. No.....

Purchase order No.....

Date.....

Item No.	Description	Code No.	Quantity ordered	Quantity received	Amount	Remarks

Received by.....  
Storekeeper .....  
Stores ledger posted by.....

Inspected by.....

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Where the factory has a separate inspection department, its main function is confined to testing the material received, for quality and specifications. The engineer or the chemist may be called to check the quality of the materials. He is to ensure that the quality is according to the purchase order. After checking the quality of the materials, the department will submit a report as to the quality and if some of materials are rejected, the reasons therefore. An unfavourable inspection report is utilised by the purchasing department in obtaining, adjustments or an authority for the return of goods to the vendor. This forms the basis for the issue of a debit note.

### **5. Checking and Passing of Bills for Payment**

Invoice is the document giving details of goods supplied and the amount to be paid. Invoice received by the purchase department is forwarded to the Accounting Department to check the authenticity as well as the arithmetical accuracy. The quantity and the price mentioned in the invoice are checked with reference to goods received note and the purchase order respectively. For Adjustment of discrepancies. the inspection report and goods returned note should be compared with the invoice. It is equally necessary to check extensions and totals.

If the contents of the invoice are found to be correct, an endorsement to that effect is made on it with a rubber stamp. With the signature of the purchase manager, the invoice is passed on to the accounts department for payment.

#### **Check Your Progress B**

- 1) Indicate whether the following statements are **True** or **False** and justify your answer.
  - i) Purchase requisition note is prepared by the purchasing department.
  - ii) Purchase order is prepared by the stores department.
  - iii) Original copy of the purchase order is sent to the supplier.
  - iv) Goods received note is prepared by goods receiving department.
  - v) Payment of the invoice is made by the purchase department.
- 2) List the steps involved in purchase of materials.
- 3) What do you mean by centralised purchasing?

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### **3.5 STORAGE OF MATERIALS**

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After the purchase, receipt and inspection of materials, the next most important step in the process of material control is concerned with 'the storage of materials which is termed as 'storekeeping'. Storekeeping is that aspect of material control which is concerned with the physical storage of goods. For carrying the task of storekeeping, a separate stores department under the charge of a storekeeper is set up. The storekeeper should have the technical knowledge and experience in stores routine and the ability of organising various activities relating to the storage of goods, An efficient system of storekeeping should:

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- 1) Ensure uninterrupted supply of materials and stores without delay to various production and service departments of the organisation.
- 2) Prevent overstocking and under stocking of materials.
- 3) Minimise the cost of storage.
- 4) Prevent all kinds of stores from theft, deterioration, evaporation and pilferage.
- 5) Ensure an effective utilisation of available storage space and workers engaged in the process of storekeeping.
- 6) Develop a system of providing necessary information about the material items in the stores as and when required.

### 3.5.1 Functions of Storekeeping

The following functions are performed by the stores department:

- 1) Receipt of material from the goods receiving department and ensuring that every Item of stores received by a storekeeper is duly supported by a indent, a purchase order, an inspection note and a goods received note.
- 2) Issue purchase requisition to the purchase department when the stock of material reaches the re-order level.
- 3) Maintain proper record of receipt, issue and balance of all items of materials, and check the bin card balances with the physical quantities in the bins.
- 4) Placing and arranging materials received at proper and appropriate places and adhering to the golden principle of storekeeping, i.e., a-place for everything and everything in its place.
- 5) Issue stores, against proper authorisation, in right quantity of right specification, and at the right time.
- 6) Minimising the storage handling and maintaining costs.
- 7) Ensuring that the stocks neither exceed the maximum level nor go below the minimum level at any point of time.
- 8) Preventing the entry of unauthorised persons into the stores.
- 9) Co-ordination and supervision of staff in the stores department.
- 10) Carrying out a regular review of the items of stores in hand for locating slow moving and non-moving items so that the necessary steps may be taken for their disposal before they become obsolete.

### 3.5.2 Location and Lay-out of Stores

The location of stores department should be undertaken very carefully. The management should keep in mind various important considerations before selecting proper site for locating the stores department. It should be close to the receiving department so that the transportation charges can be minimised. At the same time, there should be an easy access to all other departments of the factory, roads, railways siding and wharf.

Proper lay-out of stores is also of vital importance. Lay-out refers to the internal arrangement or placement of materials inside the stores. It aims at effective utilisation of space available for storage of materials. The stores

should be divided into racks which should be sub-divided into small spaces. All these spaces are known as bins. For every kind of material a bin is allotted. All bins should be serially numbered.

The stores department should be equipped with racks, shelves, boxes crates, barrels, drums, cylinders and other receptacles for storing the different items. The receptacles should be arranged in such a way as to make the fullest utilisation of available space. At the same time, they should be easily accessible. Enough space should be provided for the movement of trucks, conveyors, lifts and other mechanical devices.

A proper location and lay-out would ensure economy in materials handling, transportation costs, minimise wastage, ensure effective supervision and control.

**3.5.3 Issue of Materials**

All items in stores are meant issuance to various production departments. The procedure for the issue of material is normally laid down by the management.

The storekeeper should not issue the materials unless a properly authourised material requisition is presented to him. The requisition is prepared by the foreman or the head of the department. It is prepared in triplicate, two copies are sent to the stores department and the third copy is retained by the requisitioning department for its own reference. On receipt of the materials requisition, the storekeeper issues the necessary materials against the signatures of the person receiving the materials. One of the copies of the materials requisition is used by the storekeeper for making the necessary entries in the bin card. The other copy is sent to the costing office for pricing the issues and making the necessary entries in the stores ledger.

A specimen of the materials requisition is given in Figure 3.5

**Figure 3.5: Specimen of Materials Requisition**

**MATERIALS REQUISITION**

Department ..... Serial No .....  
 Job No..... Date.....

Quantity	Description	Code No.	Bin Card no	Store ledger Folio no.	Rate	Amount

Authorised by..... Received by.....  
 Storekeeper’s signature ..... Checked by.....

You will notice in the above specimen of materials requisition that it contains information regarding the date, requisition number, description, quantity of the material, name or job order number or work order number or process on

which material is to be used, and the signatures of the person receiving the materials. The entries in the rate' and amount columns of the requisition slip are made by the costing office.

### Bill of materials

Material requisition slip considerably increases the work-load, both in the production department and the stores department. Production may be delayed if requirements are not submitted in time or if the materials are not available in stock. The use of the bill of materials overcomes all these difficulties.

A bill of materials is a standard list (also called specification list) of all materials required for a particular work order, job or process. It is prepared by the production department on receiving the order. It can be used as a substitute for materials requisition. It provides advance intimation to the storekeeper about the requirements of different jobs or work orders.

The bill of materials serves the following purposes:

- 1) The clerical work involved in preparing a number of requisitions is considerably reduced and there is economy in the use of stationery.
- 2) The cost of transportation involved in receiving the required quantity of every type of material is also proportionately reduced since all the materials required for a particular job can be transported to the receiving department only once.
- 3) It serves an advance intimation to the storekeeper and constitutes an authorisation for the issue of materials.
- 4) It may also be used as an authorisation for procurement of materials if these not available in stock. Thus it eliminates the need for the issue of purchase requisitions for procuring materials not available in stock.
- 5) It may be used as a basis for passing accounting entries in the stores ledger.
- 6) The procurement and issue of materials can be planned in advance to avoid delays in production and deliveries.

### 3.5.4 Treatment of Surplus Materials

Sometimes materials may be issued in excess of the requirement for a particular job or work order. This may be done either to facilitate convenient handling or sometimes it may not be possible always to ascertain exactly the quantity of material that will be required. This would result in a surplus of material at the work site. We can dispose of the surplus in two ways. We can either return the surplus material to the stores or transfer the material to some other job or jobs where those materials have been requisitioned.

**Return of Materials:** The document used for return of excess materials to the stores is known as '**materials returned note**' or '**shop credit note**'. The form of the materials returned note is similar to that of material requisition slip. But to distinguish between the two, forms of different colours are generally used. The materials returned note is prepared in duplicate. One copy is retained by the department returning the material and the other

copy is kept by the storekeeper who gets it along with the material returned. The materials returned note is forwarded to the costing office where the necessary credit for value of materials returned is given to the particular job.

**Transfer of materials:** Sometimes excess materials in relation to a job or work order may become useful to another job. In such a case, a material transfer note should be prepared transferring the material from one job to another. This obviates the need to return the excess materials to stores and draw the same again.

You should note that the direct transfer of material from one job to another is undesirable and should be discouraged as far as possible. It is, however, justified when an urgent job has to be completed and it is necessary to appropriate the surplus materials in order to avoid the delay which may be caused if the normal routine of returning the material to stores and then getting them reissued is followed. But, all such transfer of materials must be accompanied by a **Materials Transfer Note** which is signed by the foreman of the sending and receiving departments and forwarded to the costing office where the necessary adjustments shall be made in the respective job accounts. If a transfer of the material is made without the knowledge of the costing office, it will result in excess debit to one job and lower debit to another. As such the true costs of jobs cannot be ascertained and cost comparison would be misleading.

### Check Your Progress C

- 1) Fill in the blanks in the following.
  - i) .....items should be stored as near as possible to the department requiring them.
  - ii) Materials should be issued by the storekeeper against .....
  - iii) A list of all materials and parts required for a particular job is called.....
  - iv) .....is a document which records the return of unused materials.
  - v) .....is a document on which is recorded the transfer of materials from one job or department to another.
- 2) List any three functions of store keeping.

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### 3.6 LET US SUM UP

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Materials are divided into two broad categories: direct and indirect. Direct materials can be easily identified with the finished product whereas indirect materials cannot be so identified. However, sometimes materials of small value, though forming part of the finished product are treated as indirect for the sake of simplicity.

Since materials constitute an important part of the cost of production, it is important to keep a proper control over them from the time orders for materials are placed with the suppliers initial they have been consumed. Proper control over material can make a significant contribution to the efficiency of business. Materials control involves the control over the procurement, storage and usage of materials.

The responsibility for the purchase of materials is entrusted to a separate purchase department under the charge of a purchase manager. The purchase function may be centralised or decentralised. Centralised buying is decidedly better than the decentralised buying due to relative merits of the former over the latter. However, neither of them can be considered as wholly satisfactory in the case of all types of concerns. The purchase department adopts a standard procedure for the purchase of materials. It involves: (i) receiving purchase requisition (ii) inviting quotations (iii) selecting the supplier, (iv) placing the order, (v) receiving the materials and transferring them to stores, and (vi) passing bills for payment.

Storage is the art of preserving raw materials and finished goods in the stores in the best possible manner. The stores department should be located as near as possible to the goods receiving department. It should have facilities for the storage of all types of goods in such a manner so as to avoid the possibility of loss in storage. The issue of materials from stores should be on the basis of properly authorised materials requisition slip. Surplus materials issued to a job may either be returned to stores or transferred to some other job where the same materials are required. Accordingly, the shop will prepare the materials returned note or the materials transfer note.

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### 3.7 KEY WORDS

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**Bill of Materials :** A standard list, of materials and components required for a particular work order.

**Centralised Purchasing:** Purchase of materials by a specialised department.

**Decentralised Purchasing:** Purchases to be made by individual departments.

**Goods Received Note:** A document prepared by the receiving department on receipt of materials.

**Goods Received Note :** A document prepared by the receiving department on receipt of materials.

**Lay-out of Stores:** Internal arrangement or placement of materials inside the stores.

**Material Control:** Regulating the functions of procurement, storage and usage of materials in such a way as to maintain an even flow of materials to production and avoid excessive investment in stock of materials.

**Materials Returned Note:** A document used for the return of excess materials to the stores.

**Materials Requisition Slip:** A document on the basis of which materials are issued by the storekeeper.

**Materials Transfer Note:** A document used for the transfer of materials from one job to another.

**Purchase Order:** A request made by the purchaser to a supplier to deliver certain goods of requisite quality and quantity at the terms and conditions agreed upon.

**Purchase Requisition Slip:** A document requesting, the purchasing department to purchase certain materials.

**Storekeeping:** Function of maintaining stores.

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### 3.8 ANSWERS TO CHECK YOUR PROGRESS

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- A) 1. i) a ii) b iii) a iv) d  
B) 1. i) False ii) False iii) True iv) True v) False  
C) 1. i) Bulky ii) Materials Requisition iii) Bill of Materials  
iv) Materials Returned Note v) Materials Transfer Note
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### 3.9 TERMINAL QUESTIONS

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- 1) What do you understand by direct material and indirect material? Give examples.
- 2) What do you understand by materials control? Give its main objectives.
- 3) What are the important requirements of an efficient system of material control?
- 4) Distinguish between centralised purchasing and decentralised purchasing.
- 5) Outline the routine for the purchase and receipt of stores noting the important documents involved.
- 6) What is a Goods Received Note? Give its specimen form and state the purpose it serves.
- 7) Describe the functions of the stores department.
- 8) State the procedure for the issue of materials.
- 9) State the documents used in connection with receipt, issue, transfer and return of materials from production to stores.
- 10) Under what circumstances should surplus material be transferred to another job?

**Note:** These questions will help you to understand the unit better. Try to write answers for them and verify with the content. But do not submit your answers to the University. These are for your practice only

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### SOME USEFUL BOOKS

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- Arora M.N. 2003. A Text Book of *Cost Accountancy*, Vikas Publishing House Pvt. Ltd.: New Delhi. (Chapter 3-8).
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- Nigam, B.M.L. and G.L. Sharma, 2018. *Theory and Techniques of Cost Accounting*, Himalaya Publishing House: Bombay. (Chapter 4-7).
- Rajiv Goel, *Cost Accounting*, International Book House.

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## UNIT 4 INVENTORY CONTROL

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### Structure

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### 4.0 OBJECTIVES

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After studying this unit, you should be able to:

- define the term inventory control and list its objectives;
- enumerate the various techniques of inventory control;
- explain the various stock levels, and the methods of their calculation;
- define the term ordering quantity and list the factors on which it depends;
- explain the record maintained by the store keeper and the costing department;
- define perpetual inventory system and explain its advantages; and
- determine the stock turnover ratio to determine the fast and slow moving stocks.

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### 4.1 INTRODUCTION

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You have learnt that inventories constitute a significant part of the total production cost of a product. An inadequate stock of inventory leads to holding up of production thereby leading to customer dissatisfaction, loss of revenue etc. Excessive investment in inventory, on the other hand, leads to locking up of capital results in losses due to deterioration and obsolescence of products. Thus, control of inventory will go a long way in reducing the cost of production and improving the profitability of a concern. In this unit, you will study the various methods by which a firm exercises proper control over inventories and avoids losses arising from under stocking and overstocking of materials.

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## 4.2 MEANING AND OBJECTIVES OF INVENTORY CONTROL

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### 4.2.1 Meaning

Inventory control includes control over raw materials, stores supplies, spare parts, partly finished goods and finished goods. It is a system which ensures the required quantity of inventories of the required quality, at the required time and with the minimum amount of capital. The function of inventory turnover is to obtain maximum inventory turnover with sufficient stock to meet all requirements. The quantum of inventory to be kept is decided after taking into consideration the availability of finance, the quantum of discount allowed, the cost of storage and storage space available etc.

### 4.2.2 Objectives Inventory Control

The main objectives of inventory control are as follows:

- i) To provide continuous flow of inventory for efficient and uninterrupted flow of production.
- ii) To avoid excessive investment in inventory and consequently reducing carrying costs.
- iii) To keep surplus and obsolete items to the minimum.
- iv) To relieve the management in taking inventory decisions for various items of inventory from time to time.

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## 4.3 TECHNIQUES OF INVENTORY CONTROL

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The following are the common techniques of inventory control:

- 1) ABC analysis
- 2) Setting of various stock levels
- 3) Economic order quantity
- 4) Use of perpetual inventory records and continuous stock verification
- 5) Use of control ratios and review of slow and non-moving items.

### 4.3.1 ABC Analysis

For the purpose of exercising selective control over materials, manufacturing concerns find it useful to divide materials into three categories. An analysis of the annual consumption of materials of any organisation would indicate that a handful to top high value items (less than 10 per cent of the total number) will account for a substantial portion of about 70 per cent of total consumption value. Similarly, a large number bottom items (over 70 per cent of the total number of items) account for only about 10 per cent of the consumption value. Between these two extremes will fall those items the percentage number of which is more or less equal to their consumption value. Items in the top category are treated as 'A' items, items in the bottom category are called as 'C' category items and the items that lie between the top and the bottom are called 'B' category items. Such an analysis of materials is known as 'ABC analysis' or 'Proportional parts value analysis.

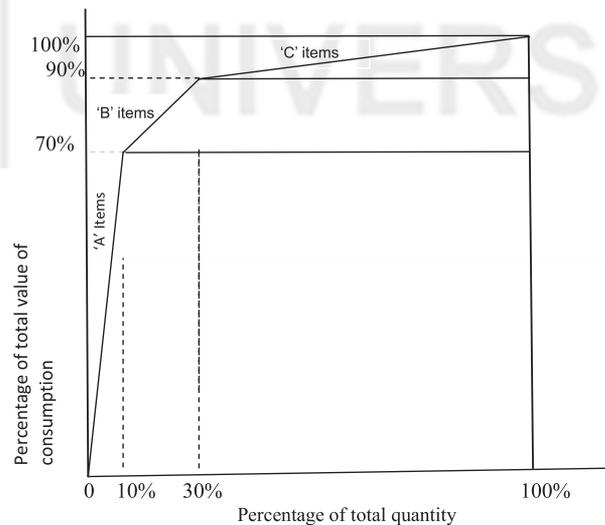
The logic behind this kind of analysis is that the management should study each item of stock in terms of its usage, lead time, technical or other problems and its relative money value in the total investment in inventories. Critical i.e., high value items deserve very close attention and low value items need to be devoted minimum expense and effort in the task of controlling inventories. The material manager by concentrating on 'A' class items is able to control inventories and show visible results in a short span of time. By controlling 'A' items and doing a proper inventory analysis, obsolete stocks are automatically pinpointed. ABC analysis also helps in reducing the clerical costs and results in better planning and improved inventory turnover. ABC analysis has to be resorted to because equal attention to A, B and C items will not be worthwhile and would be very expensive.

The following steps will explain to you the classification of the items into A, B and C categories.

- 1) Calculate the unit cost and the usage of each material over a given period.
- 2) Multiply the unit cost by the estimated usage to obtain the net value.
- 3) List out all the items by rupee annual issues and arrange them in the descending value.
- 4) Accumulate value and add up number of items and calculate percentage on total inventory in value and in number.
- 5) Draw curve of percentage items and percentage value.
- 6) Mark off from the curve the rational limits of A, B and C categories

The graphical representation of ABC analysis is shown in Figure 4.1.

Figure 4.1: ABC Analysis



### Check Your Progress A

- 1) Indicate whether the following statements are **True** or **False**:
  - i) In ABC analysis 'A' group of items consist of those materials the value of which is not high but which are used in large quantities.
  - ii) ABC analysis is based on the principle of management by

exception.

- 2) Define Inventory Control.
- 3) List the main objects of inventory control.

### 4.3.2 Stock Levels

You know that the maintenance of proper stock of each item of stores is one of the main functions of stores department. If large quantity of stores is maintained it would lead to huge investment, large space coverage, dangers of deterioration in quality, etc. On the other hand, less stock will result in frequent purchases, higher costs, lo of production etc. It implies that there is always a limit to the minimum and maximum quantity of materials in stores.

In order to ensure that the optimum quantity of material is purchased and stored, neither more nor less, the storekeeper applies scientific technique of material management. Fixation of certain levels for each item of materials is one of such techniques. The following levels are generally fixed:

- 1) Minimum stock level, 2) Maximum stock level, 3) Re-ordering level, 4) Danger level, and 5) Average Stock level

#### Re-ordering level

You should know the level at which the storekeeper will initiate the requisition for the purchase of materials for fresh supplies. This level is referred to as 're-order level' or 'ordering level'. This level normally lies between the maximum and minimum stock level. This level will usually be higher than the minimum stock level to cover for emergencies as abnormal usage of material or unexpected delay in delivery of fresh supplies. The fixation of this level normally takes into consideration the lead time (period of supply or re-order period), rate of consumption and the economic ordering quantity. Re-ordering level can be calculated according to any one of the following formulas:

$$\text{Re-order level} = \text{Maximum consumption} \times \text{Maximum re-order period}$$

OR

$$\text{Re-order level} = \text{Minimum level} + \text{consumption during the time required to get fresh deliveries}$$

The following illustrations 1 and 2 will explain to you the calculation of the re-order level.

#### Illustration 1 :

Calculate the re-order level from the following information:

Maximum consumption	=	400 units per week
Minimum consumption	=	250 units per week
Re-order period	=	4 to 6 weeks

#### Solution :

$$\text{Re-order level} = \text{Maximum consumption} \times \text{Maximum re-order period}$$

**Material and Labour**

$$= 400 \times 6 = 2,400 \text{ units}$$

**Illustration 2:**

Find out the order level from the following information:

$$\text{Maximum stock} = 2,500 \text{ units}$$

$$\text{Minimum stock} = 1,000 \text{ units}$$

$$\text{Time required for receiving the material} = 10 \text{ days}$$

$$\text{Daily consumption, of material} = 50 \text{ units}$$

**Solution :**

$$\begin{aligned} \text{Re-order level} &= \text{Minimum stock level} + \\ &\quad \text{consumption during the} \\ &\quad \text{period required for fresh} \\ &\quad \text{delivery} \\ &= 1,000 + 50 \times 10 \\ &= 1,000 + 500 = 1,500 \text{ units} \end{aligned}$$

**Minimum Stock level**

Minimum stock level points to the level of an item of material below which the stock in hand is not normally allowed to fall. In other words, it refers to the minimum quantity of a particular item of materials which must be kept in stores at all times.

This limit is fixed so as to avoid the possibility of suspension of production due to shortage of material. In fixing this level the following important factors, among others are taken into consideration:

- i) Lead time i.e., time lag between indenting and receiving of material
- ii) Rate of consumption of material during the lead time
- iii) Re-order level

Minimum stock level can be determined by applying the following formula:

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

Illustration 3 will explain to you the calculation of the minimum stock level.

**Illustration 3:**

Calculate the minimum stock level from the following data:

$$\text{Net normal consumption} = 400 \text{ units per week}$$

$$\text{Normal re-order period} = 5 \text{ weeks}$$

$$\text{Re-order level} = 3,500 \text{ units}$$

**Solution:**

$$\begin{aligned} \text{Minimum stock level} &= \text{Re-order level} - (\text{Normal} \\ &\quad \text{consumption} \times \text{Normal re-order period}) \\ &= 3,500 - (400 \times 5) \\ &= 3,500 - 2,000 = 1,500 \text{ units} \end{aligned}$$

**Maximum stock level**

It is that quantity of material above which the stock of any item should not be allowed to exceed. The main object of fixing the maximum stock level

is to avoid undue investment in stock and to use the working capital in a proper way.

Maximum stock level is fixed by taking into consideration the following factors:

- 1) Amount of working capital available
- 2) Normal rate of consumption of materials during the lead time
- 3) Time necessary to obtain deliveries
- 4) Availability of storage space
- 5) Economic ordering quantity
- 6) Cost of carrying the inventory
- 7) Possibility of loss due to evaporation, deterioration etc.
- 8) Extent to which price fluctuations may be important.
- 9) Possibility of change in fashion, habit etc., which may necessitate the change in the specification of materials
- 10) Incidence of insurance costs which may be important for some materials.

The following formula is generally used for the calculation of maximum stock level.

$$\text{Maximum stock level} = \text{Re-order level} + \text{Re-order quantity} - \frac{(\text{Minimum consumption})}{\text{Minimum re-order period}}$$

#### **Danger level**

This is generally a level below the minimum level. When stock reaches this level, urgent action is needed for replenishment of stock. If no emergency steps are taken to restock the materials, the stores will be completely exhausted and normal production stopped. At this level no further issues are made by the storekeeper except on special requisition approved by the works manager. The level is generally calculated by taking into account the time required to get the materials by the quickest possible means of transport i.e., minimum time required for obtaining supplies from any possible source. It is calculated as follows:

$$\text{Danger level} = \text{Average consumption} \times \text{Maximum re-order period for emergency purchases}$$

#### **Average stock level**

Average stock level is usually calculated with the help of the following formula:

$$\frac{1}{2} (\text{Minimum stock level} + \text{Maximum stock level})$$

Depending upon the availability of information average stock level can also be calculated as follows:

$$\text{Average stock level} = \text{Minimum stock level} + \frac{1}{2} \text{Re-order quantity}$$

Illustration 4 will explain to you the calculation of the various stock level is.

**Illustration 4 :**

From the following information, calculate:

- a) Re-ordering level  
 b) Minimum stock level  
 c) Maximum stock level
- |                            |   |                       |
|----------------------------|---|-----------------------|
| Re-order quantity          | = | 30,000 units          |
| Time required for delivery | = | 2 – 4 months          |
| Maximum consumption        | = | 8,000 units per month |
| Normal consumption         | = | 5,000 units per month |
| Minimum consumption        | = | 3,000 units per month |

**Solution:****a) Re-ordering level**

$$= \text{Maximum consumption} \times \text{Maximum re-order period}$$

$$= 8,000 \times 4 = 32,000 \text{ units}$$

**b) Minimum stock level**

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

$$= 32,000 - (5,000 \times 3)$$

$$= 32,000 - 15,000 = 17,000 \text{ units}$$

**NOTE:** Normal re-order period =  $\frac{2+4}{2}$  3 months

**c) Maximum stock level**

$$= \text{Re-order level} + \text{Re-order quantity} - (\text{Minimum consumption} \times \text{Minimum re-order period})$$

$$= 32,000 + 30,000 - (3,000 \times 2)$$

$$= 32,000 + 30,000 - 6,000$$

$$= 62,000 - 6,000 = 56,000 \text{ units}$$

**4.3.3 Re-Order Quantity**

It is helpful to determine in advance to how much should the storekeeper buy when the stock reaches the re-order level. This quantity is known as 're-order quantity' (ROQ). The quantity ordered must be such that when the same is received the stock level will not exceed the maximum stock to be carried at any point of time. The re-order quantity is also referred to as the economic order quantity. It is called 'economic order quantity' (EOQ) because the purchase of this size of materials is most economical. Purchase of material larger than the economic order quantity of material will result in increase in the carrying cost. If on the other hand small quantities of materials are purchased at frequent intervals the ordering cost will increase and will lead to disruption in the production due to inadequate inventory. The economic order quantity is fixed at such a level as to minimise the cost of ordering and carrying the stock. It is the size of the order which produces the low cost of material ordered. Carrying cost includes the interest on investment, obsolescence losses, space costs, storage charges such as warehouse rent, insurance, heating

and lighting expenses on stores staff, pilferage, breakage etc. The cost of ordering is independent of the size of the order and includes costs due to extra purchasing, handling and transportation costs, higher price due to small order quantities, frequent stock outs, resulting in disruption of production schedules, overtime and extra set up time, loss of sales and customer goodwill etc.

The economic order quantity can be calculated by making use of the following formula:  $EOQ = \frac{2UO}{\sqrt{I}}$

where EOQ = Economic order quantity

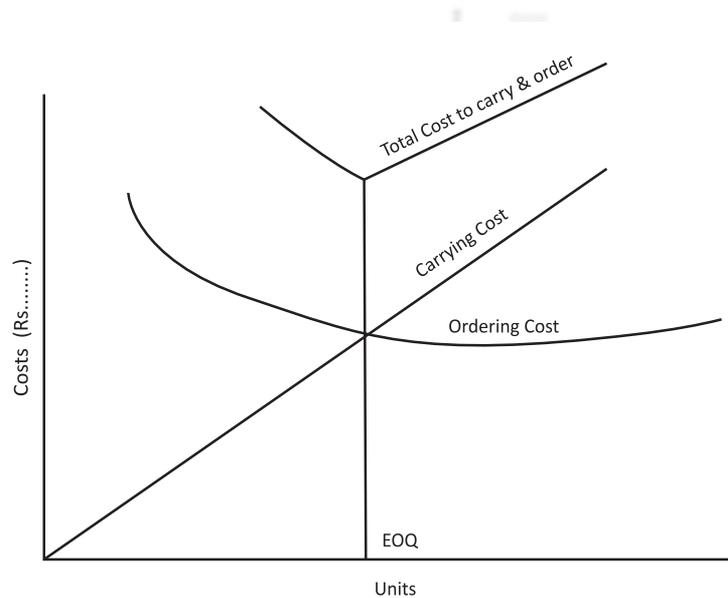
U = Annual usage in units

O = Cost of placing one order including the cost of receiving the goods

I = Cost of carrying one unit of inventory for one year

Diagram representing the Economic Order Quantity is shown in Figure 4.2

**Figure 4.2: Economic Order Quantity**



#### Assumptions in the calculation of economic order quantity

The calculation of economic order quantity is subject to the following conditions:

- 1) The quantity of the item to be consumed during a particular period is known.
- 2) Cost per unit is known and is constant. Further quantity discounts are not involved.
- 3) Ordering cost and carrying cost are known. They are fixed per unit and will remain the same throughout.
- 4) Quantity ordered is delivered immediately. The following illustration will explain to you the calculation of economic order quantity.

#### Illustration 5 :

From the following particulars calculate the economic order quantity

Annual usage = 6,000 units

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Cost of the material per unit	=	Rs. 2.50
Cost of placing and receiving one order	=	Rs. 15.00
Annual carrying cost of one unit	=	20% of inventory value

### Solution :

$$\text{Economic order quantity} = \frac{2UO}{\sqrt{I}}$$

$$U = 6,000 \text{ units}$$

$$O = \text{Rs.15.00 per unit}$$

$$I = 20\% \text{ of Rs. 2.50 to Rs. 0.50}$$

Substituting the values in the above formula

$$EOQ = \sqrt{\frac{2 \times 6,000 \times 15}{0.50}}$$

$$= \sqrt{\frac{1,80,000}{0.50}} = \sqrt{3,60,000}$$

$$= 600 \text{ units}$$

### Check Your Progress B

- 1) Indicate whether the following statements are **True** or **False** and justify your answer .
  - i) When maximum stock level is fixed, the stock in hand should never exceed this level.
  - ii) Re-ordering level is always fixed somewhere between maximum and minimum stock levels.
  - iii) Minimum stock level is the level of materials at which a new order for material is to be placed.
  - iv) Economic order quantity is the re-order quantity.
- 2) How do you compute average stock level?
- 3) List the assumptions made while fixing the re-order quantity.

### 4.3.4 Stores Records

In order to exercise proper control over materials, it is necessary to record the physical movement of every item of materials. One of the main functions of the storekeeper is to maintain records for receipts, issues and balances of various items of materials. Bin card and stores ledger are the two important stores records that are generally kept for making a record of the various items of stores.

#### Bin Card

A bin card provides a quantitative record of the receipts issues and balance of material. A bin is a place where the goods are stored. A bin may be a shelf, an almirah, open space etc. depending upon the nature of the commodity. These cards are usually attached to or place near the bin so that receipts and the issues may be entered therein as soon as they take place. **Separate bin cards are prepared for each item of stores** and if two different materials

are kept in one almirah, two bin cards one for each item are prepared, treating the almirah as two bins.

The bin card provides a continuous record of the stock in each bin and assist the firekeeper to control the stock. For each material the maximum stocks to be held an ordering level is also indicated therein so that fresh supplies may be ordered before the minimum is reached. These cards also provide an independent check on the stores ledger. In large organisations, the storekeeper also maintains 'store control cards' which are similar to bin cards and are kept by him close at hand. This obviates the difficulty of going to bins for obtaining the necessary information as and when required.

A specimen of the bin card is given in Figure 4.3.

**Figure 4.3 : Specimen of Bin Card**

**BIN CARD**

Name ..... Maximum level.....  
 Description ..... Minimum level.....  
 Bin No ..... Ordering level.....  
 Location code ..... Re-order quantity.....  
 Stores ledger folio..... Unit.....

Receipts			Issues			Balance Quan- tity	Audit	
Date	G.R.No	Qty	Date	Req. No	Qty		Date	Initials

**Stores Ledger**

This ledger is kept in the costing department and is identical with the bin card except that **the receipts, issues and balances are shown along with their money values.** Stores ledger contains an account for each class of material and facilitates ascertainment of all details relating to the material in minimum time. It provides a continuous record of stores received and issued and discloses the balance in hand at any time both in quantity and value. It thus furnishes management with a perpetual inventory.

Stores ledger is generally maintained in the form of loose leaf cards. These cards should be serially numbered to obviate the risk of removal or loss.

A specimen of the stores ledger is given in Figure 4.4.

**Figure 4.4: Specimen of Stores Ledger**

**STORES LEDGER**

**ABC Co. Ltd.**

**Material and Labour**

Name ..... Maximum level.....  
 Description ..... Minimum level.....  
 Location code ..... Ordering level.....  
 Re-order quantity .....  
 Unit .....

Date	Receipts			Amount	Issues			Amount	Balance			Remarks
	G.R.No	Quantity	Rate		Reqn No.	Quantity	Rate		Quantity	Rate	Amount	

**Difference between Bin Card and Stores Ledger**

<b>Bin Card</b>	<b>Stores Ledger</b>
1. Bin Card is not an accounting record	1. Stores ledger is the basic accounting record
2. It is a record of quantity only	2. It is a record of both quantity and value
3. It is kept inside the stores	3. It is kept outside the stores
4. It is maintained by the storekeeper	4. It is maintained by the costing department
5. Each transaction is individually posted	5. Transaction may be posted periodically and in total.

It should be noted that documents like goods received note, materials requisition slip, materials returned note, etc. also form part of stores records.

**Check Your Progress C**

- 1) Fill in the blanks.
  - i) Stores ledger is maintained in the .....
  - ii) Bin Card is a record of .....only.
  - iii) Bin Card is maintained by .....
  - iv) Quantities of materials on hand as shown by bin cards should agree with quantities actually on .....
- 2) Indicate whether the following statements are **True** or **False** and justify your answer.
  - i) Bin Card shows the quantity and value of material at any moment of time
  - ii) Bin cards are not a part of accounting, records.
  - iii) The bin card and stores ledger are written up with the help of same basic documents
  - iv) Stores control card is used as an alternative to bin card.
  - v) Documents like materials requisition and goods received note also form part of stores records

### 4.3.5 Perpetual Inventory System

In order to facilitate regular checking and to obviate closing down of work for stock taking, a method of recording stores balances after each receipt and issues, is adopted. This method is known as perpetual inventory system. Bin cards and the stores ledger help the management in maintaining this system as they make a record of the physical movements of the stock on the receipts and issues of materials and also reflect the balance in the stores. **To ensure the accuracy of perpetual inventory records, physical verification of stores is made by a programme of continuous stock taking.**

It is advisable that a number of items should be counted and checked daily or at frequent intervals and compared with the bin cards or stores ledger.

The actual stock of material should not differ from the recorded stock under normal circumstances. However, differences do arise on account of the following reasons which may be classified as unavoidable and avoidable causes.

The usual **unavoidable causes** are:

- i) Shrinkage and evaporation
- ii) Climatic conditions causing deterioration e.g., absorption of moisture, etc.
- iii) Losses arising out of breaking up bulk material as in case of sawing wood.
- iv) Losses due to accident, fire, etc.

The avoidable causes are:

- i) Errors in posting or calculation of receipts, issues or balances on bin cards or stores ledger.
- ii) Pilferages and breakages.
- iii) Entering transactions in the wrong bin card or in wrong stores ledger.

#### **Advantages :**

The following are the advantages of the perpetual inventory method:

- 1) It is possible to prepare monthly and quarterly profit and loss statements and balance sheet without physical inventory being taken for all the items. This is possible because the figure of the closing stock can be taken from the bin card or the stores ledger.
- 2) It obviates the necessity for physical checking of all items of stores at the end of the year and thereby avoids dislocation of production.
- 3) Actual stock can be compared with the authorised maximum and minimum levels, thus keeping the stock within the prescribed limits. The disadvantages of excess stock are avoided and capital tied up in stores material cannot exceed target.
- 4) The method has a moral effect on the staff, makes them disciplined and careful and acts as a check against dishonest actions.
- 5) As the work of recording and continuous stock taking is carried out systematically and without undue haste, the figures are more reliable.
- 6) Discrepancies and errors are promptly discovered and remedial action can be taken to prevent their reoccurrence in the future.

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- 7) A detailed and more reliable check on the stores is obtained.
- 8) Stock figures are available for insurance purposes.
- 9) It reveals the existence of surplus, obsolete and slow moving material and hence remedial action can be taken.
- 10) A system of internal check remains in operation. Bin card and stores ledger act as a cross check on each other. As such the errors are detected as and when they are committed.

### 4.3.6 Inventory Turnover Ratio

It is one of the techniques for exercising control over inventory. The ratio expresses the relationship between the cost of the material consumed to the average inventors held during that period. The ratio is calculated as follows:

$$\text{Inventory Control ratio} = \frac{\text{Cost of material consumed during the period}}{\text{Cost of average stock held during the period}}$$

Average stock can be calculated by adding opening and closing stocks and then dividing it by two.

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

**The inventory turnover ratio indicates the index of the efficiency or inefficiency with which inventories are maintained.** It is in the best interest of the organisation to compare the turnover of different types and grades of material as a measure of detecting stock which does not move regularly thereby minimising capital or investment in undesirable stock. A low ratio indicates bad buying, accumulation of obsolete stock, carrying of too much stock etc. On the other hand a high ratio is an indicator of fast moving stock and less investment in stock.

Illustration 6 will explain to you the calculation of inventory turnover ratio and 28 indicate the period for which the average inventory is held.

#### Illustration 6 :

Calculate the inventory turnover ratio for the year 2018 from the following information and express the same in number of days the average inventory is consumed for each material and comment on the purchasing procedure.

	Material X Rs.	Material Y Rs.
Opening Stock	40,000	60,000
Purchases during the period	2,80,000	80,000
Closing Stock	20,000	40,000

#### Solution:



of time. ABC analysis helps in reducing clerical cost and results in better planning and improved inventory turnover.

Fixation of various stock levels for each item of material is one of the scientific techniques of material management, and helps to ensure that optimum quantity of material is purchased, and stored neither more nor less.

The fixation of economic order quantity helps in the determination of the quantity of material for which order should be placed when the stock reaches the re-order level. The economic order quantity is fixed at a level which minimises the cost of ordering and carrying the stock.

The perpetual inventory control system is a method of recording stores balances after each receipt and issue, to facilitate regular checking and to obviate closing down of work for stock taking. Inventory turnover ratio expresses the relationship between the cost of the material consumed to the average inventory held during that period. The number of times an inventory is used within a particular period is a good measure of the efficiency of material control and material utilisation. Thus knowing the turnover of different items it is possible to avoid keeping capital locked up in undesirable stocks.

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#### 4.5 KEY WORDS

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**Inventory control:** A system which ensures the provision of the required quantity of inventories of the required quality at the required time with the minimum amount of investment.

**ABC analysis:** A system of stock control based on the annual consumption value.

**Maximum level:** It represents the maximum quantity above which stock should not be held at any time.

**Minimum level:** It represents the minimum quantity of stock that should be held at all times.

**Danger level:** Normal issues of stock are usually stopped at this level and made only under specific instructions.

**Ordering level:** The level of stock at which indents should be placed for replenishing stocks.

**Re-order quantity:** It is the quantity to be ordered when the stock reach the re-order level. It is also called economic order quantity.

**Lead time:** Time lag between the indenting and receipt of material. It is also called re-order period.

**Carrying cost:** Cost of holding the material in the stores.

**Ordering cost:** Cost of placing an order for the purchase of materials.

**Bin card:** Is a card which provides a continuous record of the receipt, issues and balance of each item of materials.

**Stores ledger:** A record kept in the costing department which contains information regarding receipts, issues and balance of each item of material along with their money values.

**Perpetual Inventory system:** A system of ascertaining current balance after recording every receipt and issues of materials through stock records.

**Stock turnover ratio:** Ratio of the value of material consumed during a period to the average value of inventory during the period.

#### 4.6 ANSWERS TO CHECK YOUR PROGRESS

- A) 1. i) False                      ii) True
- B) 1. i) True                      ii) True                      iii) False                      iv) True
- C) 1. i) Cost Accounting Department ii) quantities  
       iii) storekeeper            iv) hand
2. i) False ii) True iii) True iv) False v) True
- D) 1. i) perpetual inventory system    ii) bin card and stores ledger  
       ii) moral check    iv) continuous stock taking  
       v) avoidable, unavoidable

#### 4.7 TERMINAL QUESTIONS/EXERCISES

##### Questions

- 1) What do you understand by inventory control? What are its objectives?
- 2) What do you understand by ABC analysis? How is the control of stores items effected through ABC analysis?
- 3) Explain the terms minimum level, maximum level, and ordering level of stock. What are the factors that govern the fixation of these levels.
- 4) What is economic order quantity? How is it calculated?
- 5) What is a bin card? Give its specimen form and discuss its utility.
- 6) What is meant by perpetual inventory control system. Describe its advantages.
- 7) What is meant by inventory turnover? Discuss the importance of inventory turnover ratio in the control of inventory.

##### Exercises

- 1) Two components A and B are used as follows:
 

Normal usage	50 per week each
Minimum usage	25 per week each
Maximum usage	75 per week each
Re-order quantity	A 300 B 500
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.

**Answer:** A. a) 450 units b) 200 units c) 650 units  
 B. a) 300 units b) 150 units c) 750 units

## Material and Labour

2) Calculate economic ordering quantity from the following particulars:

Annual usage	6,000 units
Cost of material per unit	Rs. 20.00
Cost of placing and receiving one order	Rs. 60.00

Annual carrying cost of one unit 10 per cent of inventory value  
(Answer 600 units)

3) From the following data for an accounting year calculate the inventory turnover and express the same in number of days the average inventory is consumed for each material

	Material X Rs.	Material Y Rs.
Opening stock	1,000	1,200
Purchases during the year	5,200	4,600
Closing stock	600	1,600

(Answer: Inventory turnover ratio X = 7 times Y = 3 times)

Number of days average inventory is consumed X = 52 days, Y = 122 days)

**Note:** These questions will help you to understand the unit better. Try to write answers for them and verify with the content. But do not submit your answers to the University. These are for your practice only.

## SOME USEFUL BOOKS

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## UNIT 5 PRICING THE ISSUE OF MATERIALS

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### Structure

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### 5.0 OBJECTIVES

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After studying this unit, you should be able to:

- ascertain the cost of materials issued for production;
- identify the problems associated with pricing the issue of materials;
- list the various methods of pricing;
- assess the pros and cons of FIFO, LIFO and weighted average methods of pricing; and
- prepare the stores ledger under FIFO, LIFO and weighted average methods.

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### 5.1 INTRODUCTION

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You have learnt that the stores ledger is one of the important store records which is maintained by the costing department and that in addition to quantities it also records the prices at which the materials have been received and issued. As for the receipts of materials, they may be recorded at prices at which they are purchased after making necessary adjustment for discounts, transportation charges, cost of containers, etc. But, when it comes to the issues of materials, the problem arises with regard to the price at which each issue should be recorded because different consignments of materials might have been purchased at different prices. For this purpose, accountants have developed a number of methods based on various materials flow

assumptions. In this unit, you will learn about these methods of pricing the issue of materials and also the preparation of stores ledger account according to some of the prominent methods.

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## 5.2 ASCERTAINING THE COST OF MATERIALS

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The basic document used for ascertaining the cost of materials received is invoice. It contains the basic price as well as the items like discount, freight, insurance, sales tax, cost of containers, etc. The organisation also incurs some expenditure of cartage, receiving, inspecting and storage of materials. Now the question arises as to which of these items should be taken into account in arriving at the cost of materials. Let us discuss them one by one.

**Cash Discount:** Cash discount represents an allowance made by the supplier if the payments of bills are made within the specified period. Opinions differ as regards as method of treatment of such discount in cost accounts. One view is that cash discount, being in the nature of purely a financial transaction, should be completely excluded from cost accounts. The other view is that if cash discount is always earned for prompt payments, it may be considered in finding out the final rate for materials in cost accounts.

**Trade Discount:** Trade discount is shown in the invoice as a deduction from the purchase price. If the consignment consists of one item only, the entire trade discount is deducted from purchase price. Hence, no difficulty arises with regard to its treatment. If, however, the consignment consists of a number of items, the amount discount should be apportioned among all the items covered by the consignment on the basis of the purchase price of each item. In any case, **the net amount after deduction of trade discount is taken as the purchase price.**

**Quantity Discount:** Quantity discount is allowed as an incentive for bulk purchasing. The rate of discount varies with the quantity purchased. From the point of view of the supplier, an order for a large quantity reduces his selling and distribution cost. Thus, a part of the savings enjoyed by a supplier out of the large orders is passed on the purchaser by means of quantity discount. From the point of view of the buyer, quantity discount is in the nature of a price reduction. Hence, the amount of discount may be adjusted in the same manner as the trade discount.

**Transportation Charges:** Sometimes, the terms of supply provide for free delivery at the premises of the purchaser. In that case, the price is inclusive of the transportation charges. But, in most cases, the transport costs are paid by the purchaser. These should be added to the invoice price in order to arrive at the cost of materials. But, for the sake of convenience, the transportation charges may be regarded as an item of factory overheads and absorbed accordingly.

**Custom, excise duty, sales tax, etc.:** As stipulated in the contracts, the supplier add several items such as sales tax, excise duty, custom duty, octroi, etc. to the invoice price. These expenses should be added to the cost of purchases, if they can be directly allocated to the particular materials.

**Receiving, inspection, storage, material accounting and purchase department expenses:** These expenses cannot be easily allocated to the

materials. Hence, they are treated as factory overheads and recovered on the basis of the value of direct materials issued or as general overheads to be apportioned to the various cost-centre on the basis of the value of materials issued.

### Cost of Containers

Materials are normally supplied by the suppliers in containers. They may or may not make a separate charge for them. Then, these containers may be either returnable or non-returnable. The cost of the containers can be treated in any of the following ways:

- If the supplier has not charged the cost of containers in which materials have been supplied, there is no need to add any amount in this regard to the cost of materials. But, if the containers have some realisable value, the same should be estimated and deducted from the cost of materials. Alternatively, it may be deducted from factory overheads.
- If the supplier has charged the cost of containers and these containers are non-returnable, their cost (minus realisable value, if any, should be included in the cost by materials.
- Where the cost of the containers has been charged by the supplier and these containers can be returned to the supplier, the difference between the cost of the containers and the amount credited by the supplier on the return, will be added to the purchase price of the materials.
- Where the supplier agrees to give full credit for the cost of the containers charge by him on their return, the cost of these containers will not be added to the purchase price of the materials on the assumption that the containers will be returned to the supplier and their amount recovered fully.

Illustration 1 will explain to you the calculation of purchase price of materials.

#### Illustration 1:

From the following invoice received from a supplier, calculate the material cost per unit:

Quantity	Particulars	Rate (Rs.)	Amount (Rs.)
150 kgs	Material x	10.00 per kg	1,500
100 kgs	Material y	12.00 per kg	1,200
			2,700
	Less trade discount		90
Add:			2,610
	Cost of containers (capacity of each 50 kgs)		60
	Cartage and carriage		75
	Octroi duty @ 1%		27
			2,772

#### Terms

- 5% cash discount for payment within a week
- Return value of containers Rs. 9 each

**Solution :**

Statement showing the calculation of material cost:

	Material X Rs.	Material Y Rs.
Invoice price	1,500	1,200
Less : Trade Discount (divided in the ratio of invoice price i.e., 5:4)	50	40
	1,450	1,160
Add : i) Cost of containers (divided in the ratio of quantity i.e., 150:100)	9	6
Actual Cost	60	
Return Cost	45	
	15	
ii) Cartage and carriage (in the ratio of quantity i.e., 150:100)	45	30
iii) Octroi duty (in the ratio of invoice price)	15	12
	1,519	1,208
Cost per kg	1,519	1,208
	150 kgs	100 kgs
	= Rs.10.13	=Rs.12.08

**Notes:**

- i) Cash discount being a financial item, has been ignored.
- ii) It has been assumed that containers have been returned.

**5.3 PROBLEM IN PRICING THE ISSUE OF MATERIALS**

The fixation of the price at which issues of materials are to be charged to production is important from the point of view of cost accounting. If prices remain constant for a long time, there is little difficulty in pricing the issue of materials. But, in practice, we find that the prices of materials continue to fluctuate on account of changes in the value of money, changes in the world commodity prices, buying from different sources, and differences in the quantity discounts. Hence, different consignments of materials may be bought at different prices during an accounting period. The problem, therefore, is that which of these prices should be used for pricing the materials issued to production from time to time. Is it the price of the first, or the second consignment or the average of the two?

For example, 200 kg. of materials K was bought at Rs. 30 per kg. On January 10 and 300 kg. was bought at Rs. 32 per kg., on January 16; On January 18, 250 kg. was issued to production. Now the question arises as to whether the 250 kg. of material K be charged to production at Rs,30 or Rs.32 or Rs.31, the average price. To solve this problem, a number of methods based on certain materials flow assumptions, have been developed. You will study

these methods in detail in Section 5.4 of this unit. However, a good method of valuing material issues should satisfy the following conditions:

- a) The issue price should recover the cost of materials.
- b) The issue price must reflect the current market price.
- c) The issue price should not cause any significant variation in cost from period to period and from job to job.
- d) The issue price should not necessitate heavy adjustments at the time of valuation of closing stock.
- e) It should be simple and easy to operate.

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## 5.4 METHODS OF PRICING

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The various methods used for the pricing of the material issues can be classified as follows:

### I) Actual Cost Methods

- a) First in First out (FIFO)
- b) Last in First out (LIFO)
- c) Specific price
- d) Highest in First out (HIFO)
- e) Base stock method

### II) Average Cost Methods

- a) Simple average
- b) Weighted average
- c) Periodic simple average
- d) Periodic weighted average
- e) Moving simple average
- f) Moving weighted average

### III) Notional Cost Methods

- a) Standard price
- b) Inflated price

### IV) Market Price Methods

- a) Replacement price
- b) Net Realisable price

Of the methods listed above, FIFO, LIFO, Weighted average, Replacement price and Standard price are the most common methods. Hence we shall discuss them here in detail.

#### 5.4.1 First in First Out Method

This method assumes that materials received first are to be issued first. Under this method the price of the earliest consignment is taken first and when that consignment is exhausted, the price of the next consignment is adopted, and so on. In other words, when a requisition for a certain type

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of materials is presented to the storekeeper, he will apply the cost price of the first lot of materials received, provide the same is still on hand. If the quantity required is more than the units remaining from the first lot, he uses the cost price of the second lot, then the third and fourth until the total quantity requisitioned is issued. **This method is based on the principle that materials should be issued in the order of receipts and at the actual cost.** It should be noted that the physical issue of stores need not be in the above order, generally it is neither possible nor necessary to do so. This arrangement is only for the purpose of accounting. As the materials purchased first are charged off first, the value of closing stock conforms, more or less, to the current market price.

Illustration 2 will explain to you as to how the issue of the materials are priced under this method.

**Illustration 2 :**

In a factory, the following purchase and issues were made during the month Account January, 2018. Prepare the stores Ledger Account under FIFO method.

Date	Purchases		Rate (Rs)	Issues
	Units			
Jan. 1	500		5.00	—
Jan. 8	300		5.10	
Jan. 13	—			600
Jan. 18	400		5.20	—
Jan. 23	—		—	300
Jan. 25	500		5.10	—
Jan. 31	—		—	200

**Solution:**

**STORES LEDGER ACCOUNT (Under FIFO Method)**

Name..... Maximum Level.....  
 Description..... Minimum Level.....  
 Location Code..... Ordering Level.....  
 Re-order quantity.....

Date	Receipt				Issues				Balance		
	G.R.N. No.	Qty	Rate Rs.	Amount Rs.	R.S. NO	Qty	Rate Rs.	Amount Rs.	Qty	Rate Rs.	Amount Rs.
Jan. 1	—	500	5.00	2,500	—	—	—	—	500	5.00	2,500
Jan. 8	—	300	5.10	1,530	—	—	—	—	800 500 300	5.10	4,030

Jan. 13	-	-	-	-	-	600 { 300 300	5.10 5.00	3,030	200	5.00	1,000
Jan. 18	-	400	5.20	2,080	-	-	-	-	600 { 200 400	5.00 5.20	3,080
Jan. 23	-	-	-	-	-	300	5.20	1,560	300 { 200 100	5.00 5.20	1,520
Jan. 25	-	500	5.10	2,550	-	-	-	-	800 { 200 100 500	5.00 5.20 5.10	4,070
Jan. 31	-	-	-	-	-	200	5.10	1,020	600 { 200 100 300	5.00 5.20 5.10	3,050
		1,700		8,660		1,100		5,610	600		3,050

Closing stock is 100 units @ Rs. 5.20 and 500 units @ Rs.5.10

**This method is suitable in times of falling prices** because the materials charge to production will be high while the cost of stock replacement will be low. But in case of rising prices, if this method is followed, the charge to production will be to higher profits and higher tax liability.

#### Advantages

The following are the advantages of FIFO Method:

- 1) It is simple to understand and easy to operate.
- 2) Since materials are charged to production at actual cost, no profit or loss by reason of adopting this method.
- 3) It is a good inventory management system since the oldest units are used and inventory consists of latest stock.
- 4) Closing stock generally represents fair valuation of stock, as it would consider recent purchases of materials.

#### Disadvantages

This method suffers from the following disadvantages:

- 1) The number of calculations complicates the accounts if the prices of material purchased fluctuate considerably and increases the possibilities of errors.
- 2) Usually more than one price has to be adopted for each issue.
- 3) Comparison of one job with another may be difficult because issues to one may be charged at prices different from the other.
- 4) In a fluctuating market, the effect of the current market price is not recent the cost of issues.

#### 5.4.2 Last in First Out Method

Under this method, the price of the latest consignment is taken into consideration for pricing the issues of materials. This method is based on the assumption that materials received last are issued first. Thus, when a

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requisition is received for certain materials, the storekeeper will charge the cost price of the latest consignment. quantity required is more than the units remaining from the latest consignment will apply the cost price of the consignment immediately preceding the last lot so on.

This method is suitable in times of rising prices because the materials charged to production will be higher leading to lower profits and lower tax liability. The cost of production will also be closer to-current prices.

**Illustration 3:**

By taking the data of Illustration 2, prepare the Stores Ledger Account under LIFO method.

**Solution:**

**STORES LEDGER ACCOUNT (Under LIFO Method)**

Name..... Maximum Level.....  
 Description..... Minimum Level.....  
 Location Code..... Ordering Level.....  
 Re-order quantity.....

Date	Receipt				Issues				Balance		
	G.R.N. No.	Qty Units	Rate Rs.	Amount Rs.	R.S. NO	Qty Units	Rate Rs.	Amount Rs.	Qty Units	Rate Rs.	Amount Rs.
Jan. 1	-	500	5.00	2,500	-	-	-	-	500	5.00	2,500
Jan.8	-	300	5.10	1,530	-	-	-	-	800 { 500 300	5.00 5.10	4,030
Jan. 13	-	-	-	-	-	600 { 300 300	5.10 5.00	3,030	200	5.00	1,000
Jan. 18	-	400	5.20	2,080	-	-	-	-	600 { 200 400	5.00 5.20	3,080
Jan. 23	-	-	-	-	-	300	5.20	1,560	300 { 200 100	5.00 5.20	1,520
Jan. 25	-	500	5.10	2,550	-	-	-	-	800 { 200 100 500	5.00 5.20 5.10	4,070
Jan. 31	-	-	-	-	-	200	5.10	1,020	600 { 200 100 300	5.00 5.20 5.10	3,050
		1,700		8,660			5,610		600		3,050

Closing stock is 200 units @ Rs. 5.00, 100 units @ 5.20 and 300 units @ Rs. 5.10.

**Advantages**

The following are the advantages of pricing the material issues under LIFO:

- 1) It is simple and useful when transactions are few.

- 2) Since issues are based on the actual cost, no profit nor loss arises by using this method.
- 3) Production is charged at most recent prices so that cost of production reflects current price levels.
- 4) During the period of rising prices, profits are lowered down since production charged at current prices. The tax liability is thus reduced.
- 5) This method will iron out fluctuations in profits over a period of changing price levels.

#### Disadvantages

- 1) Sometimes more than one price has to be adopted for pricing a single requisition.
- 2) As in the case of FIFO method, calculations become complicated and cumbersome when rates of receipts are highly fluctuating.
- 3) When prices are falling, it will lead to low charge to production.
- 4) As in the case of FIFO method, a substantial difference is likely to be shown in the cost of two jobs, solely because the stock of one happened to be drawn a few minutes before those for the other. Thus it makes the comparison between different jobs very difficult.
- 5) Closing stock is valued at a cost which does not represent current conditions.

#### 5.4.3 Weighted Average Price Method

Under actual cost methods whether it is FIFO or LIFO, you have to assume certain order of the outflow of materials which may or may not be observed in actual practice. Hence, it is advocated that the issue of materials should be valued average price. This average may be a simple average or a weighted average. The weighted average considered more desirable as it also takes into account quantities bought at each price. The weighted average price is calculated by dividing the total cost of materials in stock by the total quantity in stock prior to each issue. Thus

$$\text{Weighted average price} = \frac{\text{Value of material in stock}}{\text{Quantity in stock}}$$

It is important to note the average price under weighted average method has to be calculated each time materials are received in stores and not when they are issued. Thus, under this method, as soon as a fresh lot is received, a new price is calculated and all the issues are then taken at this price until the next lot of material is received.

In periods of heavy fluctuations in prices, the weighted average method results because it tends to smooth out the fluctuations in prices by taking the average of the prices of various lots in stock, This method of pricing of material the cost price of materials from production.

Illustration 4 should help you to understand the pricing of issues of materials at weighted average price.

**Illustration 4 :**

Based on the data given in Illustration 2, prepare the stores Ledger Account on weighted average price method.

**Solution:**

**STORES LEDGER ACCOUNT (Under Weighted Average Method)**

Name..... Maximum Level.....  
 Description..... Minimum Level.....  
 Location Code..... Ordering Level.....  
 Re-order quantity.....

Date	Receipt				Issues				Balance		
	G.R.N. No.	Qty Units	Rate Rs.	Amount Rs.	R.S. NO	Qty Units	Rate Rs.	Amount Rs.	Qty Units	Rate Rs.	Amount Rs.
Jan. 1	-	500	5.00	2,500	-	-	-		500	5.000	2,500
Jan. 8	-	300	5.10	1,530	-	-	-		800	5.0375	4,030
Jan. 13	-	-	-	-	-	600	5.0375	3,023	200	5.1458	1,007
Jan. 18	-	400	5.20	2,080	-	-	-		600	5.1458	3,087
Jan. 23	-	-	-	-	-	300	5.1458	1,544	300	5.143	1,543
Jan. 25	-	500	5.10	2,550	-	-	-		800	5.1167	4,093
Jan. 31	-	-	-	-	-	200	5,1172	1,023	600	5.1167	3,070
		1,700		8,660		1,100		5,990	600	5.1167	3,070

Closing Stock is 600 units @ Rs. 5.1167 per unit

**Advantages**

- 1) It is logical and consistent.
- 2) Cost comparisons are rendered easier.
- 3) When prices fluctuate considerably, it will smooth out fluctuations.
- 4) Calculation of the new price arises only with the new receipt in stock, all subsequent issues are then charged at this price until the next lot is received

**Disadvantages**

- 1) This method requires tedious calculations. For instance to get the benefit of the method, average prices are to be calculated upto four or five decimal points which is very much laborious.
- 2) Material cost does not represent the current prices.
- 3) Closing stock also may not represent current market prices.
- 4) Fresh calculations will have to be made every time fresh purchases are made This will mean much of arithmetical work and is likely to cause error.



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Under this method, you may notice that actual value of the costing stock is 600 units @ Rs. 4.5833 (2,750 / 600) where as the actual cost of purchase is Rs. 5.70 and Rs. 5.10 under FIFO method and Rs. 5.00 Rs. 5.20 and Rs. 5.10 under LIFO method of different lots. It is clear that the manufacturing/ business firms takes the advantage of cheap price (price at the time of procurement) by not extending the benefit to customer. If the balance of quantity is valued @ Rs. 5.40 (Replacement Price) it would be Rs. 3,240 but the closing value of stock shows Rs. 2,750. Here the favourable difference is (3,240 – 2,750) Rs. 490 as it was under valued and the benefit to this extent goes to the business concern.

**5.4.5 Standard Price Method**

Under this method, a standard price is decided for issue of material by taking the previous price trend, discounts, supply and demand, market conditions etc. It is a pre-determined price. This standard price is fixed for a particular period, normally, half year or one year. Thereafter this price is revised periodically or as and when required. In this method, receipts are recorded at actual cost and issue are priced at standard price as decided.

Following illustration 6 help you to understand the posting of transactions in Stores Ledger Account under Standard Price Method.

**Illustration 6 :**

By considering the transaction given in illustration 2, prepare Store Ledger Account under Standard Price Method. The Standard price was fixed at Rs. 5.30 per unit.

**Solution:**

**STORES LEDGER ACCOUNT (Under Standard Price Method)**

Name..... Maximum Level.....  
 Description..... Minimum Level.....  
 Location Code..... Ordering Level.....  
 Re-order quantity.....

Date	Receipt				Issues				Balance	
	G.R.N. No.	Qty units	Rate Rs.	Amount Rs.	R.S. NO	Qty	Rate Rs.	Amount Rs.	Qty units	Amount Rs.
Jan.1	-	500	5.00	2,500	-	-	-	-	500	2,500
Jan 8	-	300	5.10	1,530	-	-	-	-	800	4,030
Jan 13	-	-	-	-	-	600	5.30	3,180	200	850
Jan 18	-	400	5.20	2,080	-	-	-	-	600	2,930
Jan 23	-	-	-	-	-	300	5.30	1,590	300	1,340
Jan 25	-	500	5.10	2,550	-	-	-	-	800	3,890
Jan 31	-	-	-	-	-	200	5.30	1,060	600	2,830

Now, by comparing this method of calculation with the Replacement Price Method, you will find that except the pricing for issues of material the calculation is same. In Replacement Price Method issue prices varies as the current market price on the date of issue. Where as fixed price will be charged to the issues for specific time duration as decided by the business concern.

Considering the standard price, the value of the closing stock is Rs. 3,180 (600 × 5.30). Here, the actual stock value is Rs. 2,830. The difference of value Rs. 350 (3,180 – 2,830) is under valued and it is a favourable price variance.

#### 5.4.6 Pricing of Materials Returned to Vendors

Materials which are not according to specifications or are found to be of substandard quality, are returned to the vendor. If such materials are not sent to the stores and are returned to the vendor by the receiving section itself, a debit note sent to the vendor after making the necessary adjustments in the invoice value of the goods. However, if such goods have been included in stock, the returns have to be recorded in the issue column of the stores ledger account and valued at the price which they were received. Alternatively, they may be treated as a normal issue of materials and valued according to the method of pricing used. Thus,

- i) If FIFO method is followed, the price will be that of the oldest stock on the of return.
- ii) If LIFO method is followed, the materials will be valued at the price of the latest receipt.
- iii) If the average price is followed, the returns should be valued at the average price.
- iv) If the replacement price or standard price is followed, the price of returned material is valued as per the price charged at the time of issue of such material.

#### 5.4.7 Pricing of Materials Returned to Stores

Some materials issued to a job may become surplus. These should be returned to the stores. The materials so returned to the are recorded in the bin card as well as in the stores ledger. The general rule for recording such returns in stores ledger account is to value them at the price at which they were originally issued and then they should be included in the next requisition and issued at the same price, unless given otherwise, However, if the company is following the weighted average price method, the returned materials should be recorded at the price at which they were originally issued and then a new average cost should be worked out as if the materials returned were a new purchase. Sometimes, the rate of original issue is not given. In such a situation, it should be taken as belonging to the latest issue of materials and recorded accordingly.

#### 5.4.8 Treatment of Shortage of Materials

If any shortage of materials is noted on making a physical verification of stock of materials, it should be entered in the issue column of stores ledger and valued in accordance with the method adopted for pricing material issues.

The following Illustration 7 shows the materials returned to stores and shortage of materials are recorded in the stores Ledger Account.

#### Illustration 7:

The particulars of receipts and issues of materials in a factory in August 2018 are as under:

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- August 01 Opening balance 1,500 kgs. @ Rs. 12 per kg.
- ” 02 Issued 100 kgs.
- ” 03 Issued 250 kgs.
- ” 04 Issued 300 kgs.
- ” 05 Purchased 400 kgs. @ Rs 12.50 per kg.
- ” 09 Issued 300 kgs.
- ” 10 Purchased 200 kgs @ Rs. 12.50 per kg.
- ” 11 Issued 300 kgs.
- ” 12 Returned from workshop issued on 3rd August 20 kgs.
- ” 13 Issued 450 kgs.
- ” 16 Purchased 500 kgs. Rs. 13.00 per kg.
- ” 18 Issued 400 kgs.
- ” 20 Returned from workshop issued on 9th August 60 kgs.
- ” 22 Issued 300 kgs.
- ” 26 Purchased 400 kgs. @ Rs. 12.00 per kg.
- ” 29 Issued 200 kgs.

Pricing of issues is to be done on FIFO basis. A shortage of 10 kgs. was noticed on 16th August. Prepare the Stores Ledger Account for the month of August, 2018.

**Solution:**

**STORES LEDGER ACCOUNT (Under FIFO Method)**

Name..... Maximum Level.....  
 Description..... Minimum Level.....  
 Location Code..... Ordering Level.....  
 Re-order quantity.....

Date	Receipt				Issues				Balance		
	G.R.N. No.	Qty Kgs	Rate Rs.	Amount Rs.	R.S. NO	Qty Kgs	Rate Rs.	Amount Rs.	Qty Kgs	Rate Rs.	Amount Rs.
August 1	-	1,500	12.00	18,000	-	-	-	-	1500	12.00	18,000
August 2	-	-	-	-	-	100	12.00	1,200	1400	12.00	16,800
August 3	-	-	-	-	-	250	12.00	3,000	1150	12.00	13,800
August 4	-	-	-	-	-	300	12.00	3,600	850	12.00	10,200
August 5	-	400	12.50	5,000	-	-	-	-	1250 850 400	12.00 12.50	15,200
August 9	-	-	-	-	-	300	12.00	3,600	950 550 400 400	12.00 12.50	11,600
August 10	-	200	12.50	2,500	-	-	-	-	1150 550 400 200	12.00 12.50 12.50	14,100
August 11	-	-	-	-	-	300	12.00	3,600	850 250 400 200	12.00 12.50 12.50	10,500

## Pricing the issue of Materials

August 12	-	20	12.00	240	-	-	-	-	870	20 250 400 200	12.00 12.00 12.50 12.50	10,740
August 13	-	-	-	-	-	450	20 250 180	12.00 12.00 12.50	240	5490 300 2250	12.50 13.00	5,250
August 16	-	500	13.00	6,500	-	-	-	-	520	220 200 500	12.50 12.50 13.00	11,750
August 18	-	-	-	-	-	400	220 180	12.50 12.50	2750	5,000 2250	12.50 13.00	6,750
August 20	-	60	12.00	720	-	-	-	-	580	60 20 500	12.00 12.50 13.00	7,470
August 22	-	-	-	-	-	300	60 20 220	12.00 12.50 13.00	720	3830 250 2860	13.00	4,680
August 26	-	400	12.00	4,800	-	-	-	-	360	400	13.00 12.00	9,480
August 29	-	-	-	-	-	200	-	13.00	2,600	160 400	13.00 12.00	6,880

Closing Stock is 160 kgs @ Rs.13.00 per kg and 400 kgs @ Rs. 12.00 per kg.

**NOTES: Returned from Workshop:** The returns from workshop are entered in the receipt column and valued at the rate at which they were originally issued. In this illustration, there are two returns from workshop on 12th and 20th August respectively. These are to be valued at the rates at which they were originally issued. that is, rates charged (Rs. 12) on 3rd and 9th August respectively. Further, the 20 units returned on 12th August have been included in the issue made on 13th August; and 60 units returned on 20th August have been included in the issue made on 22nd August.

2) **Shortage:** Shortage has been entered in the issue column and has been treated just like other issues. It is to be valued at the rate as per the method adopted, the FIFO, LIFO etc. treating the shortage as one of the issues.

### Illustration 8:

From the following record of the receipt and issues of coal and stores verification report, calculate the prices of issues charged out under weighted average method.

2020

- April 1      Opening balance: 100 tons Rs. 50 per ton
- ”      5      Issued 60 tons
- ”      6      Received 120 tons Rs. 50.50 per ton
- ”      7      Issued 50 tons (the stock verification report reveals a loss of 1 ton)
- ”      8      Received back from completed job 2 tons previously issued  
Rs. 50.25 per ton,
- ”      9      Issued 80 tonnes.

**Solution :**

**STORES LEDGER ACCOUNT (Under Weighted average Method)**

Name..... Maximum Level.....  
 Description..... Minimum Level.....  
 Location Code..... Ordering Level.....  
 Re-order quantity.....

Date	Receipt				Issues				Balance		
	G.R.N. No.	Qty Tons	Rate Rs.	Amount Rs.	R.S. NO	Qty Tons	Rate Rs.	Amount Rs.	Qty Tons	Rate Rs.	Amount Rs.
1990											
April 1	-	100	50.00	5,000.00	-	-	-	-	100	50.00	5,000.00
April 5	-	-	-	-	-	60	50.0000	3,000.00	40	50.00	2,000.00
April 6	-	120	50.50	6,060.00	-	-	-	-	160	50.3750	8,060.00
April 7	-	-	-	-	-	50	50.3750	2,518.75	110	50.3750	5,541.25
April 7	-	-	-	-	-	1 (loss)	50.3750	50.38	109	50.3750	5,490.87
April 8	-	2	50.25	100.50	-	-	-	-	111	50.3727	5,591.37
April 9	-	-	-	-	-	80	50.3727	4029.82	31	50.3727	1,561.55
		222		11,160.50		191	9,598.94		31		1,561.56

Closing Stock is 31 tons @ Rs. 50.3727 per ton.

**Check Your Progress A**

- 1) State whether the following statements are **True** or **False** and justify your answer.
  - i) First in First Out method of valuing materials issues is suitable in times of rising prices.
  - ii) According to LIFO method of pricing, issues are close to current economic values.
  - iii) Weighted average method of pricing stores involves adding all the different prices and dividing by the number of such prices
- 2) Fill in the blanks.
  - i) First in First Out method of valuing material issues is suitable in times of .....prices.
  - ii) Last in First Out method is suitable in times of prices.....
  - iii) Weighted average method of valuing material issues is suitable when prices.....
- 3) From the transactions given in the illustration – 6, you are advised to prepare the Store Ledger Account under :
  - i) LIFO method,
  - ii) Weighted Average Method,
  - iii) Replacement Price Method (Replacement Prices are : August 2, 3 & 4 – Rs. 12; August 9 – Rs. 13; August 11 – Rs. 13.50; August 13 & 18 – Rs.13; August 27 & 29 – Rs. 14
  - iv) Standard Price Method assuming that the standard price is Rs. 13 per kg.

### 5.4.9 Treatment of Material Losses

In course of handling the materials at different stages i.e., receiving, storage, issue, processing etc. there are possibilities of loss of material may arise. Losses are classified into two categories. They are 1) Normal Loss and 2) Abnormal Loss

**Normal Losses :** The losses which occur even after taken enough care due to natural features of the material or situations. Such as evaporation of liquid/gases for instance chemicals, petrol, CNG, PNG etc. Loss in loading and unloading. For example, cement bags, coal etc. Loss due to purchase of large quantity and making small parts for issuance to production departments. For instance cutting of wood in furniture manufacturing. These losses cannot be completely eliminated.

**Abnormal Losses :** The losses which may occur due to mishandling, poor storage facility, breakage, theft, fire accident, earthquakes, floods, thefts, long period storage, etc.

#### Accounting Treatment of Losses

**Normal losses** are treated as a part of the cost. In order to absorb normal material loss the amount of loss is adjusted by inflated rate of the usable material to cover the loss. This loss is included in the cost of transferring to the factory overheads.

**Abnormal Losses** cannot be included in the cost and charged to costing Profit and Loss Account. It is clear that this type of loss should not be absorbed on usable material in stock.

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## 5.5 LET US SUM UP

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For ascertaining the cost of materials, the purchase price of materials needs certain adjustments like cash discount, cost of transportation, cost of containers, etc.

Materials may be purchased at different rates from time to time. Hence, when they are issued to production a problem arises with regard to the price at which they should be recorded. This can be done at actual cost, at average cost, at notional cost or at market price. Accordingly, a number of methods of pricing the issues have been developed. of these, FIFO, LIFO, and weighted average price are the three prominent methods.

Under FIFO (First in First Out) method of pricing the materials, the cost of the earliest consignment is taken first and when that consignment is exhausted, the price of the next consignment is adopted and so on. This method of pricing is suitable in times of falling prices.

Under LIFO (Last in First Out) method, the cost of the latest consignment is taken first and when that consignment is exhausted, the price of previous consignment is adopted. Materials cost under this method is closer to current price level.

Under weighted average method, the price is calculated by dividing the total cost of the materials in stock by the total quantity. This method of pricing of materials gives better results because it tends to smooth out fluctuations in prices by taking the average of prices of various lots in stock. This method

is mostly used by several organisations because it satisfies most of the conditions of a good method of valuing material issues.

Under Replacement Price method, the current market price on the date of issue will be taken into account. Under Standard Price method, pre-determined price is decided for a specific period and charged to issues. This price will be revised after the specific period or as and when required. Normal losses are absorbed in the cost of usable material and abnormal loss should be transferred to Costing Profit and Loss Account.

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## 5.6 KEY WORDS

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**FIFO (First in First out):** A method of pricing the issue of materials at actual cost in the chronological order of the purchases.

**LIFO (Last in First Out):** A method of pricing the issue of materials at actual cost in of the latest purchase and when that lot is exhausted, the price of the previous consignment is adopted, and so on.

**Weighted Average Price:** The price which is calculated by dividing the total cost of materials in stock from which the materials are issued by the total quantity of materials in that stock.

**Replacement Price Method :** A method of pricing and the issue of material the price at which material would be replaced on the date of issue.

**Standard Price Method :** A method of pricing the issue of material with a pre-determined price which is fixed for specific period.

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## 5.7 ANSWERS TO CHECK YOUR PROGRESS / EXERCISES

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- A) 1. (i) False (ii) True (iii) False  
2. (i) falling prices (ii) rising prices (iii) fluctuate considerably

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## 5.8 TERMINAL QUESTIONS/EXERCISES

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### Questions

- 1) Discuss how you would treat discount, transportation costs, and the cost of containers for ascertaining the cost of materials
- 2) Indicate the different methods used for pricing the issue of materials.
- 3) Explain with examples the following methods of pricing the issues of materials:  
a) LIFO and b) FIFO  
Under conditions of rising prices, which of these two methods would you recommend and why?
- 4) What is meant by weighted average method of valuing stores issues? What are its advantages?
- 5) Explain the concept of Replacement Price and Standard Price methods of pricing to material issues.
- 6) What are the Material Losses and how would you treat the material losses in Cost Accounting ?

**Exercises**

**Pricing the issue of Materials**

- 1) The following quotation is received from a supplier in respect of material X.

	Rate per kg.
	Rs.
Lot price 100 kg.	5.00
500 kg.	4.50
1,000 kg.	4.00

Trade discount is 20%. Cash discount of 5% is allowed if payment is made within 15 days. One container is required for every 100 kg of material and containers are charged at Rs. 10,00 each but credited at R. 9.00 if returned within three months.

	Rs.
Transport charges for any order	50
Storage charges	15

Calculate the total material cost for 500 kgs. and ascertain the rate per kg of the material when the purchaser decides to purchase 500 kgs. of the material.

**(Answer:** Total cost Rs. 1,870; Cost per kg Rs. 3.74)

- 2) From the following transactions, prepare separately the stores ledger accounts using the following pricing methods:

i) FIFO and ii) LIFO

January	1	Opening balance 100 units @ Rs. 5 each
	5	Received 500 units @ Rs. 6 each
	30	Issued 300 units
February	5	Issued 200 units
"	6	Received 500 units @ Rs. 5 each
March	10	Issued 300 units
	12	Issued 250 units

**(Answer:** Closing balance under both methods 50 units @ Rs. 5 each. Total cost Rs 250).

- 3) Following transactions are recorded in respect of a store item.

Date	Receipts	Rate per unit	Issues
	kg.	kg.	kg.
December 3	400	1.00	--
December 11	600	1.20	--
December 16	--	--	500
December 19	500	1.30	--
December 30	--	--	400

Prepare a stores ledger account pricing the issues at weighted average method.

**(Answer :** Balance qty. 600 units, Rate Rs. 1.21 per unit Total Rs. 726)

**Material and Labour**

- 1) The following receipts and issues were made of a new item of stores:

	Receipts		Issues (units)
	(units)	Cost (Rs.)	
1 <sup>st</sup> January	1,000	15,000	--
1 <sup>st</sup> February	1,000	12,000	--
28th February	--	--	1,200
1 <sup>st</sup> March	1,000	18,000	--
31 <sup>st</sup> March	--	--	1,200

Tabulate the values of:

- Issue made on 28 February
- Resulting stock on 28 February
- Issue made on 31st March
- Resulting stock on 31st March

according to:

- LIFO basis
- FIFO basis
- Weighted average cost basis

**Answers:**

	(a)	(b)	(c)
	Rs.	Rs.	Rs.
i)	15,000	17,400	16,200
ii)	12,000	9,600	10,800
iii)	21,000	16,800	19,200
iv)	9,000	10,800	9,600

- 5) The following information is available from the records of oil company for the month of June 2018.

Opening stock of oil 1,00,000 litres at Rs. 3 per litre. Purchases (Including freight etc.) made

June 01                      2,00,000 litres @ Rs. 2.85 per litre

June 30                      1,00,000 litres @ Rs. 3.03 per litre

Closing stock June 30    1,30,000 litres

Sales                              Rs. 9,45,000

Administration cost    25,000

Compute the following under FIFO Method

- Value of inventory on June 30;
- Cost of goods sold for the month of June;
- Profit or loss for the month

**(Answer: (a) Rs, 3,88,500 (b) Rs. 7,84,500 (c) Rs. 1,35,500**

- 6) The following is an extract of the record of receipts and issues of a chemical coded as chemical A3 during the month.

February 01	Opening balance	500 tonnes	Rs. 200
” 03	Issue	70 tonnes	
” 04	Issue	100 tonnes	
” 08	Issue	80 tonnes	
” 13	Received from supplier	200 tonnes	Rs. 190
” 14	Returned from works	15 tonnes	
” 16	Issue	180 tonnes	
” 20	Received from supplier	240 tonnes	Rs. 210
” 24	Issue	300 tonnes	
” 25	Received from supplier	320 tonnes	Rs. 220
” 26	Issue	115 tonnes	
” 27	Returned from works:	35 tonnes	
” 28	Received from supplier	100 tonnes	Rs. 230

Issues are to be priced on FIFO, LIFO, Weighted average, Replacement Price Method (Replacement Prices are : Feb 3 & 4 – Rs. 210; Feb 8 –Rs. 205, Feb 16 – Rs. 210; Feb 24 – Rs.225 Feb 26 – Rs. 230) and standard price method assuming the price is fixed at Rs. 220 per ton. Stock verifier found shortage of 10 tonnes on 22nd. Draw up priced stores ledger card.

7) From the following data, prepare Store Ledger Account. Under the methods of i) FIFO; ii) LIFO; iii) Weighted Average, iv) Replacement Price, and v) Standard price.

July, 1	Opening Stock	500 units @ Rs. 40 each
July, 4	Received	400 units @ Rs. 42 each
July, 6	Issued	600 units
July, 8	Received	800 units @ Rs. 48 each
July, 9	Issued	500 units
July, 13	Issued	300 units
July, 24	Received	500 units @ Rs. 50 each
July, 28	Issued	400 units

**Additional Information:**

- 1) Replacement prices per unit are as under:
- 2) July 6 - Rs. 44; July, 9 – Rs. 46; July 13 – Rs.48 and July 28 – Rs. 52
- 3) The Standard Price is fixed at Rs. 48 per unit

(Ans: Closing Balances are:

- i) 400 units @ Rs. 50 = Rs. 20,000
- ii) 300 units @ Rs. 40 + 100 units @ Rs. 50 = Rs.17,000
- iii) 400 units @Rs. 48.52 total amount Rs. 19,408
- iii) 400 units total amount Rs. 15,600
- iv) 400 units total amount Rs. 13,800.

**Note:** These questions will help you to understand the unit better. Try to write answers for them and verify with the content. But do not submit your answers to the University. These are for your practice only.

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### **SOME USEFUL BOOKS**

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Arora M.N. 2003. A Text Book of *Cost Accountancy*, Vikas Publishing House Pvt. Ltd.: New Delhi. (Chapter 3-8).

Bhar, B.K. 2018. *Cost Accounting: Methods and Problems*, Academic Publishers: Calcutta. (Chapter 5-9).

Iyenger, S.P., *Cost Accounting*, Sultan Chand and Sons.

Maheshwari, S.N. and SN. Mittal, 2018. *Cost Accounting: Theory and Problems*,

Shree Mahavir Book Depot: Delhi. (Chapter 2-3).

Nigam, B.M.L. and G.L. Sharma, 2018. *Theory and Techniques of Cost Accounting*,

Himalaya Publishing House: Bombay. (Chapter 4-7).

Rajiv Goel, *Cost Accounting*, International Book House.

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## UNIT 6 LABOUR – BASIC CONCEPTS

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### Structure

- 6.0 Objectives
- 6.1 Introduction
- 6.2 Direct and Indirect Labour
  - 6.2.1 Direct Labour
  - 6.2.2 Indirect Labour
- 6.3 Time Keeping
  - 6.3.1 Forms of Time Keeping
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  - 6.3.3 Methods of Time Keeping
  - 6.3.4 Importance of Time Keeping
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- 6.5 Payroll Accounting
  - 6.5.1 Computation of Wages
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- 6.9 Let Us Sum Up
- 6.10 Key Words
- 6.11 Answers to Check Your Progress
- 6.12 Terminal Questions

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### 6.0 OBJECTIVES

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After studying this unit you should be able to:

- explain the meaning of direct and indirect labour;
- explain the concepts of time keeping and time booking;
- describe the system of payroll accounting ;
- explain the concepts of idle time and overtime and describe their treatment in cost accounts;
- discuss the implications of labour turnover;

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## 6.1 INTRODUCTION

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Labour is an essential factor of production. They make contribution to the organisation through their time and energy. This needs adequate compensation to labour by way of wages for the work done by them which constitutes another important element of cost. In this unit you will learn about the concept of direct and indirect labour, the method of their time keeping and time booking, the methods of wage payment and payroll accounting, and the treatment of idle time and overtime in cost accounts.

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## 6.2 DIRECT AND INDIRECT LABOUR

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Labour is an essential factor of production. It is a human resource and participates in process of production. The remuneration paid to labour is a significant item of cost. For costing purposes, labour may be classified into two broad categories (i) direct labour, and (ii) indirect labour.

### 6.2.1 Direct Labour

Direct labour refers to labour engaged directly in the manufacture of a product or in a particular job. Some examples of direct labour are:

- a) Labour engaged in converting raw materials into manufactured articles
- b) Labour employed on a construction job
- c) Helper attending a machine operator
- d) Compositors working in a printing press

The main features of direct labour are as follows:

- 1) It can be easily identified and allocated to cost units.
- 2) It varies directly with the volume of output.
- 3) It can be easily ascertained and controlled because of its close proximity to the output.

Wages paid to direct labour are termed as 'direct labour cost' and **forms part of prime cost.**

### 6.2.2 Indirect Labour

There are a number of workers who are not engaged directly in the manufacture of a product or in a particular job. They may be employed as supervisors, repair workmen, inspectors, security men, foreman, cleaners, messengers, timekeepers, etc. or engaged in purchasing, stores, factory office or maintenance job. Wages and salaries paid to such staff are treated as. 'indirect labour cost' which is **included in overheads.**

**The importance of distinction between direct labour and indirect labour** lies in the fact that whereas direct labour can be identified with, and charged directly to, the product or a job, the indirect labour is not identifiable and is, therefore, included in overheads which may be allocated to different products on some suitable basis.

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## 6.3 TIME KEEPING

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Time Keeping is a system of recording the time of arrival and departure of workers. This provides a record of total time spent by the workers in the factory. **It is on the basis of this record that their total entitlement for**

**work under time rate system is determined.**

The process of time keeping is to maintain an accurate record of time of every worker when he is in and out of the factory i.e., a record of when he reports for duty and when he leaves his duty. This also provides a basis for distinction between regular time and overtime.

**6.3.1 Forms of Time Keeping**

Normally, two sets of time records are maintained in a factory:

- i) **Attendance Time:** showing the total number of hours spent by each work the factory. This record is used for determining the amount of wages payable to the workers.
- ii) **Job Time:** showing the number of hours spent on the jobs. This record he computing the labour cost for each job, product or process.

**6.3.2 Purpose of Time Keeping**

The purpose of time keeping is to provide information for

- 1) Preparation of pay rolls;
- 2) Calculation of labour cost per unit of operation, production or service;
- 3) Allocation of overhead cost based on wages or labour hours;
- 4) Attendance record of workers to meet statutory requirements;
- 5) Control of labour cost;
- 6) Determination of productivity of labour in the factory; and
- 7) Promotion of punctuality and discipline among the workers.

**6.3.3 Methods of Time Keeping**

Attendance of workers in a factory on the basis of the time of their arrival and departure may be recorded through either, or a combination, of the following three methods:

Method of Time Keeping		Main Features
1. HANDWRITFEN METHOD	a)	Names of the workers are entered in an <b>attendance register</b> maintained for the purpose of time keeping.
	b)	They are required to sign the register at the time of their arrival for duties in the factory and at the time they leave.
	c)	Some time after the actual time scheduled for reporting for duties, workers are marked 'late' or 'absent' as the case may be.
	d)	Though this is a simple and common method, the possibilities of fake attendance or fraudulent marking of attendance may not be ruled out under this method.
2. CHECK, TOKEN OR DISC METHOD	a)	Each worker is allotted an identification or <b>token</b> number

	b)	At the time of arrival, the worker collects his token from the board and drops it in a box kept for the purpose at the factory gate.
	c)	After 10 or 15 minutes of the normal arrival time, the box is removed by the Time Keeper or it is substituted by another box.
	d)	The late corners are required to report directly to the Time Keeper
	e)	On the basis of the tokens dropped in the box, necessary entries regarding attendance of the workers are made in the Time Book which is passed on to the Wages Section for payroll accounting.
	f)	The method needs proper supervision to ensure that a worker does not put in the box more than one token.
<b>3. MECHANICAL OR CLOCK METHOD</b>	a)	Each worker is given a <b>Clock Card</b> which is placed in racks the factory gate.
	b)	The time of arrival and departure of a worker is recorded the help of clock recorders.
	c)	When workers report for duties, they take out their cards from rack one, get them punched by the Time Recording Clock maintained at the factory gate, and place them in rack two.
	d)	When they leave, they again get their cards punched with the time of departure and put them back in rack one.
	e)	It is a quick, safe scientific, reliable and accurate method of time keeping

### 6.4.3 Importance of Time Keeping

Time keeping is a significant aspect of labour accounting. The process of time keeping

- 1) Ensures punctuality of workers and Identifies late-corners;
- 2) Improve discipline among workers;
- 3) Boosts morale of personnel;
- 4) Promotes a productive environment in the organisation;
- 5) Checks idle time and increases output by adherence to production schedules;
- 6) Helps recording of time for statistical purposes;
- 7) Maintains a record of work performed by the people; and
- 8) Assists computation of labour cost per unit or per process of production.

**Check Your Progress A**

- 1) What is Direct Labour?
- 2) What is Indirect Labour?
- 3) What are the objects of Time Keeping?
- 4) State whether each of the following statements is **True** or **False B** and justify your answer.
  - i) A fast worker is more profitable than a quality conscious worker
  - ii) A good system of wage payment is one which ensures maximum possible payment to workers.
  - iii) Commission to salesmen is a direct labour cost.
  - iv) Labour cost control must be such which can ensure efficiency and satisfaction.
  - v) There is no need for keeping a record of time for those who get monthly salary.

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## 6.4 TIME BOOKING

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Under time keeping methods we simply record the time spent by a worker in the factory. Such record does not show how that time was utilized by him i.e., how much time he spent on the jobs entrusted to him and for how much time he remained idle. Hence, in addition to recording his time of arrival and departure, it is also necessary to record the time he spent on each job, order or process. The system of maintaining such record is termed as 'time booking'. In other words, time booking is a method of recording time devoted by a worker on a job, order or process.

### 6.4.1 Purpose of Time Booking

The major purposes of time booking are:

- 1) To assist in ascertaining the cost of a job, order or process performed;
- 2) To check wastage of time by the worker after he enters the factory;
- 3) To assess the cost of idle time, and
- 4) To ensure that the time spent by the worker in the factory has been properly utilised.

### 6.4.2 Methods of Time Booking

The system of time booking may be maintained either manually or mechanically. In relatively bigger organisations, where a large number of labourers work, or where there is a wide variety of jobs being performed every day, Time Recording Clocks may be used to enter the time of starting and finishing each job separately on the Job Cards.

The other methods of booking the time taken on separate jobs are:

- 1) **Daily Time Sheets:** This is a record for each worker separately in respect of time spent by him on each job during the day. Daily Time Sheet (also known as time cards) include details relating to:
  - a) Name of the worker,
  - b) Work Order Number,

**Material and Labour**

- c) Description of Work,
  - d) Quantity Produced,
  - e) Time of starting and finishing the job,
  - f) Total hours consumed on the job,
  - g) Rate of Wages per hour, and
  - h) Amount of wages.
- 2) **Weekly Time Sheets:** It contains similar details of the record of time for all jobs done by the workers during a complete week.
  - 3) **Job Cards:** It is prepared for each operation to be carried out on every order. This helps in computing the exact time taken by a worker on a particular job, operation or service. A job card authorises a worker to carry out the specified assignment. It also assists in having a correct allocation of wages to jobs, operations or processes.

As a matter of fact, time card (daily time sheet) and job card are similar in nature and content. Both help in ascertaining how each worker utilised his time while he was in the factory and enable the organisation to reconcile the time spent by the worker on each job with the time paid as per the attendance record. **Another advantage of these cards is that they provide complete record as to the labour content of each job so that the computation of labour cost is greatly facilitated.** The difference between these two types of cards lies only in the form in which the analysis of worker's time is recorded. In time card the analysis of time is made with reference to each worker whereas in job card, the analysis of time is made with reference to each job. Figures 6.1 and 6.2 should help you to understand this difference.

**Figure 6.1: Daily Time Sheet**

DAVAR CO. LTD. Daily Time Sheet								
Name of worker .....				No .....				
Token No. of worker .....				Date.....				
Department.....								
Job or work order No.	Work done	Description of work done	Time		Total Hours		Cost	
			On	Off	Ordinary	Overtime	Rate	Amount
Total hours.....					Worker.....			
Total Cost .....					Foreman.....			

**Figure 6.2: Job Card**

<b>DAVAR CO. LTD.</b> <b>Job Card for each Job</b>									
Job Order No .....					Completed on .....at				
Job Description .....					Started on .....at .....				
	Token no of worker	Name of Worker	Deptt	Work done	Time		Total Time	Wage Rate	Amt.
					On	Off			
Checked and Verified			Total time for the job			Total Amount For the job			
Deptt Foremen									

## 6.5 PAYROLL ACCOUNTING

Each organisation has to maintain a system of payroll accounting for the purpose of commutating wages payable to workers. This involves (i) the calculation of gross wages and net amount payable to the employees after making all deductions, and (ii) the preparation of wages sheet (also known as payroll) according to the specified method of wage payment.

### 6.5.1 Computation of Wages

The **gross wages** payable to each worker are computed with the help of Time Sheets, Job Cards, or Piece Work Cards. Under the time wage system, the amount of gross wages is calculated by taking into account the total number of hours worked multiplied by the hourly rate of wage payment, plus overtime premium. Under the piece wage system, the amount of gross wages is calculated by taking into account the number of units produced multiplied by the rate per unit. For calculating the **net wages** payable to each worker, following deductions are usually made from the gross wages:

- i) Fines and deductions for absence from duty
- ii) Damages or loss of goods or money
- iii) House rent and cost of other amenities or services
- iv) Recovery of loans or advances
- v) Income tax
- vi) Provident fund
- vii) Welfare fund
- viii) Co-operative society dues
- ix) Life insurance premium
- x) Contribution to employees' state insurance
- xi) Deductions on the basis of court order or the directive of some other authority.

### 6.5.2 Preparation of Wages Sheet

The wages sheet (payroll) is a consolidated statement showing the gross wages, deductions and net wages payable to workers. It is prepared at periodical intervals according to the time of wage payment. Large concerns, these days make use of computers for preparing the wages sheets.

A wages sheet should generally contain the following information:

- 1) Name of the Department, 2) Period—Month/Week, 3) Worker's Number, 4) Name of the Worker, 5) Number of Hours worked, 6) Normal Hours of Duty 7) Overtime Hours, 8) Bonus Earned, 9) Rate of Payment, 10) Gross Wages plus Allowances, 11) Deductions, 12) Net Wages Payable

Normally, payrolls or wages sheets are prepared separately for each department. But they must be checked properly to minimise the possibilities of wrong payments either deliberately or inadvertently. Detection and prevention of both errors and frauds, including the checking for dummy workers in wages sheets, need attention to ensure accuracy in wage payments.

### 6.5.3 Purposes of Payroll Accounting

Payroll Accounting system helps the organisation in

- 1) Providing relevant data for cost control;
- 2) Determining the net amount of wages payable to each employee individually;
- 3) Knowing the total amount of wages payable by the organisation weekly, fortnightly or monthly for the different departments of the unit;
- 4) Minimising the possibilities of errors and frauds in wage payments; and
- 5) Issuing pay slips to every worker showing in detail the amount of gross wages and the deductions made there from for ascertaining the net amount payable for the period.

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## 6.6 IDLE TIME

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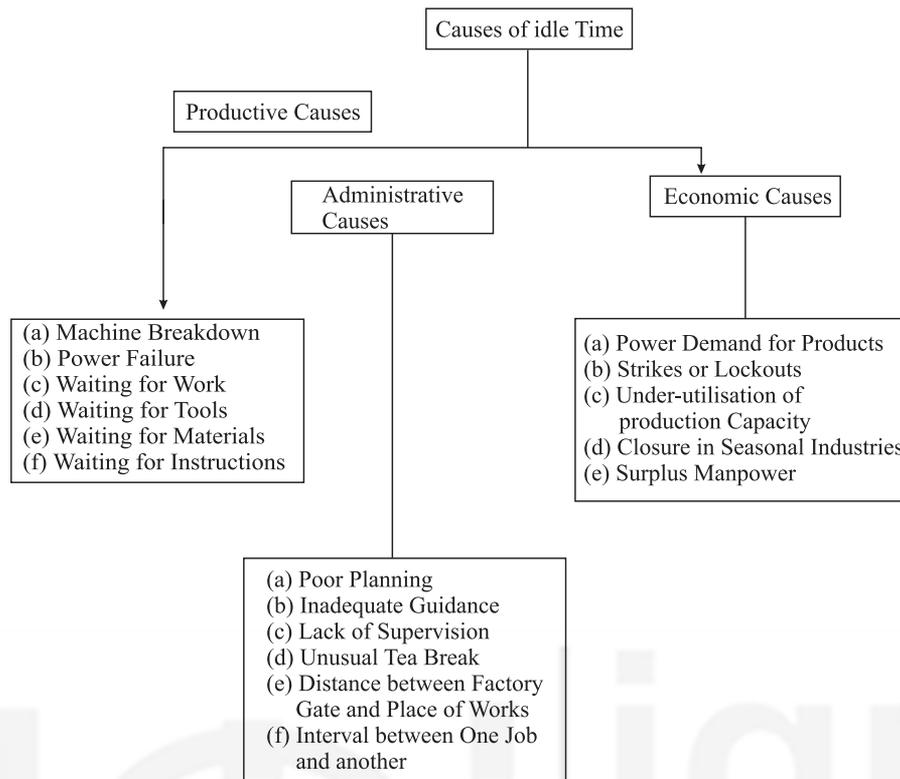
When workers are paid on the basis of time, there may be some difference between the time paid for and the time actually spent on production. This difference is known as 'idle time'. In other words, idle time is a period or duration for which workers have been paid but they have not worked towards production in the factory. This is a wastage which needs some effective control so that payment of wages without actual work may be minimised.

Idle time may be of two categories: (i) normal idle time due to unavoidable factors in the factory, and (ii) abnormal idle time caused by avoidable factors.

### 6.6.1 Causes of Idle Time

The reasons for idle time may be multiple. Some of the examples of situations which cause idle time are prescribed in figure 6.3.

Figure 6.3: Causes of Idle Time



**6.6.2 Control of Idle Time**

In order to reduce losses owing to idle time, the following measures may be adopted:

- 1) Fix responsibilities for various activities associated with production and for the control of idle time occurring at different stages in the organisation.
- 2) Introduce a preventive maintenance system for machines with periodical check-ups.
- 3) Maintain adequate stock of raw materials and a proper system of stores control to ensure continuity of production.
- 4) Use planning, give clear instructions in advance, define job participation by workers and apply proper supervision at every stage of performance.
- 5) Obtain periodical reports on idle time, identify the causes of time loss and exercise quick corrective action.

**6.6.3 Treatment of Idle Time Cost**

Cost of idle time should be treated in the following manner:

Item	Charged to
1) Cost of Normal and Controllable Idle Time	FACTORY OVERHEAD
2) Cost of Normal but Uncontrollable Idle Time	JOBS (by inflating the rates of wages)
3) Cost of Abnormal and Uncontrollable or Unavoidable Idle time	COSTING PROFIT AND LOSS ACCOUNT

**Check Your Progress B**

- 1) State the purpose of Time Booking.
- 2) What do you mean by Payroll Accounting?
- 3) Give four examples of items determining the wages payable to a worker.
- 4) Distinguish between Active Time and Idle Time.
- 5) Give five major causes of Idle Time.
- 6) State whether each of the following statements is **True** or **False** and justify your answer.
  - i) Wages Sheet containing dummy names on the payroll, but fully passed for payment, form part of labour cost.
  - ii) Idle time is a deliberate wastage of time.
  - iii) One of the techniques of minimising idle time is to keep the tools and materials ready for use.
  - iv) The difference between gross wages and net wages represents deductions.
  - v) Job Cards can be used for the purpose of time booking.

**6.7 OVERTIME**

When workers have to work beyond their normal duty hours, the additional period is treated as 'Overtime'. Overtime is an extra time over and above the scheduled hours of work or beyond the usual working hours. When workers are detained for overtime, they are normally paid at double the usual rate for extra hours.

Overtime may be considered useful under the following circumstances:

- 1) When the urgency of work demands an immediate completion of the job for the customer.
- 2) When the organisation desires to make up any shortfall in production;
- 3) When the company needs extra production to meet additional market demand or seasonal rush; or
- 4) When the number of workers is less than the requirement.

Since overtime involves an extra cost, it needs proper authorisation and control. One must ensure that the system is not put to misuse. This will expect a careful scrutiny i) the justification for overtime; and (ii) the workers who are required to be tamed for this purpose.

**Treatment of Overtime Cost:** Additional payment for overtime should be charged as follows:

Nature of Overtime	Charged to
1) Due to customers' request to complete a job within a specified period	JOB directly
2) Due to general pressure of work	GENERAL OVERHEAD
3) Due to delayed schedule	DEPARTMENT
4) Due to loss of time for unavoidable reasons	COSTING PROFIT AND LOSS ACCOUNT
5) Due to seasonal rush and peak load	PRIME COST

## 6.8 LABOUR TURNOVER

Workers often change their jobs for better prospects and better environment. In any organisation, therefore, there is a continuous flow of labour—some old ones are leaving and new ones are joining. Though it is a normal process, the frequent changes in the composition of labour affect the continuity as well as the productivity of the organisation. This, in turn, affects the labour cost. Hence, every effort is made to reduce the labour turnover, which is **defined as the rate of change in the labour force of an organisation during a particular period**. It can be measured by the following two methods:.

$$\frac{\text{Number of Workers Left}}{\text{Average Number of workers on Roll}} \quad \text{Separation Method}$$

OR

$$\frac{\text{Number of Workers Replaced}}{\text{Average Number of workers on Roll}} \quad \text{Replacement Method}$$

### 6.8.1 Causes of Labour Turnover

Factors which cause labour turnover can be grouped into two categories:

(i) avoidable causes, and (ii) unavoidable causes

Examples of **avoidable causes** of labour turnover are as follows:

- 1) Workers and jobs not matching with each other
- 2) Low wages
- 3) Bad working conditions
- 4) Poor treatment by employers
- 5) Lack of job satisfaction
- 6) Absence of planning and foresight in management
- 7) Psychological reasons like nature, behaviour, habit of change, jumping preferences, militant attitude, etc.
- 8) Poor relationship with fellow workers
- 9) Unfavourable or odd hours of work
- 10) Bad relationship with supervisors
- 11) Poor promotion policy
- 12) Inadequate protection against accidents
- 13) Discrimination between one worker and another
- 14) Lack of proper incentives
- 15) Absence of a sound recruitment and training policy
- 16) Lack of recreational and medical facilities

Among the **unavoidable causes** of labour turnover are the following:

- 1) Opportunities of better prospects
- 2) Sickness
- 3) Accident or disability

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- 4) Change of place of stay
- 5) Marriage
- 6) Death
- 7) Retirement
- 8) Problems of accommodation and transport.
- 9) Resignation
- 10) Retrenchment
- 11) Domestic problems and family responsibilities
- 12) Seasonal nature of the business
- 13) Shortage of raw materials, power supply, market demand, etc.

### 6.8.2 Effects of Labour Turnover

A high rate of labour turnover means that workers often leave and do not stay long. Old workers generally possess more experience than new workers. Replacement of workers, therefore, declines the overall efficiency. Moreover engagement of new workers needs recruitment and training which involves a cost. This gap between the old and the new labour often brings down both the and quantity of output. **Undue labour turnover, thus, involves an addition the organisation owing to:**

- 1) Cost of recruitment of substitute workers;
- 2) Cost of training new workers;
- 3) Cost of decline in production due to reduced efficiency and disturber schedule;
- 4) Loss on Account of defective work and increased wastage in production;
- 5) Breakage of tools and equipment due to mishandling by new workers; and
- 6) Wastage of materials in handling by new workers.

The overall effect of labour turnover, therefore, is a higher cost of production and lower profitability.

### 6.8.3 Control of Labour Turnover

Since labour turnover is a loss to the organisation, every effort is required to minimise its frequency. Some of the measures to minimise labour turnover are:

- 1) Institute proper machinery to attend promptly to the grievances of workers;
- 2) Create congenial working conditions in the factory;
- 3) Provide adequate welfare facilities to the workers;
- 4) Improve employees' morale;
- 5) Give opportunities for workers' participation in management;
- 6) Follow a suitable policy of promotion and transfers; and
- 7) Develop a sound system of recruitment and training.

Control of labour turnover, therefore, needs proper job satisfaction to workers so that they continue to serve the organisation instead of taking a decision to change.

**Check Your Progress C**

- 1) What is Overtime?
- 2) Why do we need to control overtime?
- 3) What do you 'mean by Labour Turnover?
- 4) Judge whether the following are GOOD or BAD as a trend in a manufacturing enterprise and justify your answer.
  - i) Rising Wages with stable output.
  - ii) High labour turnover.
  - iii) Declining market prices but without any change in labour cost.
  - iv) Workers' decision to work extra for compensating the loss due to strike.
  - v) Workers work independently without any supervision.
  - vi) Substantial bonus is declared .by the company to the workers.

**6.9 LET US SUM UP**

Labour is an important element of cost. For costing purposes, labour may be classified into direct and indirect. Direct labour cost forms part of the prime cost while indirect labour is included in overheads. Recording of time of arrival and departure of Recording the workers is termed as 'time keeping' for which various methods like attendance register, token or disc method, or clocks cards are used, Such record does not show how each worker's time was utilised. For this purpose a system of time booking is maintained with the help of time cards or job cards. Job cards help in ascertaining how each worker utilised his time while he was in the factory and also in computing the labour cost of each job or operation. Payroll accounting refers to the system of computing net wages payable to each worker and preparing the wages sheet according to the specified method of wage payment. It helps in providing relevant data for cost control and minimising the possibilities errors and frauds. Idle time refers to the time during which workers were not engaged on production and for which they have been paid. For costing purposes such time may be classified into normal idle time and abnormal idle tithe. Wages paid for normal idle time are Labour charged to jobs by inflating the hourly wage rates. But, the wages paid for abnormal idle time carried by un-controllable factors like machine break-down, power failure, strike etc. are charged to the Costing Profit and Loss Account. Overtime involves an extra cost because the workers are paid higher wages for such time. The additional payment for overtime should be charged to general overheads if it is done due to general pressure of work or to the job directly if it is done for completing a specific job within a specified period. Labour turnover refers to the rate of change in the labour force during a particular period. It may be caused by some unavoidable factors like retirement, marriage, disability, etc. or by avoidable factors like poor work environment, poor labour policies, low wages, etc. Undue labour turnover involves additional cost and low profitability and should, therefore, be avoided.

## 6.10 KEY WORDS

**Clock Card:** A card given to each worker on which his time of arrival and departure is recorded with the help of clock records.

**Direct Labour:** Labour directly engaged in the manufacture of a product or in a particular job.

**Idle Time:** Wages paid for unproductive time due to circumstances beyond the control of the workers..

**Indirect Labour:** Labour employed as supervisors, repair workmen, security men, etc.

**Job Card:** A card maintained for each Job on which the time spent by different workers on that job is recorded.

**Labour Turnover:** Rate of change in the labour force of an organisation during a particular period.

**Overtime:** Extra time spent in the factory over and above the scheduled hours of work.

**Payroll:** Wages sheet recording gross wages and net wages payable to each worker.

**Payroll Accounting:** A system of computing net wages payable to each worker.

**Standard time:** Pre-determined time allowed for completing a particular task.

**Time Booking:** Recording utilisation of worker's time on various jobs, operations etc.

**Time Card:** A card maintained for each worker on which the time spent by him on different jobs is recorded.

**Time Keeping:** Recording the time of arrival and departure of workers.

## 6.11 ANSWERS TO CHECK YOUR PROGRESS

- A) 4. i) False ii) False iii) False iv) True v) False  
 B) 6. i) False ii) False iii) True iv) True v) True  
 C) 4. i) Bad ii) Bad iii) Bad iv) Good v) Bad vi) Good

## 6.12 TERMINAL QUESTIONS

- 1) Distinguish between Direct Labour and Indirect Labour.
- 2) Bring out the salient features of Time Keeping and Time Booking.
- 3) What do you mean by idle time? How are wages paid for idle time treated in cost accounts?
- 4) 'Overtime is an evil'. Do you agree? Give reasons and explain extra wages paid for overtime treated in cost accounts.
- 5) What is Labour Turnover? State the major causes of Labour turnover.

**Note:** These questions will help you to understand the unit better. Try to write answers for them and verify with the content. But do not submit your answers to the University. These are for your practice only.

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**SOME USEFUL BOOKS**

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Arora M.N. 2003. *A Text Book of Cost Accountancy*, Vikas Publishing House Pvt. Ltd.: New Delhi. (Chapter 3-8).

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Maheshwari, S.N. and SN. Mittal, 2018. *Cost Accounting: Theory and Problems*,

Shree Mahavir Book Depot: Delhi. (Chapter 2-3).

Nigam, B.M.L. and G.L. Sharma, 2018. *Theory and Techniques of Cost Accounting*,

Himalaya Publishing House: Bombay. (Chapter 4-7).

Rajiv Goel, *Cost Accounting*, International Book House.



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## UNIT 7 ACCOUNTING FOR LABOUR

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### Structure

- 7.0 Objectives
- 7.1 Introduction
- 7.2 Methods of Wage Payment
  - 7.2.1 Time Wage System
    - 7.2.2 Piece Wage System
    - 7.2.3 Balance of Debt System
- 7.3 Incentive Plans
  - 7.3.1 Halsey Premium Plan
  - 7.3.2 Rowan Premium Plan
  - 7.3.3 Differential Piece Rate System
  - 7.3.4 Group Bonus Scheme
- 7.4 Let Us Sum Up
- 7.5 Key Words
- 7.6 Answers to Check Your Progress
- 7.7 Terminal Questions

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### 7.0 OBJECTIVES

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After studying this unit, you should be able to:

- understand time wage system; and
- understand piece wage system;
- explain balance of wage system; and
- explain various incentive plans used to reward labour efficiency.

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### 7.1 INTRODUCTION

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In the previous unit, you learnt various aspects of labour and how their wages are computed. In this unit, you will learn another important aspect of labour that is payment of wages.

There are three important methods of wage payment namely time wage system, piece wage system and balance of debt system. Besides there are some incentives plans by which the more productive labour is motivated and rewarded. Incentive plans are used to compensate the efficiency of labour for the extra efforts used in minimising the time and cost.

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### 7.2 METHODS OF WAGE PAYMENT

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One of the basic incentives to job satisfaction and labour efficiency is adequate wages.

Unless people get proper remuneration for their services, they are not encouraged to participate actively in discharging their duties or in completing the assignment effectively.

There are various methods of remunerating labour. Each method has its merits and demerits. However, a good method of wage payment should

- 1) Guarantee a minimum wage for the time devoted by the worker,
- 2) Easy to understand and simple to operate,
- 3) Balance the interests of both the employers and the employee,
- 4) Allow proper supervision and control over the quality of output,
- 5) Maintain a reasonable distinction between efficient workers and inefficient workers in terms of their wages,
- 6) Reward efficiency by additional payment for time saved or target exceeded,
- 7) Avoid disparity of pay in similar nature and level of operations, and
- 8) Incorporate flexibility to adjust with the changing circumstances of the business

It is to incorporate all such considerations that two main methods of wage payment have been developed. These are:

- 1) Time Wage System
- 2) Piece Wage System

Let us now discuss the characteristics, merits and demerits of these two systems separately.

### 7.2.1 Time Wage System

This is the most popular method of payment to workers. Under this system, wages are based on the amount of time spent by a worker inside the factory. He is paid at a specified rate per unit of time (for example, per hour, per day, per week or per month) for his services rendered to the organisation. Calculation of wages under this method of remuneration takes into account: (i) the time for which the workers are engaged on the job and, (ii) the rate per unit of time fixed for payment. For example, if a worker gets Rs. 5 per hour, he works for 8 hours per day and has been present for duties on 25 days during the month, his wage for the month on the basis of Time Rate will be:  $\text{Rs. } 5 \times 8 \times 25 = \text{Rs. } 1,000$ .

The main **advantages** of Time Rate method of wage payment are:

- 1) It offers a fixed minimum wage to the worker for a defined period of time.
- 2) It simplifies calculation of the payable amount of wages.
- 3) It makes a stable and secure return to the workers.
- 4) It encourages the workers to do their jobs with utmost quality, care and efficiency and in the best possible manner.
- 5) It promotes a sense of equality and unity among the workers.
- 6) It is an economical system to the organisation in respect of wage administration material use, plant operation and quality control.

The major **disadvantages** or limitations of Time method of wage payment are:

- 1) It ignores the individual quality and quantity of output.
- 2) It reduces personal initiative to work faster.
- 3) It treats both efficient and inefficient workers at par.
- 4) It increases the cost of labour per unit because of the tendency to consume more time in finishing a job.
- 5) It needs a close supervision to ensure continuity of operations.

### 7.2.2 Piece Wage System

When workers are paid on the basis of their output, irrespective of the time consumed in completing the work, it is termed as Piece Wage. The rate of payment under this method is related to the quantity of work done i.e. per unit of output, per article per job or per commodity. Under this system, the total units produced or manufactured by the worker during a given period form the basis of computation of his wages for the period. For example, if the rate of labour per chair is Rs.50 and the worker has completed 10 chairs during a week, his wages for the week on the basis of piece rate will be:

$$\text{Rs. } 50 \times 10 = \text{Rs. } 500$$

The major **advantages** of Piece Wages system are that it

- 1) Places greater reliance on the merit and efficiency of workers;
- 2) induces workers to be efficient, produce more and earn higher wages;
- 3) facilitates prompt computation of cost for quotations; and
- 4) maintains plant and equipment properly so as to avoid disruption in work.

The main demerits or **disadvantages** of the piece wage system of wage payment are at it:

- 1) ignores quality of products in an effort to maximise output;
- 2) kills a long-term interest and continuity of engagement in the organisation of the workers;
- 3) treats workers as unsecure and uncertain in terms of wages payable during different periods;
- 4) creates dissatisfaction among workers owing to disparity in wages;
- 5) needs a continuous supervision over the quality of operations;
- 6) enhances wastage of materials, wear and tear of machines and absenteeism of workers; and
- 7) declines the level of labour discipline.

### 7.2.3 Balance of Debt System

In order to retain the merits of both Time Wage and Piece Wage systems, as also to minimise their demerits, a balanced system of wage payment is recommended in developing units. This is known as 'Balance of Debt system' which is a compromise between the Time Wage and Piece Wage.

The two **main features** of Balance of Debt system are:

- i) **Minimum Payment:** The worker is paid on the basis of a piece rate per unit of output. In case, due to some unavoidable factors, the earnings of a worker at piece rate are less than his earnings at time rate, he is paid on time basis.
- ii) **Recoument:** The difference between the time rate and piece wage paid to the worker is treated as an extra payment to be recouped from his subsequent earnings when his piece rate wages are more than time rate wages. This grants protection to workers to earn a minimum wage on the basis of time rate even if he completes a job in longer hours due to some unavoidable reasons. The recovery of extra payment too may not be felt inconvenient by the worker when his piece wage earnings exceed the time rate wages.

Under the Balance of Debt System, therefore, a worker gets fixed wages for the time he works, plus extra payment for his performance beyond a certain prescribed limit of output.

### 7.3 INCENTIVE PLANS

You have learnt that wages are paid to labour on time rate or piece rate basis. But individual performance must also receive attention in a structure of wages so that an appreciable difference is maintained between a good worker, an average worker and a bad worker. Not only that, efficiency of labour usually saves time and cost. Hence, it would be justified that a portion of the benefit which goes to the organisation through labour efficiency is also shared by those who generate this benefit. **Incentive plans are used to compensate the efficiency of labour for his extra efforts used in minimizing the time or cost.** It may be in the form of a bonus or premium. Incentive plans are devised to compensate the worker through an additional payment over and above their guaranteed wages. The plans also aim at keeping efficient workers satisfied with their employment. The standard time and standard performance are determined in advance so as to judge individual contribution. In case there is a gain on time saved, it is distributed between the employers and workers.

The **main features** of most incentive plans are:

- 1) The standard time and standard performance are determined in advance.
- 2) Time wages are guaranteed to all workers.
- 3) Efficient workers are given incentive by way of bonus for the time saved.
- 4) Wages per hour increase but not in the same proportion as the output.
- 5) Labour cost per unit of output decreases. The employer also shares the benefit of efficiency which induces him to improve the methods and equipment.

Some of the prominent plans are discussed here in detail.

#### 7.3.1 Halsey Premium Plan

The main features of Halsey Premium Plan as a method of incentive to efficient workers are as follows:

- 1) Standard time and standard work are prescribed in advance.
- 2) Workers are paid for the actual time they take to complete the job as per the time rate.
- 3) If a worker completes the job in less than the pre-determined standard time, he is given a bonus for the time saved. This is in addition to his wages for the actual time spent on the job.
- 4) A bonus equal to 50 per cent of the wages of time saved is paid to the worker as a reward to his good work.
- 5) Workers who fail to reach the prescribed standard get the time wage

The rate of bonus under the Halsey Premium Plan may vary according to the policies of the organisation. In some cases, it may be  $\frac{1}{3}$  of the wages of time saved.

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It is a simple system to operate. It guarantees the hourly wages to workers for the actual time. But fixation of standard time is a difficult process. Workers however, feel that they do not get the full benefit for the time saved under this system.

### Method of Computation

Total Earnings of the worker = (Time Rate  $\times$  Time Taken) +

$$\frac{1}{2} \text{ Time Saved Time Rate}$$

$$\text{or, } (T \times R) + \frac{1}{2} (S - T) \times R$$

Where S = Standard Time

T = Actual Time Taken

R = Rate of Wages per Hour

Now, if the Standard Time for a Job = 8 hours

Actual Time = 6 hours

Rate per hour = Rs. 7

Then, Total Earning of the worker are

$$\begin{aligned} &= (6 \times 7) + \frac{1}{2} 2 \times 7 \\ &= \text{Rs. } 49 \end{aligned}$$

This includes times wages of Rs. 42 and Rs. 7 as bonus for time saved. It is to be noted here that the worker gets Rs. 49 for 6 hours, which comes to Rs. 8.16 per hour.

### 7.3.2 Rowan Premium Plan

Rowan Premium Plan is similar to Halsey Plan. The main features of Rowan Plan are:

- 1) Workers are paid for the actual time taken by them in completing the job on the basis of time rate.
- 2) They are paid a bonus for the time saved i.e., for the difference between the standard time and actual time.
- 3) Bonus under this method is calculated as a proportion of the time wages as time saved bears to the standard time.

### Method of Computation

Time saved

$$\text{Bonus} = T \times R \times \frac{\text{Time Saved}}{S}$$

$$\text{Total Earnings} = (T \times R) + (T \times R \times \frac{S - T}{S})$$

$$\begin{aligned} \text{In the above example, it will be} &= (6 \times 7) + (6 \times 7) \times \frac{8 - 6}{8} \\ &= \text{Rs. } 52.50 \end{aligned}$$

This includes time wages of Rs. 42 and Rs. 10.50 as bonus for time saved. Since the worker gets Rs. 52.50 for 6 hours, it amounts to Rs. 8.75 per hour.

The merits and demerits of Rowan Plan are similar to those of Halsey Plan.

An additional advantage under Rowan Plan is that the worker is not induced to rush through the work because if time saved is more than 50 per cent of the standard time, the bonus will decrease. However, the calculation of bonus is complicated.

Look at Illustration 1 and study how total wages of a worker are calculated under different plans.

**Illustration 1 :**

The standard time allowed to complete a job is 100 hours and the hourly rate of wage payment is Rs. 5. The actual time taken by the worker to complete the job is 80 hours.

Calculate the total wages of the worker on the basis of :

- i) Time Rate ii) Piece Rate iii) Halsey Plan iv) Rowan Plan

Also compare the effective earnings per hour under the above methods.

**Solution:**

**i) Time Rate**

$$\text{Total Wages} = 80 \times 5 = \text{Rs. } 400$$

**ii) Piece Wage**

$$\text{Total Wages} = 100 \times 5 = \text{Rs. } 500$$

**iii) Halsey Plan**

$$\text{Basic Wages for 80 hours at Rs. 5 per hour} = \text{Rs. } 400$$

$$\text{Bonus (of Basic Wages for Time Saved)} = 20 \times 5 \times \frac{1}{2} = \text{Rs. } 50$$

$$\text{Total Wages} = \text{Rs. } 450$$

**iv) Rowan Plan**

$$\text{Basic Wages for 80 hours @ Rs. 5 per hour} = \text{Rs. } 400$$

$$\text{Bonus for Time Saved} = \frac{20}{100} \times 80 \times 5 = \text{Rs. } 80$$

$$\text{Total Wages} = \text{Rs. } 480$$

**Commutative Earnings Per Hour**

$$\text{Time Rate} = \text{Rs. } 400 \div 80 = \text{Rs. } 5$$

$$\text{Piece Wage} = \text{Rs. } 500 \div 80 = \text{Rs. } 6.25$$

$$\text{Halsey Plan} = \text{Rs. } 450 \div 80 = \text{Rs. } 5.62$$

$$\text{Rowan Plan} = \text{Rs. } 480 \div 80 = \text{Rs. } 6$$

**7.3.3 Differential Piece Rate System**

Besides Halsey and Rowan Premium Plans, there is yet another line of thought in respect of incentive methods. This system believes in payment of wages to labour on the basis of piece rates varying with the level of efficiency of workers.

Some of the exponents of differential piece rate system are:

- i) Taylor ii) Gantt iii) Merrick

Let us now study the main features of their suggestions regarding the exact basis on which the rates of payment should be distinguished between one

worker and another.

**i) Taylor System**

The main features of this system are:

- a) It offers a higher piece rate to workers beyond a defined level of output;
- b) It distinguishes between workers through two types of piece rates: (i) a lower rate for sub-standard performance (e.g. 80% of piece rate), and (ii) a higher rate for standard and above standard performance, which is much more than time wages (e.g. 120% of piece rate)
- c) It acts as an additional incentive to expert workers towards maximisation of production; and
- d) It ignores any form of guaranteed day wages.

**Illustration 2:**

Standard Time allowed            10 units per hour

Normal Piece Rate                Rs. 5

Differential Piece Rate:

80% of Piece Rate for Output below standard

120% of Piece Rate for output at or above standard

A produces 75 units in a day of 8 hours

B produces 100 units in a day of 8 hours

Compute wages of A and B under Taylor Differential Piece Rate System.

**Solution :**

Piece Rate will be  $5 \div 10 = \text{Rs. } 0.50$  per unit

Standard Output in 8 hours is  $8 \times 10 = 80$  units

So A's performance is below standard and B's above standard

$$\text{Earnings of A} = 75 \times 0.50 \times \frac{80}{100} = \text{Rs. } 30$$

$$\text{Earnings of B} = 100 \times 0.50 \times \frac{120}{100} = \text{Rs. } 60$$

Labour Cost per unit

$$A = 30 \div 75 = 0.40 \text{ per unit}$$

$$B = 60 \div 100 = 0.60 \text{ per unit}$$

**ii) Gantt Task Bonus Plan**

This system combines the (a) Time Wage, (b) Piece Wage, and (c) Bonus Plan. It mainly follows a differential piece rate basis of remuneration with the following method of computation:

- a) Output below standard to be paid at guaranteed Time Rate
- b) Output at standard to be paid with 20 per cent of Time Rate as Bonus
- c) Output above standard to be paid at high piece rate on the entire output of the worker.

Gantt System, therefore, offers an incentive to efficient workers for increased production. It means lesser the time consumed in completing the job, higher the earnings per hour. The standard output within a specified period is pre-determined. Bonus is paid at the rate of 20% for 100% efficiency. Those workers who complete their job in the standard time are treated as 100 per cent efficient. They get wages for time taken plus bonus at a fixed percentage of wages. If a worker completes his job in less than the standard time, he gets wages for standard time plus bonus at a fixed percentage of wages earned (which is usually 20%). Slow workers, however, still get the guaranteed wage for the day.

**Illustration 3 :**

Standard Rate = Rs 5 per hour

Standard Hours for the Job = 8 hours

Bonus = 20% of Standard Time

Worker A completes the work in 10 hours

Worker B completes the work in 8 hours

Worker C completes the work in 6 hours

Compute the earnings of A, B and C under Gantt Task Bonus Plan.

**Solution:**

The comparative earnings per hour of the three workers will be computed as follows:

A: Wages for 10 hours at Rs. 5 per hour = Rs. 50

B: Wages for 8 hours at Rs. 5 per hour = Rs. 40 + 20% of 8 hours  
= 40 + 8 = Rs. 48

C: Wages for 6 hours =

Wages for 8 hours at Rs. 5 per hour = Rs. 40 + 20% of 8 hours = Rs. 48

A's earnings per hour = Rs. 5

B's earnings per hour = Rs. 6

C's earnings per hour = Rs. 8

**iii) Merrick Differential Piece Rate System**

The main features of this system are as follows:

- a) It is a multiple piece rate system.
- b) All workers under this scheme are paid only on the basis of their output.
- c) Time Rate wages are not guaranteed to the workers; they are paid on the basis of their efficiency.
- d) The rates of payment under this system are:

<b>Level of Efficiency</b>	<b>Payment</b>
Up to 83% of the standard	Normal Piece Rate
83% to 100%	110% of Normal Piece Rate

Above 100%

120% of Normal Piece Rate

**Illustration 4:**

Piece Rate—Rs 20 per unit

Standard Output—24 units per day of 8 hours

Output of A – 16 units

Output of B – 21 units

Output of C – 25 units

Compute wages for A, B and C under Merrick Differential Rate System.

**Solution:**

$$\text{A : Efficiency} = 16 \div 24 \times 100 = 67\%$$

As this level is below 83%, wages =  $16 \times 20 = \text{Rs.} 320$ 

$$\text{B : Efficiency} = 21 \div 24 \times 100 = 87\frac{1}{2}\%$$

Efficiency level is above 83% but below 100%

$$\text{Wages} = 21 \times 22 = \text{Rs.} 462$$

$$\text{C : Efficiency} = 25 \div 24 \times 100 = 104\%$$

Efficiency level is above 100%. Rate per unit will be Rs. 24

$$\text{Wages} = \text{Rs.} 600 (25 \times 24)$$

A gets Rs. 20 per unit, B Rs. 22 per unit and C Rs. 24 per unit.

**7.3.4 Group Bonus Scheme**

This system rewards a group associated with production rather than the individual workers.

The main characteristics of this system are:

- a) Bonus is paid for collective efficiency in production.
- b) Bonus is payable to a group of workers for their joint output over and above the given target.
- c) Distribution of bonus to the individual members of the group is made on some agreed basis or in specified proportions.
- d) Production is considered to be a team effort governing the efficiency of performance.
- e) It is a method of payment by results based on group productivity being shared by the workers either equally or in different specified proportions between workers of different skills.
- f) The aim is to create a team spirit for increased production and lower cost per unit through healthy competition between different groups.
- g) The system gives an opportunity also to foremen and supervisors to share the deals of efficiency in output and to take adequate initiative in this area.

**Check Your Progress A**

- 1) How can you determine wages under the time rate system?
- 2) Why do we pay labour on piece wage basis?

- 3) State the need for labour incentives through bonus and premium.
- 4) Which one of the following alternatives should be the most advantageous choice of objective in a company?
  - i) Increased production
  - ii) Minimum wages
  - iii) Effective supervision
  - iv) Extended hours of duty
  - v) Uniform rates of payment to all staff
  - vi) Fully mechanised operations
  - vii) Labour satisfaction -
  - viii) Industrial peace
  - ix) Optimum efficiency
  - x) Tight control over punctuality of workers.
- 5) State whether each of the following statements in **True** or **False** and justify your answer.
  - i) A good method of wage payment should guarantee a minimum wage to all workers.
  - ii) Time wage system motivates the worker to work faster.
  - iii) Under piece wage system, the worker maintains the plant and equipment properly.
  - iv) Balanced debt system is a compromise between time wages and piece wages systems.
  - v) Under incentive plans wages per hour increase in the same proportion as the output.
  - vi) Rowan premium plan is more complicated than the Halsey premium plan.
  - vii) Taylor differential piece rate does not ignore guaranteed day wages.
  - viii) Gantt task bonus plan combines time wage system, piece wage system and bonus plan.

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## 7.4 LET US SUM UP

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One of the basic incentives to job satisfaction and labour efficiency is adequate wages. This has two aspects – proper remuneration for the services rendered by the labour but control over the non performing labour as well. There are basically three methods of wage payment system. These methods are time wage system, piece wage system and balance of debt system.

Each method has certain merits and demerits. For example, time wage system offers a fixed minimum wage for a defined period of time, but the disadvantages is that it ignores the individual quality and quantity of output. Similarly, piece wage system has the advantage that it places greater reliance on the merit and efficiency of workers. But its disadvantage is that it ignores quality of the products in an effort to maximize output. These are other advantages and disadvantages also.

It has been realized that besides paying wages on time rate or piece rate basis, there must be some plan to differentiate between a good worker, an

average worker and a bad worker. Thus some incentive plans are used to compensate efficiency of labour for the extra efforts used in minimising the time and cost. There are three incentives plans - Halsey Premium Plan, Rowan Premium plan, and Group Bonus Scheme.

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## 7.5 KEY WORDS

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**Balance of Debt System:** A system of wage payment under which a worker is paid on the basis of piece rate subject to a minimum wage based on the time spent by him in the factory. The extra payment is recouped from his subsequent extra earnings.

**Differential Piece Rate System:** A system under which piece rate varies according to the efficiency of workers.

**Piece Wage System:** A system under which wages payable to workers are based on their output.

**Time Wage System:** A system under which wages payable to workers are based on the time spent by workers in the factory.

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## 7.6 ANSWERS TO CHECK YOUR PROGRESS

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A) 1. 4 (ix)

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## 7.7 TERMINAL QUESTIONS

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- 1) Name the various methods of remunerating labour and explain any one of them in detail.
- 2) What are the different methods of incentives? Discuss any one of the systems of bonus or premium which you consider as effective.
- 3) Comment on the relative utility of:
  - a) Halsey premium Plan
  - b) Rowan Premium Plan
  - c) Differential Piece Rate System
  - d) Group Bonus Scheme.
- 4) Compare merits and demerits of Time Wage System and Piece Wage system.
- 5) How balance of debt system retains merits of time wage and piece wage systems and minimizes their de-merits.

### Exercise

- 6) Guaranteed wage of a skilled workers for 44 hours per week is Rs. 150 per hour. The Standard time to produce one item is 30 minutes. Under incentive scheme the time allowed is increased by 20%. During one week, the worker manufactured 100 items. Calculate his wage under (i) Time wage, (ii) Piece wage, with a guaranteed weekly rate of wage (iii) Rowan Plan, and (iv) Halsey Plan.  
(Answer: (i) Rs. 6,600; (ii) Rs. 9,000 (iii) Rs. 8,359.56 (iv) Rs. 7,800
- 7) Calculate the earnings of a worker from the data given below:  
(i) Time wage (ii) Piece Wage (iii) Halsey Method (iv) Rowan  
Standard time for completion of job is 30 hrs. Time taken is 20 hours.

Hourly rate is Rs. 100 and Dearness allowance @ Rs. 50 per hour worked.

(i) Rs. 3,000 (ii) Rs. 4,000 (iii) Rs. 3,500 (iv) Rs. 3,667

- 8) From the following information, Calculate the earnings of A and B workers under (i) Strait Piece Rate and (ii) Differential Piece Rate Systems.

Normal rate per hour Rs. 100, standard time per unit – 30 seconds.  
Worker A and B produced 800 units and 1,000 units respectively per day of 8 hours.

	Worker A	Worker B
1.	Rs. 664	Rs. 830
2.	Rs.528	Rs. 990

- 9) Calculate the earnings of workers A, B and C under Strait Piece Rate and Merrick's Differential Piece Rate Systems.

Normal Rate per hour Rs. 75

Standard time per unit 1minute

Workers output per day of 8 working hours as follows:

A= 390 units, B = 450 units and C = 600 units

(Answer: Strait Piece Rate : a) Rs. 487.50 b) Rs. 562.50 c) Rs. 750

Merrick Piece Rate : a) Rs. 487.50 b) Rs. 616.50 c) Rs. 900

- 10) In a day of 8 working hours, the output of X, Y and Z workers is 75 units, 80 units and 85 units respectively. Guaranteed time rate is Rs. 150 per hour. Standard output is 10 units per hour. High piece rate is fixed at Rs. 20. You are required to calculate the earnings of X, Y and Z workers under Gantt Task Bonus Plan.

X) Rs. 1,200 Y) Rs. 1,440 Z) Rs. 1,700

**Note:** These questions will help you to understand the unit better. Try to write answers for them and verify with the content. But do not submit your answers to the University. These are for your practice only.

### SOME USEFUL BOOKS

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